OVERCOMING INEQUALITIES IN SCHOOLS AND LEARNING COMMUNITIES: INNOVATIVE EDUCATION FOR A NEW CENTURY

EDITED BY: Rocio Garcia-Carrion, Roseli Rodrigues De Mello and Arnetha F. Ball

PUBLISHED IN: Frontiers in Education and Frontiers in Psychology

frontiers Research Topics

frontiers

ISSN 1664-8714
ISBN 978-2-88963-606-8
DOI 10.3389/978-2-88963-606-8

About Frontiers

Frontiers is more than just an open-access publisher of scholarly articles: it is a pioneering approach to the world of academia, radically improving the way scholarly research is managed. The grand vision of Frontiers is a world where all people have an equal opportunity to seek, share and generate knowledge. Frontiers provides immediate and permanent online open access to all its publications, but this alone is not enough to realize our grand goals.

Frontiers Journal Series

The Frontiers Journal Series is a multi-tier and interdisciplinary set of open-access, online journals, promising a paradigm shift from the current review, selection and dissemination processes in academic publishing. All Frontiers journals are driven by researchers for researchers; therefore, they constitute a service to the scholarly community. At the same time, the Frontiers Journal Series operates on a revolutionary invention, the tiered publishing system, initially addressing specific communities of scholars, and gradually climbing up to broader public understanding, thus serving the interests of the lay society, too.

Dedication to Quality

Each Frontiers article is a landmark of the highest quality, thanks to genuinely collaborative interactions between authors and review editors, who include some of the world's best academicians. Research must be certified by peers before entering a stream of knowledge that may eventually reach the public - and shape society; therefore, Frontiers only applies the most rigorous and unbiased reviews.
Frontiers revolutionizes research publishing by freely delivering the most outstanding research, evaluated with no bias from both the academic and social point of view. By applying the most advanced information technologies, Frontiers is catapulting scholarly publishing into a new generation.

What are Frontiers Research Topics?

Frontiers Research Topics are very popular trademarks of the Frontiers Journals Series: they are collections of at least ten articles, all centered on a particular subject. With their unique mix of varied contributions from Original Research to Review Articles, Frontiers Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area! Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers Editorial Office: researchtopics@frontiersin.org

OVERCOMING INEQUALITIES IN SCHOOLS AND LEARNING COMMUNITIES: INNOVATIVE EDUCATION FOR A NEW CENTURY

Topic Editors:
Rocio Garcia-Carrion, Universidad de Deusto, Spain
Roseli Rodrigues De Mello, Federal University of São Carlos, Brazil
Arnetha F. Ball, Stanford University, United States

Educational inequalities have strongly impacted disadvantaged and underserved populations such us indigenous, Roma, migrant children, students with disabilities, and those affected by poverty. A wide array of research has contributed to explaining the mechanisms and effects of inequalities in the achievement patterns, dropout rates, disengagement in the school experiences of children and youth traditionally excluded. Research also suggests the negative consequences for child development – including cognitive, language, and social–emotional functioning – of poverty and lack of quality education in the early years. Consequently, the current unequal access to optimal learning environments for every single child to succeed in education and to have a better life perpetuates the exclusion and neglects the right to education for those minorities. This Research Topic aims at moving beyond causes and shed light upon effective solutions by providing successful pathways for integration and inclusion of the learners most heavily affected.

Scholars worldwide are looking for successful actions with children, youth, and communities of learners historically underserved to overcome educational and social exclusion. These transformative approaches go beyond the deficit thinking and are grounded in theories, empirical evidence, and multidisciplinary interventions oriented towards achieving social impact, which refers to the extent to which those actions have contributed to improve a societal challenge. The international network of "Schools as Learning Communities" is advancing knowledge on deepening and expanding the impact of what has been defined as Successful Educational Actions (SEAs); that is, those interventions that improve students' achievement and social cohesion and inclusion in many diverse contexts, regardless the socioeconomic, national, and cultural environment of schools.

Drawing on the evidence generated by this network of researchers to address the global challenge of inequality by studying educational actions oriented towards achieving social impact and potentially transferrable to other contexts, this Research Topic aims at deepening on this approach. In short, our purpose is that the contributions included in this Research Topic contribute to reduce educational and social inequalities and especially benefit those populations most in need.

Citation: Garcia-Carrion, R., De Mello, R. R., Ball, A. F., eds. (2020). Overcoming Inequalities in Schools and Learning Communities: Innovative Education for a New Century. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-606-8

Table of Contents

frontiers in Psychology

ORIGINAL RESEARCH
published: 06 September 2018
doi: 10.3389/fpsyg.2018.01621

Challenges and Solutions Perceived by Educators in an Early Childcare Program for Refugee Children

Julian Busch, Lilly-Marlen Bihler, Hanna Lembcke, Thimo Buchmüller, Katerina Diers and Birgit Leyendecker*

Department of Developmental Psychology, Faculty of Psychology, Ruhr University Bochum, Bochum, Germany

Immigration to Germany peaked in 2016. More than 105,000 refugees below the age of 7 years arrived within 12 months. Since then, Germany and other host nations have been in need of strategies to cover the emerging demand for childcare services. The German federal state North-Rhine Westphalia has funded a specialized early childhood education and care (ECEC) program for recently arrived refugees. The present study investigated challenges and possible solutions in this specialized ECEC. In a pilot study, inductive content analysis of n_1 = 28 semi-structured interviews with early childhood educators revealed 19 distinct challenges and four generic categories for solutions (provide clear and predictable structures, involve and support parents, ensure adequate structural features of the childcare group, convey trust and feelings of competence). For the main study, identified challenges were transcribed into items for a closed-format questionnaire, which was distributed to a second sample of educators (n_2 = 96). Challenges perceived as most difficult concerned language barriers and communication with parents. An exploratory factor analysis of the challenges questionnaire yielded four underlying domains (interpersonal stress, feasibility and attendance, cultural and communication barriers, structural features of a childcare group). Our study provides a first basis to adapt childcare settings for refugees, and to guide staff training for this special group. We discuss evidence in regard to understanding how ECEC programs can successfully promote refugee children's psychosocial adaptation and educational outcomes.

Keywords: early childhood education, childcare, refugee, challenges, preschool

OPEN ACCESS

Edited by:
Rocio Garcia-Carrion, IKERBASQUE Basque Foundation for Science, Spain

Reviewed by:
Sherri Horner, Bowling Green State University, United States
Sharinaz Hassan, Curtin University, Australia
Jesús Paz-Albo, Universidad Rey Juan Carlos, Spain

****Correspondence:***
Julian Busch
julian.busch@rub.de

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Psychology

Received: *26 March 2018*
Accepted: *13 August 2018*
Published: *06 September 2018*

Citation:
Busch J, Bihler LM, Lembcke H, Buchmüller T, Diers K and Leyendecker B (2018) Challenges and Solutions Perceived by Educators in an Early Childcare Program for Refugee Children. Front. Psychol. 9:1621. doi: 10.3389/fpsyg.2018.01621

INTRODUCTION

When immigration peaked in 2016, Germany received more than 105,000 applications for asylum from children below the age of 7 years within a 12 months period. Two-thirds originated from Syria, Afghanistan, or Iraq (German Federal Agency for Migration and Refugees, 2016). Refugee children often have disrupted educational biographies. In early childhood, precarious environments potentially jeopardize children's successful transition into early childcare programs (Sirin and Rogers-Sirin, 2015). Recent immigration, therefore, poses a challenge for policy makers, early childhood educators, and caregivers in Germany. The enrollment rates of recently arrived refugee children in ECEC programs are currently lower compared to those of non-refugee children (Gross and Ntagengwa, 2016; Gambaro et al., 2017). However, the number of arrived

children exceeds the current number of available places in German early childhood education and care (ECEC) programs. North-Rhine Westphalia, the largest of all German federal states, hosts more than one quarter of all refugees. Its Federal Ministry for Children, Women, Refugees and Integration responded to this new demand for childcare places by establishing "Bridging Projects" for recently arrived refugee children. The aims of these provisional childcare groups are to compensate for the lack of regular childcare places and to facilitate their subsequent transition into regular ECEC programs. There are some legal restrictions to receive funding for a Bridging Project. At least one educator needs a childcare-related qualification, and the educator-child ratio should be 1:5 or better. Setting, equipment, and schedule of these childcare groups may vary, depending on the context. More than 1,100 diverse childcare groups have been established since May 2015.

Several studies have shown that the degree of social support, community integration, and reinstatement in ECEC programs are associated with psychosocial adjustment and developmental outcomes of refugee children (Sirin and Rogers-Sirin, 2015). ECEC program attendance has also been associated with higher academic performance, better health, and higher rates of later employment in the general population (Schweinhart, 1993), as well as in immigrant, and disadvantaged, populations (Han, 2008; Votruba-Drzal et al., 2015). Despite this evidence, research on how to integrate recently arrived refugee children into ECEC programs is still scarce. When adapting childcare, it is essential that policy makers and educators know about the challenges arising from the transition of refugee children into ECEC programs, and effective solutions. However, educators expressed concern about lacking cultural competence, and reported discomfort when policies conflicted with families' cultural norms and practices (Hurley et al., 2011). A multi-center study on refugees in social services in the south of the United States showed that refugee families were more likely to choose informal childcare options (Farrell et al., 2008). Reasons for their usage preferences were easier access, accordance with their cultural values, and opportunities for home-language support.

Some studies investigated challenging topics in childcare with refugee children. Hurley et al. (2013) interviewed 25 preschool service providers in New England. The identified themes concerned current life circumstances of refugees (social isolation and resettlement stress), cultural dissonances between educators and families (expectations toward childcare and child rearing practices), and the required competencies of children for early childcare (language and self-regulation). Another interview study with 26 diverse refugee families and educators in the state of New York found the language barrier to be a distinct demand (Szente et al., 2006). Other identified challenges in this study were related to structural features, and to feasibility of ECEC with refugee children. For a German childcare group with refugees from the Roma community, Hahn (2011) found challenges concerning adequate equipment, continuous funding, and trained personal. In recent field visits of Bridging Projects our research team moreover learned about infrequent attendance and fluctuation of refugee children due to deportation as further obstacles in the stable integration of them into early childcare (Busch et al., unpublished).

There is less evidence about solutions for the specific challenges in childcare with refugee children. Some studies focus on how educators can support refugee children as they cope with emotional problems and psychosocial adjustment. Findings from an ethnographic case study in an early childcare group with refugee children in Norway (Kalkman and Clark, 2017) suggested beneficial effects of role-play activities. They argued that role-play facilitates the reprocessing of past events and fosters the ability to recognize social activities, cultural identity, and local traditions. Consistent to this approach, researchers in Canada examined the "sand-play program" for emotional problems of 4- to 5-year-old refugee and immigrant children in childcare groups in a randomized and controlled effectiveness study. The researchers concluded that children expressed and processed their emotions through play behavior as they made references to past experiences (Lacroix et al., 2007). Repeated assessments by parents and educators showed that the sand-play program reduced psychological stress (Rousseau et al., 2009).

Further studies focused on effective pathways to integrate refugee families into childcare, and to adapt services correspondingly. In his report, Waniganayake (2001) recommended strategies for successfully working with refugees in childcare, such as providing children with opportunities for expression, setting clear boundaries, teaching alternative conflict resolution strategies, or visiting refugee families at home. In the interview study by Hurley et al. (2013), educators in childcare with refugees suggested considering community food preparation to bond with the parents, providing routines to make children feel more comfortable, and using pictures and symbols to express emotions. Poureslami et al. (2013) utilized focus groups with childcare providers, educators, and immigrant parents to identify five domains to promote the transition of refugee children into childcare. These domains were a centralized system (linking existing programs and sharing expertise on different cultural communities), support of childcare staff (dealing with cultural diversity and strategies to introduce new participants), effective announcement of services (in schools, communities, and media), educational materials (information for parents), and program structure (flexible operating hours, transport, and parental involvement).

It is still unclear, which theoretical approach geared at educators in ECEC programs can guide research and inform us about challenges and solutions with recently arrived refugee children. In order to systematically structure challenges and solutions in ECEC programs with refugee children, Hurley et al. (2013) discussed the pyramid model (Fox et al., 2003). This three-tiered model aims to foster positive socio-emotional and behavioral developmental outcomes. The first tier, "universal promotions," provides nurturing environments and stimulation to every child in a childcare group in order to foster their development and acquisition of competencies. The second tier focuses on the special needs of certain groups of children, i.e., refugee children. Secondary prevention and intervention strategies are employed which address needs related to the educational gap, resettlement, and culture of refugee children,

and may directly foster the required competencies (e.g., language and self-regulation) and psychosocial adjustment. The third tier contains tertiary interventions that are often administered by a multi-professional team according to an individual, intensive support plan. In the case of childcare for recently arrived refugees, third tier intervention may encompass professional trauma therapy, as well as practical and holistic support to overcome obstacles during resettlement.

To date, educators can rely on few research-based experiences in childcare with refugee children (Tadesse et al., 2009). However, they are confronted with several specific challenges in the transition of refugee children into ECEC programs. Scientific evidence on this topic is limited from a geographical, methodological, and conceptual perspective. Geographically, available studies were predominantly conducted in countries with extensive resettlement programs and under specific policies (e.g., Canada, United States, and Australia), whereas research from European countries is very scarce. Methodologically, evidence in this research field builds less on analytic studies, and mainly on small sample sizes (i.e., case reports and case series), and expert opinions. From a conceptual perspective, few findings on childcare with refugee children were organized according to a theoretical model. Research on ECEC programs with refugee children needs to overcome these limitations in order to obtain valid and generalizable findings. The aim of the present study was to investigate challenges and solutions in the Bridging Projects, as perceived by the educators. This research was divided into a pilot study and a main study. The pilot study investigated challenges and possible solutions using a qualitative approach. For the main study, a closed-ended questionnaire was created based on data from the pilot study. The questionnaire was used to assess the severity of certain challenges and to systemize them by applying factor analysis. Findings from both study parts will be integrated in the general discussion.

PILOT STUDY

Methods

Participants

Our research team visited a total number of 50 Bridging Projects for field observations. One educator, from each respective 28 Bridging Project, participated in the pilot study during or subsequent to the visit. These educators on average were 42 years old (SD_{age} = 11.24 years). All but two were female. On average, the 28 Bridging Projects were attended by 9 refugee children ($SD_{\text{number of children}}$ = 4.50, $\text{range}_{\text{number of children}}$ = 1–15).

Material

We provided a paper-pencil survey to educators in Bridging Projects. They answered two open format questions in writing: (1) "What are specific challenges in the work with refugee children?" and (2) "What are proven or possible solutions concerning these challenges?" Additionally, educators reported socio-demographic information about themselves.

Data Analysis

Four research assistants, two with a master's and two with a bachelor's degree in psychology, established a focus group. Based on the procedure described by Elo and Kyngäs (2008), the focus group conducted inductive content analysis. Generic categories were individually generated through open

TABLE 1 | Description of generic categories for perceived challenges.

Generic category	Description
Communication	- Language barriers. - Dealing with hot topics (e.g., wearing a head scarf). - Establishing cohesion in a linguistically diverse group. - Parents need more time to understand routines.
Child behavior	- Behavior problems (e.g., anxiety, withdrawal, restlessness, emotional outbursts). - Children re-enact war-scenes. - Tardiness. - Reliability and infrequent attendance of refugees.
Interpersonal conflicts	- Caregivers' expectations toward childcare. - Conflicts between children (e.g., teasing); children and educators (e.g., children break the rules frequently, children have difficulties regulating closeness-distance); educators and parents (e.g., the parents do not intervene at misbehavior of own children); participating parents (e.g., between nationalities).
Flight-related experiences	- Sensitive topics strain educators emotionally (e.g., asylum, deportation, war-experience, separation of families). - Educators lack knowledge about the experiences and biographies of refugees. - Educators struggle empathizing with refugees.
Structural features of a childcare Group	- Accessibility of childcare groups (e.g., connection to public transport). - Insufficient educator-child ratio. - Group fluctuation. - Insufficient equipment (e.g., too many donated toys). - Insufficient settings for childcare. - Age differences between attending children.
Intercultural understanding	- Differences in parenting, culture, traditions. - Social relations between actors in childcare (e.g., role of educators).

Generic categories and descriptions for solutions derived from inductive content analysis ($n_{educators}$ = 28).

TABLE 2 | Description of generic categories for solution approaches.

Generic category	Description
Provide clear and predictable structures	- Starting every day with a morning circle. - Communicate and enforce rules in a comprehensible way.
Involve and support parents	- Establishing new rules in consultation with parents. - Provide support, even for other areas of life.
Ensure adequate structural features of the childcare group	- Improve educator-child ratio (allowing one-on-one care, if necessary). - Provide appropriate material (e.g., games to learn self regulation, language). - Provide material that is easy to understand.
Convey trust and feelings of competence	- Make children feel welcome. - Be kind, reliable, and trustworthy. - Recognize children's talents. - Give children enough time for integration.

Generic categories and descriptions for solutions derived from inductive content analysis ($n_{educators}$ = 18).

coding of raw responses, and repeatedly discussed. To check reliability of obtained categorization, two research assistants independently assigned the open responses of educators to the generic categories for perceived challenges and solutions, respectively.

Results

We analyzed responses of all $n_1 = 28$ educators for the perceived challenges in childcare settings for refugees, and $n_2 = 18$ responses for possible solutions. A *post hoc* reliability check revealed an overall moderate interrater reliability (challenges: *Kappa* = 0.52, $p < 0.001$; solutions: *Kappa* = 0.59, $p < 0.001$; Landis and Koch, 1977). Perceived challenges were arranged into six generic categories by the focus group (see **Table 1**). Educators mentioned organizational (e.g., accessibility), interpersonal (e.g., communication, behavior, and conflict), and cultural topics (e.g., parenting and roles) as challenges. Considering potential solutions, the focus group identified four generic categories in inductive content analysis, which are shown in **Table 2**. Mentioned solutions concerned different qualities of childcare, i.e., process quality (e.g., convey trust and competence), structural quality (sufficient material), and childcare group conception (session structuring and parental involvement).

Discussion

Educators report different topics as challenging in the Bridging Projects. Obtained information was aggregated into six generic categories by a focus group according to similarities in educators' responses. We added new evidence to this understudied field of research by informing about challenges in childcare settings for refugee children. However, there are shortcomings in the approach of relying on openly reported experiences of educators. We only received responses from 28 Bridging Projects, which seems insufficient to conclude generalizability of the challenges. We moreover do neither know about the significance of each of those challenges nor the validity of the generic categories.

Secondly, our pilot study identified potential solutions to the perceived challenges. Only 18 educators responded to this open-format question. Several educators in the Bridging Projects might have limited experiences with refugee families yet and therefore omitted this question. If this conclusion based on educators' response behavior is valid, it hints to a strong need for new strategies in childcare settings for refugees. Nevertheless, obtained answers reveal first insights into current childcare practices with refugees in specialized ECEC programs from an educator's perspective. Findings on potential solutions are preliminary and need further empirical evidence. Linking those preliminary findings on solutions with empirically validated findings on challenges in a theoretical framework could increase applicability of our evidence for childcare practice.

MAIN STUDY

Methods

Participants

For the main study, we randomly contacted a second sample of Bridging Projects via email and telephone. One educator per Bridging Project was asked to complete an online questionnaire about the perceived challenges. Overall, 96 educators (M_{age} = 43.48 years, SD_{age} = 11.83 years; 91% female) participated in the survey. On average, 10 children ($SD_{number\ of\ children}$ = 8.58, $range_{number\ of\ children}$ = 2–60) attended each of these Bridging Projects on a regular basis.

Instruments

The aforementioned focus group created items for the closed-ended questionnaire. In a first step, the group members generated items on potential challenges via open coding of the responses received by educators in the pilot study. Each member was asked to directly segment and code the educators' open responses. Creating items directly from the pure data (instead of the content-analysis from pilot study) limited circularity when comparing qualitative and quantitative results of both study parts. In a second step, the focus group selected a set of 19 items during group conversation. The rationale for the selection of items was to ensure that the scope of educators' open responses

TABLE 3 | Factor loadings for EFA with oblimin rotation using all items of the challenges questionnaire.

Item	Factor 1	Factor 2	Factor 3	Factor 4
	Interpersonal stress	**Feasibility and attendance**	**Cultural and communication barriers**	**Structural features of a childcare group**
Conflicts between parents	**0.72**	0.19	−0.09	−0.08
Conflicts between children	**0.68**	−0.26	−0.02	0.19
Conflicts between educators and parents	**0.63**	0.01	0.08	−0.04
Behavior problems of children	**0.51**	−0.08	0.11	0.12
Educators' emotional stress due to living conditions and flight related experiences of children	**0.47**	0.23	−0.03	0.08
High fluctuation complicates ability to plan	−0.10	**0.80**	−0.08	0.13
Children take part irregularly	0.17	**0.66**	0.09	−0.13
Decreasing number of participants throughout the project	0.01	**0.58**	0.02	0.16
Tardy arrival *(reversed)*	**−0.35**	**−0.40**	−0.04	−0.08
Long-term feasibility of the childcare group	0.11	**0.30**	0.13	−0.07
Linguistic barriers between educators and parents	−0.17	−0.09	**0.80**	0.06
Communication with parents	0.07	0.14	**0.66**	−0.07
Cross-cultural communication barriers	**0.34**	−0.05	**0.53**	−0.02
Parents' expectations	0.04	−0.03	**0.46**	0.10
Communication barriers between children	0.23	0.23	**0.39**	0.07
Different ages of children	−0.05	0.15	0.12	**0.65**
Educator-child ratio	0.15	0.06	−0.08	**0.54**
Material resources	0.02	−0.08	0.04	**0.48**
Accessible by public transportation	0.26	0.07	−0.05	**0.40**
Eigenvalue (variance explained)	2.48 (13%)	2.03 (11%)	1.83 (10%)	1.37 (7%)

Questionnaire about the challenges in Bridging Projects; factor loadings ≥0.30 are in boldface; items "cross-cultural communication barriers," Tardy Arrival revealed cross-loadings with the first factor; EFA, Exploratory factor analysis.

would be covered. Responses to the questionnaire were given on a five-point Likert scale, which was presented with three anchors (1 = not challenging at all, 3 = somewhat challenging, 5 = very challenging).

Data Analysis

We calculated the mean and standard deviation for each item of the questionnaire. The descriptive analysis allows the ranking of distinct challenges across all Bridging Projects. We conducted an exploratory factor analysis with principal axis factoring (EFA; Costello and Osborne, 2005) on the questionnaire in order to validate and extend findings from inductive content analysis. Conceptually, EFA and inductive content analysis both exploratively aggregate data to find domains of higher order. However, a larger sample size for EFA fosters generalizability. The statistical approach of EFA, moreover, is less dependent on the subjectivity of a few coders. EFA goes beyond a content-directed structuring, which exclusively guides inductive content analysis.

For the rotation of the factors in EFA, we used the oblique rotation method oblimin. This non-orthogonal approach has fewer model-restrictions. It is therefore best suited to delineate first evidence in a field. In preliminary analyses, we scanned the correlation matrix for variables that did not correlate, or correlated very highly (>0.90) with any other variable. The overall and variable specific Measures of Sampling Adequacy (MSA) were additionally calculated. $MSA \geq 0.50$ indicates that the sample size is sufficient to yield distinct and reliable factors in an EFA (Kaiser, 1974). After preliminary analyses, we assessed a reasonable number of factors using Kaiser's criterion (eigenvalue >1), scree plot examination, and parallel analysis. Overall model fit was examined by the model chi-squared test on an alpha-level of 0.05. Additionally, we considered the root mean square error of approximation (RMSEA), and the Tucker-Lewis index (TLI) for model fit. Good fit was defined by a $RMSEA \leq 0.06$ and a $TLI \geq 0.95$ (Hu and Bentler, 1999). Factor loadings ≥0.30 were considered as substantial. The focus group interpreted the factors of challenges from EFA according to the grouping of the items on the latent factors. All statistical analyses were performed in R 3.4.1 using default packages and the "psych" package for EFA.

Results

Hierarchy of Perceived Challenges

The ranking of the challenges according to their ratings is shown in **Table 3**. Educators perceived the language barrier and communication with parents as most challenging. Although

TABLE 4 | Hierarchy of challenges in early childcare groups with refugees according to the questionnaire.

Rank	Item	*M*	*Md*	*SD*	*n*	MSA
1	Linguistic barriers between educators and parents	3.96	4	1.02	95	0.51
2	Communication with parents	3.88	4	1.12	93	0.54
3	Long-term feasibility of the childcare group	3.44	3	1.24	93	0.54
4	Tardy arrival *(reversed)*	3.27	3	1.34	92	0.80
5	Behavior problems of children	3.21	3	1.04	94	0.66
6	Children take part irregularly	3.02	3	1.18	94	0.66
7	High fluctuation complicates ability to plan	2.79	3	1.32	95	0.59
8	Different ages of children	2.75	3	1.32	92	0.64
9	Cross-cultural communication barriers	2.69	3	1.05	94	0.74
10	Educators' emotional stress due to living conditions, and flight related experiences of children	2.55	2.5	1.20	94	0.67
11	Decreasing number of participants throughout the project	2.48	2	1.23	92	0.71
12	Communication barriers between children	2.41	2	0.94	94	0.72
13	Educator-child ratio	2.38	2	1.23	93	0.64
14	Conflicts between children	2.35	2	1.11	93	0.75
15	Parents' expectations	2.34	2	1.17	93	0.80
16	Material resources	2.08	2	1.07	92	0.39
17	Accessible by public transportation	1.96	2	1.18	89	0.70
18	Conflicts between parents	1.62	1	0.97	93	0.80
19	Conflicts between educators and parents	1.56	1	0.87	94	0.71

Challenges of the generated questionnaire are displayed and ranked according to their arithmetic mean. Each challenge was rated on a Likert-scale ranging from 1 (not challenging at all) to 5 (very challenging). M, arithmetic mean; Md, median; SD, standard deviation; n, number of educators answering the respective question; MSA, measurement of sampling adequacy.

mentioned, conflicts and accessibility of a childcare group were perceived as the least severe challenges.

Pre-analysis of EFA

Inspection of the correlation matrix yielded that all variables did correlate with at least one other variable, with no correlation being greater than $r = 0.90$. The overall MSA of 0.67 was satisfactory. The calculation of the variable-specific MSAs indicated that all items reached the critical score of $MSA \geq 0.50$ (**Table 3**), with an exception for the item "material resources" ($MSA = 0.39$). This indicates that partial correlations of this certain item are low. We decided not to exclude the item in order to not drop reported challenges in the explorative statistical analyses. Scree plot, and parallel analysis indicated that four factors should be retained. **Table 4** shows the obtained factor loadings on each factor. Cross-loadings above the defined threshold emerged for the items "tardy arrival" and "cross-cultural communication barriers." Considering the overall model fit for the four-factor solution, the chi-squared test was marginally significant [$\chi^2_{(101)} = 126.06$, $p = 0.046$], the $RMSEA = 0.064$ [0.007, 0.078], and the $TLI = 0.88$. Although the defined criteria for good model fit were not fully met, model parameters indicate that explorative analysis may have led to solid results.

Domains of EFA

According to the statistical grouping of items, the focus group interpreted and labeled the revealed factors as the following domains of challenges (given in descending order regarding their eigenvalue): Interpersonal Stress (i.e., conflict and behavior problems), Feasibility and Attendance" (i.e., family's reliability and maintenance of the project), Cultural and Communication Barriers (i.e., exchanging information and dissonance on childcare goals), and Structural Features of a Project" (i.e., ensure functional project and group characteristics). Intercorrelations between factors are displayed in **Table 5**.

Discussion

The findings of the main study validate and extend the results from the pilot study. Item ranks inform about what educators perceive as most challenging in childcare settings with refugee children. Those results can guide stakeholders and staff to anticipate and react to potential difficulties during planning and conducting ECEC services with refugee children. Using a statistical approach, EFA systematically validated and systemized findings from the inductive content analysis based on a larger sample. EFA explored which challenges tended to coincide among Bridging Projects irrespective of content relations. Pre-analysis for EFA suggested that the item "material resources" is problematic in this approach. This

TABLE 5 | Intercorrelations among factors from EFA.

Factor	1	2	3
1. Interpersonal stress	–		
2. Feasibility and attendance	0.20	–	
3. Cultural and communication barriers	0.11	−0.01	–
4. Structural features of a childcare group	0.18	0.19	0.14

Pearson's product-moment intercorrelations between factors of oblique exploratory factor analysis are presented.

may due to technical reasons, e.g., a relatively small sample size, an item to subject ratio around 1:5, or vague wording. Alternatively, the item may not demonstrate additional value and should thus be excluded in further conclusive analyses, e.g., scale construction. We kept this item in our explorative investigation, because material resources seemed to be an important issue in improvised Bridging Projects (Busch et al., unpublished).

A comparison of EFA with inductive content analysis generally substantiated validity of the preliminary findings from the pilot study. The generic categories Child Behavior, Interpersonal Conflicts, and Flight-related Experiences from inductive content analysis were subsumed under the latent factor Interpersonal Stress. Generic categories Communication and Intercultural Understanding were reflected in the latent factor Cultural and Communication Barriers. The generic category Structural Features of a Childcare Group remained unchanged. A new latent factor, Feasibility, and Attendance, emerged from the EFA of the main study. This factor was not previously identified in the inductive content analysis of the pilot study. Changes of the factor structure and labeling in EFA seemed to better fit the educators' perspective. These results are, therefore, potentially better suited to guide effective prevention and intervention strategies.

GENERAL DISCUSSION

Young refugee children are likely to stay in host countries, at least for some years, due to on-going crises in several countries. Thus, the host countries require evidence-based strategies for the transition of arriving children into childcare services. Our study adds systematic evidence to this field by identifying specific challenges that educators perceived in specialized ECEC programs for refugee children. In the pilot study, educators freely reported on challenges and solutions in childcare settings for refugee children. We grouped those challenges and solutions into six and four generic categories, respectively. In the main study, educators ranked distinct challenges, which were derived from the pilot study. We then aggregated the distinct challenges into four higher-order domains. The general discussion of our findings is organized according to those domains. Findings on the solutions are subsequently discussed with respect to the pyramid model.

Challenge: Interpersonal Stress

Our evidence suggests that educators experience conflict with refugee children, as well as their parents, and is directly confronted with the psychosocial needs of refugee families. Consequently, some educators struggled to cope with the fate of refugee families who expected deportation, experienced recent bereavement, or other psychosocial hardships. Our evidence corresponds to findings on mental health of refugee children. Refugee children in preschool age are at risk for increased levels of anxiety, withdrawal, anger, and emotional outbursts (Bronstein and Montgomery, 2011; Buchmüller et al., 2018). Moreover, refugee children may become confused if rules and childcare practices between home and childcare contexts diverge (Whitmarsh, 2011). Vandenbroeck et al. (2009) interpreted this dissonance as a potential source of conflict. Md-Yunus (2009) reported that educators often struggle to create a culture-sensitive environment in childcare settings. Moreover, educators in German childcare settings reported a demand for assistance with psychological problems of young refugee children (Riedel and Lüders, 2016).

Challenge: Feasibility and Attendance of Refugee Families

Another domain of challenge in childcare with refugee children subsumes their infrequent attendance, high group fluctuation, and the initial unreliability of some refugee families. As a possible explanation, it is proposed that high levels of mental distress of refugees and low perceptions of self-agency (Mitchell and Ouko, 2012) might disturb parental engagement. Cultural differences in educational aspirations and childcare practices additionally aggravate the extent of parental engagement (Tadesse, 2014). Moreover, some refugee parents struggle with separation from their young children without the support of close relatives, particularly in a foreign context after adverse circumstances (Riedel and Lüders, 2016). Improvised childcare settings, high fluctuation of refugees, and changing premises (i.e., closing of central refugee accommodations) may affect long-term feasibility of Bridging Projects. Educators reported these challenges in our study, yet these specialized childcare groups are considered to be a flexible, temporary service until transition into regular ECEC programs is possible.

Challenge: Cultural and Communication Barriers

Language and cultural barriers hinder successful communication. Educators in our study perceived these barriers as major obstacles in early childcare programs for refugee families. However, a panacea-like strategy for effective communication seems unrealistic, as refugee families are demographically and ethno-culturally diverse. Regarding the cultural barriers, educators reported to experience different expectations for childcare practices from parents, which represents an additional challenge. ECEC programs similar to Western models of institutionalized childcare are less widespread in several countries from which refugees originate (Mitchell and Ouko, 2012; Poureslami et al., 2013). In a study with 199 educators, Bernhard et al. (1998) reported that a substantial number of refugee parents did not understand the goals of ECEC programs in Canada. Specifically, some studies found refugee parents from different African countries to have their own expectations toward the parent-educator relationship and the format of caregiving, which were different to Western ECEC practices (Tadesse et al., 2009; Whitmarsh, 2011; Tadesse, 2014). Overall, our evidence suggests a need for effective communication, and sensitive strategies to convey intentions and practices of existing ECEC programs in the host country to refugee families. At the same time, ECEC programs need to consider prior experiences those families might have had with childcare in home-countries or during flight.

Challenge: Structural Features of a Childcare Group

Challenges regarding structural features concerned the large age-range of refugee children, who attended the Bridging Projects, the lack of good educator-child ratios, inadequate premises, lack of equipment for a childcare group, and lack of accessibility of the childcare programs. Responses may to some extent reflect the diversity of Bridging Projects. Systematic field observations suggested that differences in the structural quality of Bridging Projects depend on the childcare setting (Busch et al., unpublished). Moreover, educators reported accessibility of childcare programs by refugees as challenging. Consistently, refugee families in Canada reported a lack of locally available childcare groups (Morantz et al., 2012; Poureslami et al., 2013). In conclusion, stakeholders need to deliberately settle childcare services for refugees to accessible locations, which also meet sufficient structural quality standards.

Possible Solutions for the Challenges According to the Pyramid Model

The pyramid model (Fox et al., 2003) scaffolds linkages between challenges in childcare settings for refugee children and potential solutions. The first tier of the model subsumes measures for providing a nurturing, need-oriented environment for all children of a group, which facilitates learning experiences and builds positive relationships with participating families. Therefore, the childcare environment must also consider the needs of refugee children. Educators in our study remarked on the scarcity of suited materials for early language learners. They emphasized the importance of easy accessibility for refugee families, and an adequate educator-child ratio. They suggested predictable and reliable structures (e.g., repeating timetables) with consistently enforced rules, which promote routines, and foster reliable relationships with refugee children and parents. Correspondingly, Lunneblad (2017) found that refugee children and caregivers often need more time to familiarize themselves with a childcare setting. Educators in our study suggested that conveying warmth, encouragements, and patience are particularly important to foster positive relationships with refugee children and their families.

The second tier intends to specifically address challenges with refugee children and their families, if necessary. According to the educators in our investigation, additional measures for refugees should target the psychosocial situation of refugees, bonding with parents, and facilitation of communication. In addition to the use interpreters, educators suggested communication-supportive materials, e.g., pictograms or posters, as helpful to overcome the language barrier in early childcare with refugees. In line with our evidence on discrepant views on childcare, Tadesse (2014) reported that some refugee parents show resistance when accepting additional measures in ECEC for their children. Exploration of their individual attitudes toward childcare, provision of information about childcare systems, and educational goals might promote acceptance, and foster parental engagement. Besides potential topics of conflict, educators mentioned the unsteady attendance and tardiness of refugee children as challenging. Therefore, educators suggested drop-off and pick-up services. This could promote the regular attendance of refugees because many families often have scarce resources, or they are not familiar with the use of public transport.

The third tier addresses intensively individualized interventions for some children and families. Refugee children in the Bridging Project groups seem to have specific patterns of mental distress (Buchmüller et al., 2018). The majority of refugee children exhibit mild behavior problems. Some children, however, show severe anxiety and withdrawal behavior. This suggests that, at times, educators must cope with severe emotional problems of refugee children. Educators in our study reported that they were insufficiently prepared to deal with this challenge. Cultural and language barriers hinder sensitive and specific identification of the refugee children in need with available diagnostic tools (Hurley et al., 2014). Training of the educators should, therefore, cover an in-depth understanding about psychosocial symptom manifestations, and specific risk factors for negative developmental outcomes. However, educators should not provide psychological therapy, but detect and refer children in need of intervention to treatment facilities. Close cooperation with communal youth welfare, or health care agencies, might help to conduct intensive psychosocial interventions for the complex, and entangled problems that refugee children and their families face during the post-migration period (Szente et al., 2006; Poureslami et al., 2013). Educators in our study reported that the provision of individual assistance for refugee families beyond childcare, e.g., with obstacles of resettlement, promotes successful conductance of childcare with refugee families.

The pyramid model structures challenges and solutions in childcare with refugee children. However, boundaries between the different tiers follow a theoretical concept, and the evidence is ordered in theoretical accordance. Beyond this theoretical model, the practical feasibility of tiered interventions for refugee children needs additional consideration, as measures are implemented into policy and practice.

Strengths, Limitations, and Future Research

We were the first research group, who used a stepwise approach to investigate perceived challenges and possible solutions in a specialized ECEC program for refugee children. In the pilot study, a focus group applied inductive content analysis in order to generate a questionnaire on challenges, and to obtain findings on potential solutions. Despite the standardized procedure, personal narratives, and past experiences of coders might, nevertheless, have had an impact on how generic categories and the questionnaire were generated. The main study builds on the closed questionnaire on challenges. Future research should particularly investigate its reliability, validity, and comprehensiveness. Psychometric criteria of our questionnaire seem overall sufficient for EFA, and led to solid factors (Costello and Osborne, 2005; Bühner, 2011). However, the item with low MSA and mediocre subject to item ratio might jeopardize a reliable factor structure.

Current childcare services are in need of research on refugees, with short-term practical impact. The main goal of this study was, therefore, to investigate challenges and solutions in specialized ECEC programs for refugee children. Our findings are consistent with a qualitative study on childcare with refugee families in Canada (Poureslami et al., 2013). Our study extends evidence by methodological triangulation in a larger sample from specialized ECEC programs in Germany. General challenges and solutions for all types of childcare settings for refugees exist along with very specific ones that may vary depending on context, group settings, inclusive or exclusive orientation, and specific childcare goals. Linking type and severity of specific challenges to an ECEC program's structural characteristics helps to further systematize and evaluate the advantages and obstacles of diverse concepts of childcare settings for refugee children. The newly constructed questionnaire of this study provides a basic tool for such investigations. Besides, our investigation is limited to educators' perspectives. The perspective of refugee parents might possibly reveal more challenges and solutions in ECEC programs.

To date, the effects of childcare attendance on the psychosocial adjustment, academic achievement, and developmental outcomes of refugee children have been insufficiently studied. We do not yet have substantial evidence on effective pathways for recently arrived refugee children into childcare services, or on solutions to tackle the specific challenges in childcare settings for refugee children.

CONCLUSION

Our study contributes to systematic research on childcare services for children. We disentangled and systematized challenges, and possible solutions that educators perceived in specialized ECEC programs for refugee children. We generated a questionnaire on perceived challenges, and embedded our findings into a theory-driven framework on a broader empirical basis. Findings can directly inform educators, stakeholders, and policy makers about the specific challenges of refugee children in early childcare and steps toward effective solutions.

ETHICS STATEMENT

This study was conducted in accordance with the ethical guidelines of the German Psychological Society. The Ethics Committee of the Faculty of Psychology at the Ruhr University Bochum approved the study protocol. All subjects gave written informed consent in accordance with the Declaration of Helsinki.

DISCLOSURE STATEMENT

The funders had no role in study design, data collection, or analysis, decision to publish or preparation of the manuscript.

AUTHOR CONTRIBUTIONS

JB contributed in manuscript writing, data analysis, data interpretation, and study conceptualization. L-MB contributed in data analysis, methodological realization, and manuscript writing. HL contributed in manuscript feedback and revision, discussion of findings, and manuscript writing. TB contributed in study conceptualization and manuscript feedback. KD contributed in data analysis and literature research. BL contributed in manuscript feedback and revision, discussion of findings, and head of the project.

FUNDING

This work was supported by the Federal Ministry of children, families, refugees and integration (MKFFI), State of North Rhine-Westphalia by a grant to BL. We acknowledge support by the DFG Open Access Publication Funds of the Ruhr University Bochum.

ACKNOWLEDGMENTS

We gratefully thank Laura Bremer and Florian Nussdorfer for their assistance, and all Bridging Project organizers and educators for supporting our study.

REFERENCES

Bernhard, J. K., Lefebvre, M. L., Murphy Kilbride, K., Chud, G., and Lange, R. (1998). Troubled relationships in early childhood education: parent–teacher interactions in ethnoculturally diverse child care settings. *Early Educ. Dev.* 9, 5–28. doi: 10.1207/s15566935eed0901_1

Bronstein, I., and Montgomery, P. (2011). Psychological distress in refugee children: a systematic review. *Clin. Child Fam. Psychol. Rev.* 14, 44–56. doi: 10.1007/s10567-010-0081-0

Buchmüller, T., Lembcke, H., Busch, J., Kumsta, R., and Leyendecker, B. (2018). Exploring mental health status and syndrome patterns among young refugee children in Germany. *Front. Psychiatry* 9:212. doi: 10.3389/fpsyt.2018.00212

Bühner, M. (2011). *Einführung in die Test-und Fragebogenkonstruktion*. München: Pearson Studium.

Costello, A. B., and Osborne, J. W. (2005). Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *Pract. Assess. Res. Eval.* 10, 1–9.

Elo, S., and Kyngäs, H. (2008). The qualitative content analysis process. *J. Adv. Nurs.* 62, 107–115. doi: 10.1111/j.1365-2648.2007.04569.x

Farrell, M., Barden, B., and Mueller, M. (2008). *The Evaluation of the Refugee Social Service (RSS) and Targeted Assistance Formula Grant (TAG) Programs: Synthesis of Findings from Three Sites*. Available at: https://www.acf.hhs.gov/sites/default/files/orr/synthesisoffindingsfromthreesites.pdf

Fox, L., Dunlap, G., Hemmeter, M. L., Joseph, G. E., and Strain, P. S. (2003). The teaching pyramid: a model for supporting social competence and preventing challenging behavior in young children. *Young Child.* 58, 48–52.

Gambaro, L., Liebau, E., Peter, F. H., and Weinhardt, F. (2017). Viele kinder von Geflüchteten besuchen eine Kita oder Grundschule: nachholbedarf bei

den unter Dreijährigen und der Sprachförderung von Schulkindern. *DIW Wochenbericht* 84, 379–386.

German Federal Agency for Migration and Refugees (2016). *Aktuelle Zahlen zu Asyl - Ausgabe: Dezember 2016*. Available at: http://www.bamf.de/SharedDocs/Anlagen/DE/Downloads/Infothek/Statistik/Asyl/aktuelle-zahlen-zu-asyl-dezember-2016.html?nn=7952222

Gross, J., and Ntagengwa, C. (2016). *Challenges in Accessing Early Childhood Education and Care for Children in Refugee Families in Massachusetts*. Available at: http://www.migrationpolicy.org/research/challenges-accessing-early-childhood-education-and-care-children-refugee-families

Hahn, U. (2011). "Arbeit mit Roma-Flüchtlingskindern," in *Handbuch Resilienzförderung*, ed. M. Zander (Wiesbaden: Springer VS), 590–610.

Han, W.-J. (2008). The academic trajectories of children of immigrants and their school environments. *Dev. Psychol.* 44, 1572–1590. doi: 10.1037/a0013886

Hu, L., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model.* 6, 1–55. doi: 10.1080/10705519909540118

Hurley, J. J., Medici, A., Stewart, E., and Cohen, Z. (2011). Supporting preschoolers and their families who are recently resettled refugees. *Multicult. Perspect.* 13, 160–166. doi: 10.1080/15210960.2011.594400

Hurley, J. J., Saini, S., Warren, R. A., and Carberry, A. J. (2013). Use of the pyramid model for supporting preschool refugees. *Early Child Dev. Care* 183, 75–91. doi: 10.1080/03004430.2012.655242

Hurley, J. J., Warren, R. A., Habalow, R. D., Weber, L. E., and Tousignant, S. R. (2014). Early childhood special education in a refugee resettlement community: challenges and innovative practices. *Early Child Dev. Care* 184, 50–62. doi: 10.1080/03004430.2013.769214

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika* 39, 31–36. doi: 10.1007/BF02291575

Kalkman, K., and Clark, A. (2017). Here we like playing princesses – newcomer migrant children's transitions within day care: exploring role play as an indication of suitability and home and belonging. *Eur. Early Child. Educ. Res. J.* 25, 292–304. doi: 10.1080/1350293X.2017.1288020

Lacroix, L., Rousseau, C., Gauthier, M.-F., Singh, A., Giguère, N., and Lemzoudi, Y. (2007). Immigrant and refugee preschoolers' sandplay representations of the tsunami. *Arts Psychother.* 34, 99–113. doi: 10.1016/j.aip.2006.09.006

Landis, J. R., and Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics* 33, 159–174. doi: 10.2307/2529310

Lunneblad, J. (2017). Integration of refugee children and their families in the Swedish preschool: strategies, objectives and standards. *Eur. Early Child. Educ. Res. J.* 25, 359–369. doi: 10.1080/1350293X.2017.1308162

Md-Yunus, S. (2009). Rice, rice, rice in the bin: addressing culturally appropriate practice in early childhood classrooms. *Child. Educ.* 86, 27–32. doi: 10.1080/00094056.2009.10523104

Mitchell, L., and Ouko, A. (2012). Experiences of Congolese refugee families in New Zealand: challenges and possibilities for early childhood provision. *Aust. J. Early Child.* 37, 99–107.

Morantz, G., Rousseau, C., and Heymann, J. (2012). The divergent experiences of children and adults in the relocation process: perspectives of child and parent refugee claimants in Montreal. *J. Refug. Stud.* 25, 71–92. doi: 10.1093/jrs/fer025

Poureslami, I., Nimmon, L., Ng, K., Cho, S., Foster, S., and Hertzman, C. (2013). Bridging immigrants and refugees with early childhood development services: partnership research in the development of an effective service model. *Early Child Dev. Care* 183, 1924–1942. doi: 10.1080/03004430.2013.763252

Riedel, B., and Lüders, K. (2016). Flüchtlingskinder in der Kita - Zugänge gestalten, Kooperationen stützen! *Kinder Jugendschutz Wiss. Prax.* 61, 138–142.

Rousseau, C., Benoit, M., Lacroix, L., and Gauthier, M.-F. (2009). Evaluation of a sandplay program for preschoolers in a multiethnic neighborhood. *J. Child. Psychol. Psychiatry* 50, 743–750. doi: 10.1111/j.1469-7610.2008.02003.x

Schweinhart, L. J. (1993). *Significant Benefits: The High/Scope Perry Preschool Study through Age 27 (Monographs of the High/Scope Educational Research Foundation, No. Ten)*. Ypsilanti, MI: HighScope Press.

Sirin, S. R., and Rogers-Sirin, L. (2015). *The Educational and Mental Health Needs of Syrian Refugee Children*. Available at: https://www.researchgate.net/profile/Selcuk_Sirin/publication/287998909_The_Educational_and_Mental_Health_Needs_of_Syrian_Refugee_Children/links/567ccd6c08ae19758384e4bf.pdf

Szente, J., Hoot, J., and Taylor, D. (2006). Responding to the special needs of refugee children: practical ideas for Teachers. *Early Child. Educ. J.* 34, 15–20. doi: 10.1007/s10643-006-0082-2

Tadesse, S. (2014). Parent involvement: perceived encouragement and barriers to African refugee parent and teacher relationships. *Child. Educ.* 90, 298–305. doi: 10.1080/00094056.2014.937275

Tadesse, S., Hoot, J., and Watson-Thompson, O. (2009). Exploring the special needs of African refugee children in U.S. schools. *Child. Educ.* 85, 352–356. doi: 10.1080/00094056.2009.10521400

Vandenbroeck, M., Roets, G., and Snoeck, A. (2009). Immigrant mothers crossing borders: nomadic identities and multiple belongings in early childhood education. *Eur. Early Child. Educ. Res. J.* 17, 203–216. doi: 10.1080/13502930902951452

Votruba-Drzal, E., Coley, R. L., Collins, M., and Miller, P. (2015). Center-based preschool and school readiness skills of children from immigrant families. *Early Educ. Dev.* 26, 549–573. doi: 10.1080/10409289.2015.1000220

Waniganayake, M. (2001). From playing with guns to playing with rice: the challenges of working with refugee children: an Australian perspective. *Child. Educ.* 77, 289–294. doi: 10.1080/00094056.2001.10521652

Whitmarsh, J. (2011). Othered voices: asylum-seeking mothers and early years education. *Eur. Early Child. Educ. Res. J.* 19, 535–551. doi: 10.1080/1350293X.2011.623540

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Education

ORIGINAL RESEARCH
published: 19 September 2018
doi: 10.3389/feduc.2018.00079

Dreams of Higher Education in the Mediterrani School Through Family Education

Carme Garcia Yeste[1]*, *Teresa Morlà Folch*[2] and *Vladia Ionescu*[3]

[1] Department of Pedagogy, University Rovira i Virgili, Tarragona, Spain, [2] Department of Business Administration, University Rovira i Virgili, Tarragona, Spain, [3] Department of Sociology, University of Barcelona, Barcelona, Spain

Through Learning Communities, schools and their communities may play a key role in overcoming inequalities suffered by vulnerable populations. Learning Communities implement Successful Educational Actions (SEAs), one of which is Family Education. This action focuses on promoting basic education among community members, in addition to other adult educational and cultural activities. In this context, SALEACOM. Overcoming inequalities in schools and Learning Communities: Innovative education for a new century (2015–2017) is a Marie Curie RISE project that develops interdisciplinary solutions for and with learners most heavily affected by inequalities, including access to higher education and its quality. In this article, we focus on one experience from the Mediterrani School (Spain), where we work through SALEACOM. This school was known as a ghetto school until 2012, when they decided to transform the school into a Learning Community and to apply SEAs. This article analyses the impact of the Family Education programme in relation to families and children's expectations of higher education and how these expectations affected children's results. Family Education started in the Mediterrani School in the academic year 2012–2013, when the school and families conducted adult training courses. Three years later, family education had a massive response from the community, when 63 community members, 41% of the Roma enrolled in training courses. Since then, all courses are established according to the community's decisions through their active participation. Following a communicative methodology, we conducted semi-structured interviews with a communicative orientation among some of the participants in these adult courses. The communicative analysis showed that Family Education allowed the participants, and the members of community expected continued education throughout life and access to the university. The Adult Education promoted in the Mediterrani School can have a transformative effect on educational outcomes, opening possibilities for personal and social change.

Keywords: learning communities, vulnerable populations, Roma, adult education, family involvement, family education, diversity, higher education

OPEN ACCESS

Edited by:
Roseli Rodrigues De Mello, Universidade Federal de São Carlos, Brazil

Reviewed by:
Camila Domeniconi, Universidade Federal de São Carlos, Brazil
Ana Cruz, St. Louis Community College, United States

***Correspondence:**
Carme Garcia Yeste
carme.garciay@urv.cat

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *15 May 2018*
Accepted: *22 August 2018*
Published: *19 September 2018*

Citation:
Garcia Yeste C, Morlà Folch T and Ionescu V (2018) Dreams of Higher Education in the Mediterrani School Through Family Education. Front. Educ. 3:79. doi: 10.3389/feduc.2018.00079

INTRODUCTION

The concern about education and the lack of accessibility for the entire population is a global problem. Preliminary research (Giroux and Flecha, 1992; Ogbu, 1997; Orfield and Lee, 2005; Ferguson et al., 2007) has shown a link between poverty and educational opportunities. Specifically, McLoyd (1998) showed that living in extreme poverty persistently has particularly negative effects. In this sense, poverty alleviation is one of the five priority themes of the Europe 2020 strategy adopted by the European Council (European Commission, 2010a) that commits EU actors and Member States to work for smart, sustainable and integrated growth (Valls and Padros, 2011). Education and permanent education became a key strategy in European policies guaranteeing immigrants' social and economic integration (De Paola and Brunello, 2016). Immigrant and Roma students are two groups that have historically experienced the greatest educational inequalities resulting from segregation and low expectations (Arabadjieva, 2016; Miguel-Luken and Solana-Solana, 2017).

The right to education is a fundamental human right, reflected in a free compulsory primary and secondary education and the possibility of accessing other levels of studies without discrimination. "The development of high quality education systems is a key factor to help guarantee full social inclusion for everyone, as well as the development of a competitive and dynamic knowledge-based economy, and greater social cohesion in Europe" (INCLUD-ED, 2007, p.4). When dropout rates are reduced, educational success and social impact in terms of the completion of upper secondary education and participation in tertiary education (European Commission, 2009) are related both to social inclusion and access to various social areas such as employment, housing, health and political participation, access to resources, the use of public institutions and the availability of personal networks (Rusk, 2003; Briggs, 2005).

In this context, the integrated project (7th priority of the 6th Framework Program) INCLUD-ED, Strategies for inclusion and social cohesion in Europe based on Education (2006–2011) provides the keys to successful educational actions (SEAs) (INCLUD-ED Consortium, 2009), through which trajectories of social transformation are generated. Some SEAs studied through the INCLUD-ED Project are interactive groups, extending learning time (after-school activities), dialogic literary gatherings (de Botton et al., 2014), and family education (Flecha, 2015). As explained by Flecha and Soler (2013), these actions are transferable to different countries and to many environments because they contain universal components (Racionero-Plaza and Puig, 2017). Learning Communities, based on SEAs, are inclusive educational experiences that confront new social needs while raising an equal educational response by working toward social cohesion. Schools and their community environments through Learning Communities may have a key role in overcoming inequalities suffered by vulnerable populations. In this article we focus on the SEA: Family Education, which focuses on the family and the community but is part of UNESCO's definition (2016, p. 6) of adult education:

> "Adult learning and education is a core component of lifelong learning. It comprises all forms of education and learning that aim to ensure that all adults participate in their societies and the world of work. It denotes the entire body of learning processes, formal, non-formal and informal, whereby those regarded as adults by the society in which they live, develop and enrich their capabilities for living and working, both in their own interests and those of their communities, organizations and societies."

The case study presented in this article shows how Family Education contributes to the transformation of the expectations of higher education and children's expectations of reaching higher education in an urban primary school in Catalonia (Spain). The article presents the results of the SALEACOM project (2015–2017)[1], a Marie Sklodowska-Curie Research and Innovation Staff Exchange (RISE) call. These crucial challenges are addressed by identifying SEAs that overcome the educational exclusion of the most vulnerable students ("About Us – SALEACOM Project", 2018).

As an introduction, on the one hand, this article presents what the previous literature described regarding Family Education as a successful action and, on the other, the kind of community participation that has been proven scientifically to be successful for the community and its children.

In addition to the introduction, the article is structured in four sections that provide data and evidence of a direct relationship between Family Education, expectations of higher education and the improvement of children's academic results. First, we detail the theoretical approach used for Family education and its impact on the education and expectations of students; seconds, we explain the methodology used to develop the research and how it has been carried out as well as the chosen sample and the techniques used; third, we present the main results regarding how Family Education contributes to academic improvement and expectations toward higher education; finally, the conclusion offers a brief summary on the article's main contributions.

Breaking the Cycle of Inequality Trough Family Education

The promotion of Family Education, especially in highly vulnerable contexts, shows results that can offer alternatives to school failure in children from these contexts, thereby breaking the cycle of inequality that exists alongside low socioeconomic levels. Extensive research finds that socioeconomic level is a significant predictor of academic success for young people of racial or ethnic minorities (Furstenberg et al., 1999; Malecki and Demaray, 2006), especially in those families that have a low educational level and low expectations (Oreopoulos et al., 2006). Different studies point to the importance of high parenthood expectations in relation to children's academic success (Castro et al., 2015). Parents' completed levels of education may, for example, affect children's academic achievement (Black

[1] This project aims to develop interdisciplinary solutions for and with learners most heavily affected by inequalities, including access to higher education and its quality. The SALEACOM Project, begun in January 2015 and slated for completion in December 2017 (36 months), creates a global research network with a shared goal: overcome inequalities affecting children and youth systematically underserved.

et al., 2005). According to Fall and Roberts (2012), research consistently shows that students of poor or single-parent families whose parents do not have a high school diploma are at a higher risk of school dropout compared to students of families without risk factors. One of these potential support factors is social support (Malecki and Demaray, 2006).

Different results are derived from the different availabilities of cultural, social and economic resources in the family that can limit educational opportunities and, as a consequence, children's first working experiences entering the labor market. Thus, family background's effect on education and labor market entry is repeatedly demonstrated (Dustmann, 2004; Krause and Schüller, 2014; Jose et al., 2017). Research indicates that those with a higher educational level have more opportunities in the labor market; conversely, those with lower educational levels tend to have temporary jobs that are precarious (De Vries and Wolbers, 2005; Santa Cruz et al., 2011). In this context, European organizations such as the European Commission (2010b) and European Union Agency for Fundamental Rights (2014) have noted that the lack of academic training, precariousness and inactivity are key factors that increase the vulnerability to poverty. Considering this reality, UNESCO et al. (2015, p. 69) notes that "it is equally necessary and urgent to promote the financing of literacy programmes for young people and adults, as well as opportunities for learning, education and adult training, in a perspective of lifelong learning." Practices demonstrate the association between Family Education and children's performance; for example, the School Development Program (James Comer, Yale University), Accelerated Schools (Henry Levin, Stanford University), Success for All programmes (Robert Slavin, John Hopkins University) and Learning Communities (Ramón Flecha, Universitat de Barcelona—CREA).

Family Education in Learning Communities

In particular, Learning Communities from SEAs is a project that begins at school but integrates the entire community. Learning Communities is a project of social and cultural transformation of an educational center and its surroundings to achieve an Information Society for all people (Valls, 2000). Learning Communities are considered relevant means of combatting social fragmentation and exclusion, as they promote and attribute a key role to families and the community. Thus, Family Education is considered one of the tools for overcoming this social exclusion through dialogic learning, according to which students learn through dialogue and interaction between all educative agents with whom they are related inside and outside the classroom (Elboj et al., 2002).

INCLUD-ED shows that social inequalities can be overcome by promoting the education of families and demonstrated that the family environment can be transformed. INCLUD-ED identified Successful Educational Actions (SEAs), which are practices that have given the best results in education and that have been endorsed by the international scientific community. These actions are characterized by reorganizing the resources available in the school and the community to support the academic success of all students rather than segregating some according to their capacity or reducing their education and depriving them of opportunities. SEAs improve educational outcomes for many children and adolescents (Flecha and Soler, 2013). These actions are derived from a rigorous analysis of educational systems, especially 27 case studies in schools attended by families of low socioeconomic status who still obtained excellent educational outcomes in schools throughout Europe (Valls and Padros, 2011).

In this framework, one SEA is Family Education, a successful action we focus on in this article. Family Education programmes address non-academic families. This action in particular emphasizes promoting basic education among community members, in addition to other adult educational and cultural activities. When children are supported by these environments, their interest toward school and participation increases. The educational research shows the benefits derived from establishing strong and honest links between the members of the school community are collected widely (Epstein, 1991). As the literature presents it, mature students who participate in Lifelong Learning programmes have the opportunity to develop skills and knowledge and improve their personal lives and community well-being (Merriam and Kee, 2014). For these reasons, especially in lower socioeconomic students, social support should be considered, especially parents and teachers, as an objective for intervention (Malecki and Demaray, 2006; Tellado, 2017). Through a study carried out by Carrillo et al. (2017), as in the case of Family Education, dialogical approaches can contribute to the community's developmental processes in contexts that are severely affected by racial segregation and poverty.

Community and Family Participation

Another major issue in the scientific literature highlighted in this article is the type of community/family participation that is successful in the school, as this is a subject of profound debate. First, to address reproductive theories (Bourdieu and Passeron, 1970), several authors develop theories able to transform inequalities, since they recognize the ability of agents to transform their situations (Giroux, 1988; Bernstein, 1990; Freire, 1997; Touraine, 1997). Apple and Bene (1997), through their inclusive school models, show that education can be a transformative tool for social inequalities.

Currently, international consensus relates to how schools can modify people's life trajectories and, consequently, their social structures (Giroux and Flecha, 1992; DeLuca and Rosenblatt, 2010). Giddens (1995) tells us that we are all influenced by our social context, our structure, and our developing activity in the social world around us; at the same time, we are structured by it, so we can create and modify the environment. Empirical evidence maintains that family involvement in schools improves children's learning (Dearing et al., 2006).

Hidalgo et al. (2002) defend families' participation in schools as more important than aspects such as family structure, socioeconomic level or parents' education, among others. The benefits of families or community members' school participation indicate an independence from economic level, family background, educational level or belonging to a vulnerable group (Henderson and Mapp, 2002; Koutroba et al., 2006).

Specifically, the literature indicates that families' participation in educational centers contributes generally to the children's educational success (Epstein, 1991; Sheldon and Epstein, 2002; Barron et al., 2010). Particularly, Dearing et al. (2006) find that families' increased involvement in schools improves children's literacy levels. Furthermore, even in those cases when family involvement levels are low, a gap exists between the literacy performances of children with either more or less educated parents; when family involvement is high, this gap disappears. In addition, when families participate and the center improves its educational quality (OCDE, 1997; Flecha, 2009; Tellado and Sava, 2010; INCLUD-ED, 2011), behavioral and affective areas of children's development are affected, as is the quality of parent-child interpersonal relationships, and positive attitudes toward school are generated (Epstein, 2001; Pomerantz et al., 2005).

In this sense, family participation increases children's cultural and educational interactions with these social agents and can contribute to reversing the tendency of school failure, even in children coming from non-academic families (Rogoff et al., 2001; INCLUD-ED Consortium, 2009; Diez et al., 2011; Oliver et al., 2011). Therefore, measures and policies must be implemented based on family participation (Giroux and Flecha, 1992; Teddlie and Reynolds, 2001; DeLuca and Rosenblatt, 2010).

In many cases, family participation in the educational system in the European context is materialized through the associations of mothers and fathers with the School Council (Egido, 2014). However, this participation is insufficient to transform reality. Comellas (2009) states that the presence of relatives in educational decisions related to their children is usually guaranteed, but a lack of real participation continues. Thus, INCLUD-ED acquires special significance with regard to the current evolution of scientific knowledge about European education and its relation to social exclusion and inclusion (Valls and Padros, 2011). Five community types are identified in this project according to the level and area of involvement.

INCLUD-ED's results indicate that not all types of family participation have the same effect or improve school performance (INCLUD-ED Consortium, 2009). Of the five, two do not have any kind of effect; specifically, informative participation and consultative participation are based on simple information or consultation without any kind of decision-making power. Despite favoring contact and coexistence, these two forms of family involvement play a very small role in terms of results and continuity in studies. As Wenger (2001, p. 22) also noted, in relation to participation, it "not only refers to local events of commitment to certain activities and with certain people but also to a process of greater scope, consisting of participating actively in the practices of social communities." Research shows that only the three following factors were likely to have a higher impact on students' learning:

(1) Evaluative participation. This activity involves family and community members in the evaluation of students' learning processes or school programmes.
(2) Decisive participation. Decision-making processes occur by becoming representatives in the school's decision-making bodies. The democratic participation of families and the community in decision-making processes helps to promote cultural acceptance and to improve the educational performance of children belonging to cultural minorities previously silenced, as Weis and Fine (1993) noted. The recent study by García-Carrión et al. (2017) shows that the engagement of families and other community members in a school's decision making can prevent early school leaving among vulnerable youth and increases their enrolment in secondary education.
(3) Educative participation. This activity occurs when families and other community members participate in students' learning process or in their own training as adults within the center. In the first case, people from the community, and specifically family members, join the centre's academic activities, thereby contributing human resources to learning. In the second case, families and members of the community participate in training programmes. This type of participation includes attending family education programmes that responds to family's needs such as literacy courses, graduate courses, dialogical literary gatherings or sewing classes, among others.

Redding (2000) emphasizes that when families are related to each other, social capital increases; children receive the attention of a greater number of adults; and parents share guidelines, norms, and educational experiences. This fact implies that we must build a meeting space, a school for everyone and everyone. Freire (1997, p.94) argues that the fight against discrimination, against the negotiation of our being, is only victorious if we do the obvious—unite in diversity—an essential principle in Learning Communities.

MATERIALS AND METHODS

The results presented in this article are obtained from the research project entitled SALECOM (2015-2017). The communicative methodology (CM) of research (Gómez et al., 2011; Flecha and Soler, 2013) is used in this case study, applying its principles, which are recommended by the European Commission for their suitability in working scientifically with groups belonging to cultural minorities (Puigvert et al., 2012). The CM is recognized as one of the methodological approaches that achieves the greatest social impact, especially in the educational (Gómez and Holford, 2011) and political spheres (European Commission, 2010b). In the CM, knowledge arises from the dialogue between the scientific evidence contributed by the researchers and the community, who from their life experiences (Habermas, 1984) make fundamental contributions interpreting the school's reality. That is, we apply the construction of dialogic knowledge (Gómez, 2014) with ethnic voices during the entire research process. This dialogue shows in previous searches (for example: INCLUD-ED, 2006-2009; Flecha and Soler, 2013) how it can increase the investigation's social utility and transformative expectations. In this sense, the social sciences face the challenge of going beyond diagnosing the situation of poverty and exclusion to have a social impact or to contribute to the formulation of policies and measures based on evidence oriented to solve social problems (Flecha et al., 2015; Girbés-Peco et al., 2015).

The methodology used in the research contemplates the seven principles of the CM. Firstly, universality of language and starting from the premise that all humans regardless of their culture, ethnic, or academic background can communicate and interact with others. Secondly, people as transformative social agent, for this reason, is essential the creation of liberation spaces. Thirdly communicative rationality, people use knowledge to search for a wide consensus rather than imposing. "The people seeking to change their own situation who participate in the research contribute to that dialogue with their interpretations and reflections based on their daily-life experiences and common sense" (Gómez et al., 2011, p. 242). In the same line, the fourth principle is the common sense. The fifth principle is related to the premise of an interpretive hierarchy, the comments of the people under the study may be as solid or more than those of the research team. Then, equal epistemological level, the investigators participate in the research under the same conditions as the people under the study. And finally, dialogic knowledge the knowledge resulting from the research is the result of a dialogue between all the agents.

The Mediterrani School: A Communicative Case Study

To prepare this case study, first, a secondary documentary analysis was carried out. On the one hand, the notes of the children of the different courses have been consulted, in order to see the results. And on the other hand, participation data in adult training have been consulted, observing the number of participants in each activity and the results achieved. Data provided was used to contextualize and thoroughly know the school as well as to obtain evidence of the school's transformation.

Likewise, the three authors of this article are volunteers in the Mediterrani School, so they have direct contact with different school agents, a fact that facilitated the possibility of carrying out the fieldwork and built the trust participants had when explaining their thoughts and experiences.

The Mediterrani School is located in Campclar, a peripheral district of Tarragona (Spain), where 11,424 citizens (Tarragona City Council, 2018) ("Ajuntament de Tarragona", 2018) live. This neighborhood was created in the 1960s as a result of the city's industrialization with the installation of petrochemical companies. Since its inception, it has been characterized by high rates of immigration and poverty; in Tarragona city, the poverty rate does not exceed 19%, but in Campclar, it reaches 48%.

This school is characterized by approximately 70% of students of Roma ethnicity and approximately 30% of the Muslim religion. The high rates of students with severe situations of poverty and a high rate of absenteeism has grown since its inception. A clear example is the 2011–2012 academic year, when absenteeism reached 48.4% in the mornings and 59.05% in the afternoons. Faced with this situation and a lack of solutions, in 2011, the center opted for the transformation to a Learning Community[2] and the application of Successful Educational Actions. A dialogical procedure began in which researchers from the Community of Researchers in Excellence for All (CREA), families, teachers, children and community members, through an egalitarian dialogue, agreed to become a Learning Community. As one of the first stages of transformation in the Learning Community, all educational agents dreamed about the school they wanted. By sharing the families' dreams, they realized one commonplace trait: many family members dreamed that students have the same expectations for their children as others do. Families made it clear that they did not want concessions. They wanted their children to learn. To achieve this dream, many families acquired a commitment from the start with the school. With relatives' demands and leadership's persistence, the school has expanded the educational offerings, and this year (2017–2018) begins the first year of secondary school.

Family Education started in the academic year 2012–2013, when the school and families conducted adult training courses. Specifically, in adult training, the type of activities that were developed in these 5 years varied depending on family members' needs and demands. All activities aimed at improving the skills and knowledge necessary for today's society.

In the Mediterrani School, the most in-demand courses are instrumental training courses. These courses are focused on adults with low SES to increase their skills in reading, writing, and elementary calculations. Some of them are oriented to prepare the participants to take exams to access vocational training. In the case of Mediterrani School families, they prepare for the primary and secondary school graduate exams. These courses are attended by people who did not finish their primary or secondary education and people who graduated in their native country with certifications that are not recognized in Spain.

In the 2015–2016 school year, two mothers, Lorena and Amina, passed the instrumental exam and obtained their official certification after the training they received at the Mediterrani School. Lorena was the first Roma mother in the school who took the course at the same school and passed the exam. Next, she planned to sign up for the graduate school, asked for the assessment to fulfill the need she had for a driving license; thereupon, she signed up at the driving school. Passing the Instrumental Training exam encouraged her, in her own words, to feel more intelligent. In the 2017–2018 school year, she attended the secondary education training course. On the other hand, Amina, after passing the exam, began the secondary education training course. Amina also participates in other activities both inside and outside the school, particularly in dialogical literary gatherings (DLGs).

DLGs are another form of adult education that takes place each year. The majority of the participants are Moroccans, but Roma women also participate. DLGs are exceptional for the diversity among the participants: women with or without academic degrees and from different cultures, ages and religions. In this space, dialogues, critical reflections, and knowledge constructions are shared around a work of universal classical literature. For example, participants at the Mediterrani School have read *Bodas de sangre* and *The House of Bernarda Alba*,

[2]See more information: http://utopiadream.info/ca/ (Accessed on 27April 2018).

two Spanish classics written by Federico Garcia Lorca, and *The Arabian Nights*. The participants show their satisfaction and taste for reading. Likewise, reading is part of their daily lives, and they share it with their relatives or friends. This fact causes the gatherings to pique the interest of other people who want to read the same book and participate in the literary gatherings, even among people who cannot read and write fluently. Therefore, during 1 year, a literacy group was created that focused on the readings, and they read and prepared the contributions in relation to the chosen book. Currently, people who cannot read participate in the gatherings.

At the same time, oral and written Spanish courses are conducted during the whole course. Catalan is also conducted during a quarter of each year (a co-official language in Catalonia). These language courses focus on literacy while aiming to teach a new language. Therefore, the main objective is to read and write texts in Spanish and Catalan, according to students' personal and social needs. Following the premise of conducting training that would be necessary for the participants, relatives showed their interest in learning computer skills. For this purpose, during one academic year, a course was held in relation to information and communication technologies (ICT). It brought basic notions about ICT to the participants. The contents included the use of the computer, treatment of digital information, and navigation and communication in digital environments.

Three years after the start of Family Education, the school registered a massive response from the community, when 63 community members, 41% of the Roma enrolled in the training courses. Currently, 5 years later, approximately 80% of family members participate in learning activities. All courses are established according the community's decisions through their active participation. The transformation of the school into a Learning Community where families have an educational participation means that the school's transformation quickly obtained results that demonstrated the school's change. For example, in 2011–2012, after embracing the Learning Community project, the enrolment rate increased by more than 66%, family participation in the center increased by 30%, and the absenteeism rate decreased from near 59% to less than 5%. Better academic results were also seen.

Sample

In short, the Mediterrani School was selected for the project because it fulfilled the four requirements: (1) it was located in a high poverty area (2) where the community has a high unemployment rate, and (3) most students were characterized by a low socio-economic status and (4) belonged to vulnerable groups. The head of the Mediterrani School helped us in the final selection of participants using the following criteria: (1) involved in family education for more than 2 years, (2) involved in the school participating as a volunteer, (3) member of a vulnerable group living in a poor situation, (4) and having children in the school.

Following these criteria, six mothers were selected. Three of them were participating in a course to prepare for official certification of a primary education exam, and the fourth was a participant who passed the exam, and the other two participants in the Dialogical Literary Gatherings. Finally, two students[3], whose mothers are participating in the Family Education courses, were interviewed.

The interviews of the students were conducted in the school, and in the case of the mothers they were given the choice of deciding where they felt most comfortable, in order to generate a dialogical and egalitarian space. Therefore, through the CM, it is possible to include the knowledge and interpretations of families from cultural minority groups through egalitarian dialogue with researchers, at the same time they highlighted the difficulties encountered in family education processes.

Data Collection

Throughout the SALEACOM project, quantitative and qualitative data collection techniques are implemented, as well as surveys, communicative daily life stories, semi-structured interviews and communicative focus groups. The concrete material for this article is based only in qualitative techniques, semi-structured interviews and a communicative daily life story.

(1) One communicative daily life story with a one mother, Dina. This technique, based on reflective dialogue, enhances the reflection and interpretation of the person's daily life and focuses on the present moment and on the narrator's interpretations of their lives. The dialogue is conducted between a researcher and a person whose perceptions are evaluated to go "beyond constructing a biography and obtain an interactive interpretation of the past, present, and future life" (García-Yeste, 2014, p. 925). One of the advantages of using this technique is that the interviewer, the researcher, can introduce scientific concepts to the discussion, so interviewees find themselves connected to them and associate them with their own experiences (Ramis et al., 2014).

(2) Seven semi-structured interviews with a communicative orientation for five mothers and two students. Two interview scripts were designed, one for mothers and one for children. These interviews are different from the traditional ones because they follow the postulates of the communicative approach. Basically, during the interview the interviewers introduce the accumulated academic knowledge about the researched subject and the interviewed people can take it into account when they answer the questions and make the contributions from their daily vision. Thus, interviewers break with the traditional hierarchy which establish differences between researcher (subject) and researched (object) and create an egalitarian space of intersubjective dialogue, highlighting the common sense of the participants and their capacity to understand critically the reality, contributing to transform it (Gómez et al., 2006). All participants contributed with their knowledge and experience in relation to the research topic.

[3]To guarantee the anonymity of participants, the names used throughout the article are pseudonyms.

Data Analysis

This methodology focuses on social situations and personal processes, which are analyzed by identifying two dimensions: exclusionary (elements that perpetuate inequality and exclusion) and transformative (elements that contribute to overcome these inequalities) (Gómez et al., 2006). In this article, we focus on the second dimension, the transformative, highlighting the aspects of family education that promote opening possibilities for personal and social change about university access. In that way, this dimension shows the social impact of Family Education and the CM (Gómez et al., 2010; Macías and Redondo, 2012).

The contributions made by the participants are analyzed according to the criteria of the communicative techniques. The interviews were recorded, subsequently transcribed and then the data obtained was analyzed. They are structured on both dimensions, exclusionary and transformative and were classified in six categories of analysis: (1) Impact on the participants themselves, (2) Participation, motivation and knowledge acquisition, (3) Changes in family roles, (4) Impact on coexistence, (5) Impact on boys and girls, (6) Characteristics and elements of the environment. Likewise, the key characteristics and other information are also included in the analysis table.

RESULTS: ADULT EDUCATION OPENING PERSONAL AND SOCIAL CHANGES

According to the interviewed mothers, the main motivations for participating in adult training are the desires to help their children complete their homework and, in general, participate in their learning process. The lack of referents for students' environments who have reached university studies is a remarkable factor. As a result of the exclusion and repeated educational failure that the mothers have suffered in their life trajectories, they have a negative self-concept. In this sense Lorena, referring to her Roma family, tells us, "we have never been to university." Likewise, the case study presented in this article shows that the transformation of the school into a Learning Community increases educational expectations. The main contributions are presented below.

After 6 years of relatives' involvement in adult education at the Mediterrani School, personal changes are observed that help change dynamics in the homes. In many cases, mothers have very low educational levels because they dropped out of school early, and participation in adult training caused them to acquire instrumental skills for helping their children do homework or even create spaces for joint learning where mother and daughter do their homework together, as explained by Lucía:

> "I also have homework, and they too, and then we sit together to do it."

In the same context, Manuela tells us how doing homework together with her daughter becomes a motivation, since her daughter encourages her to continue studying:

> "She arrives at home and she already knows we are going to work together. We have homework to do and she explains it to me and I learn, and I also teach her what I know. And she says to me, mum, you are so smart!"

This support, along with that from the husband, is fundamental, as the mothers themselves point out, since it motivates students to continue studying. In this context, another mother, Lorena, shows the interest and the concern her children show regarding her learning as their mother:

> "My children always ask me when I have exams, if I have homework..."

This mother shows how her self-esteem has also improved after her participation in school. She realizes that the work she does is important for her children, a fact that also increases her motivation to continue learning. On the other hand, the improvement in adult learning also causes a positive emotional impact.

In the same way, mothers perceive the sense and the meaning of the learning developed in the school. Due to their participation, they also conduct self-reflection and assessment. Therefore, they are encouraged to continue studying, as Dina says:

> "I am going to encourage [my children] to go to the institute and that they pass everything they can."

The children themselves perceive it. When asked if he likes to go to school with his mother Kalifa responds:

> Yes (...), because if I am there and I am seeing that she studies. And of course, it's important because I learn more.

Overcoming personal barriers means that people are empowered and can become a role model for others. The same mother, Dina, adds the following:

> "I am an example for them [their children], I am the example, if I have made it they can make it."

The training makes it possible for the participants to feel they can restart (or even start) their educational trajectories and feel that they are capable of learning. They modify their expectations and their expectations toward their children because now they see higher education as a possibility. Now the children dream of being doctors, biotechnologists, anthropologists... And we know that for that reason they must go to the university. Mohamed's answer emphasizes it:

> "… If I get the graduate, I can do the same with the university degree"

Mothers like Dina are an example for their children to continue studying because if she can do it, children feel they can do it too. This feeling is essential for families who have never entered university. Related to this fact, the results of the children both in the examinations and in the standardized tests of the Generalitat

(Catalan Government) have improved significantly. Loli started only 3 months ago; she brings her children to school and she participates in adult education courses. She also acknowledges that her both children had a very low educational level, since they came from a school with low expectations. Despite it, she explained the following:

> "Well, the boy is getting good grades, for example, the girl was always very good at learning, but she is doing what other children are doing in the second grade and there are seconds-graders who do not reach the level she has; because the girl has a seconds-grader level in only three months, in three months."

On the other hand, through their testimonies, they also show us the importance of creating social networks. As we have seen, Family Education empowers—in this case, mothers in their private lives—but it also gives them security. They acquire commitment in the social framework of the school and the community. Adult training is a space where the community members know one another since they learn and coexist together. Prior to the school's transformation, they took their children to the school, but they did not pass through the door or interact, but after they started participating in training activities, they reinforced the bonds between different community members. Dina explains:

> "We gather here [in the school]. We have a good time because you are with them [other mothers] and we talk and laugh. Before this happened, when we met on the street "hello" "hello," but now, when we meet, we stop to chat for a while because this has united us."

Thus, in addition to instrumental learning, these spaces encourage people to overcome the isolation that many families may feel, since, as mentioned before, most of the families in the school are immigrants. Therefore, this trust between relatives helps families to work together and discuss what problems have been found and how these have been overcome. Families themselves conduct community mentoring and peer support, which increases social cohesion in the center and the neighborhood.

Social transformations result from community members' own participation in a dialogic way at school. Relatives' testimonies show the transformation of their dynamics and educational expectations possible with the families' participation, since from their own Family Education experiences, participants make sense of the education. In short, as Manuela explains, they want their children to continue studying:

> "What I want now for the future of my children and my daughter, although I am half illiterate, is crystal clear for me, and if I do not know [something], I search for it, because something that I have clear is that I do not want my children to have the same experiences that I had. What I want is for them to study, to go to the high-school, to go to university and to continue studying, and I will do anything possible to make it that way."

In short, starting with the participation of family members in training activities, the learning school–home link has been reinforced. Now, many families and students dream of going to university and see that it is possible, since both the school and family/community share this dream and work together to achieve it.

DISCUSSION AND CONCLUSION

The case study presented in this article suggests that the school as an institution that reproduces inequality (Bourdieu and Passeron, 1977) is overcome by a school that provides the possibility of educational success for all social classes, starting with educational participation. The mothers interviewed demonstrate the emotional change they made. Based on the instrumental knowledge, they increased their self-esteem and improved their self-concept. This change causes mothers to be empowered and wish to continue with the training. Equally, their participation increases their educational expectations of their children. They perceive that transforming reality is possible; mothers interviewed experienced a connection to education and were able as agents to transform the situation (Willis, 1981; Giroux, 1988; Bernstein, 1990; Freire, 1997; Touraine, 1997) of educational failure.

On the other hand, as Castro et al. (2015) previously noted, parents' high expectations are related to children's educational success. The testimonies presented show how participation in training activities helped community members participating in Family Education increase their expectations about the role that education can play in achieving a better future and how it can promote social mobility. In addition, relatives' participation in these programmes create role models that deviate from the path of educational exclusion. On one hand, mothers do not feel alone, and they are increasing social leadership (Redding, 2000). In addition, from the joint work performed with the training, mothers find themselves participating more in social networks, which empowers and motivates them even more.

The previous literature stated that poverty deprives people of educational opportunities (Giroux and Flecha, 1992; Ogbu, 1997; Orfield and Lee, 2005; Ferguson et al., 2007); similarly, the case study presented in this article reveals that training of family members can contribute to overcoming social exclusion. Family Education is a successful tool for overcoming the educational social inequalities of families belonging to vulnerable groups. Of course, poverty is not overcome by completing a basic education, but education is a condition for achieving this goal (Girbés-Peco et al., 2015).

Family Education shows the school's community model fosters dialogue between the social agents involved in the formation of relatives and their educational participation (INCLUD-ED Consortium, 2009). The participants are protagonists of their own learning, increasing the formative motivation of the families and the students, as INCLUD-ED (2006–2011) presented. According to the mothers' contributions during the interviews, the learning environment is transferred to the home, and children and family members learn together by

performing educational activities together. Therefore, from the case study led at the Mediterrani School, we can see that change has been enabled by transforming the school through Learning Communities and the importance of dialogue with a community to listen to its formative demands. As a result, the whole dream of achieving higher education is present in community members' expectations. As some authors explain (De Vries and Wolbers, 2005; Santa Cruz et al., 2011), achieving a higher education leads to better possibilities: people have a greater chance for a more stable job and are less vulnerable to poverty (European Commission, 2010a; European Union Agency for Fundamental Rights, 2014). Therefore, to follow the community's transformation, we must continue with the research and verify how the dreams that we now project for higher education are completed and the impact these actions have on community members' work lives and long-term trajectories.

ETHICS STATEMENT

This study was carried out in following the European recommendations for H2020 Model Grant Agreements: H2020 MGA MSC-RISE–Multi: v2.1–1.[4] October 2015, the beneficiaries must carry out the action in compliance with: (a) ethical principles (including the highest standards of research integrity—as set out, for instance, in the European Code of Conduct for Research Integrity—and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct) and (b) applicable international, EU, and national law.

The protocol was approved on 21 December 2015 by the Clinical Research Ethics Committee of Hospital Universitari Sant Joan, Reus (Tarragona, Spain). All subjects gave written informed consent in accordance with the European Code of Conduct for Research Integrity.

[4]http://ec.europa.eu/research/participants/data/ref/h2020/mga/msca/h2020-mga-msca-rise-multi_v2.1_en.pdf

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

FUNDING

This research is framed in the context of the European project SALEACOM. Overcoming inequalities in schools and Learning Communities: Innovative education for a new century (2015–2017), which was funded by the European Commission, H2020 Marie Curie RISE, grant number 645668.

REFERENCES

"About Us – SALEACOM Project". (2018). Saleacom.Eu. [Accessed 1 May 2018]. Available online at: http://saleacom.eu/about-us/

"Ajuntament de Tarragona". (2018). Tarragona. [Accessed 27 April 2018]. Available online at: https://www.tarragona.cat/la-ciutat/poblacio

Apple, M. W., and Bene, J. A. (1997). *Escuelas Democráticas*. Madrid: Morata.

Arabadjieva, K. (2016). Challenging the school segregation of roma children in central and Eastern Europe. *Int. J. Human Rights* 20, 33–54. doi: 10.1080/13642987.2015.1032266

Barron, A. E., Hohlfeld, T. N., and Ritzhaupt, A. D. (2010). Connecting schools, community, and family with ICT: four-year trends related to school level and SES of public schools in florida. *Comp. Edu.* 55, 391–405. doi: 10.1016/j.compedu.2010.02.004

Bernstein, B. (1990). *The Structuring of Pedagogic Discourse: Class, Codes and Control. Vol. IV*. London: Routledge.

Black, S., Devereux, P., and Salvanes, K. J. (2005). Why the apple doesn't far: understanding the intergenerational transmission of education. *Am. Econ. Rev.* 95, 437–449. doi: 10.3386/w10066

Bourdieu, P., and Passeron, J. C. (1970). *La Reproduction. Éléments pour une Theorie du Système d'Enseignement*. Paris: Les Éditions de Minuit.

Bourdieu, P., and Passeron, J. C. (1977). *La Reproducción*. Barcelona: Laia.

Briggs, X (ed.). (2005). *The Geography of Opportunity: Race and Housing Choice in Metropolitan America*. Washington, DC: Brookings Institution Press.

Carrillo, A., Girbés-Peco, S., De Botton, L., and Valls-Carol, R. (2017). The role of communicative acts in the dream process: engaging moroccan migrants in a community development initiative in urban Spain. *Community Dev. J.* 1–18. doi: 10.1093/cdj/bsx049

Castro, M., Expósito-Casas, E., López-Martín, E., Lizasoain, L., Navarro-Asencio, E., Gaviria, L. et al. (2015). Parental involvement on student academic achievement: a meta-analysis. *Edu. Res. Rev.* 14, 33–46. doi: 10.1016/j.edurev.2015.01.002

Comellas, M. J. (2009). *Familia y Escuela: Compartir la Educación*. Barcelona: Grao.

de Botton, L., Girbés, S., Ruiz, L., and Tellado, I. (2014). Moroccan mothers' involvement in dialogic literary gatherings in a catalan urban primary school: increasing educative interactions and improving learning. *Improving Schools* 17, 241–249. doi: 10.1177/1365480214556420

De Paola, M., and Brunello, G. (2016). *Education as a Tool for the Economic Integration of Migrants*. Luxembourg: Publications Office of the European Union.

De Vries, M. R., and Wolbers, M. H. J. (2005). Non-standard employment relations and wages among school leavers in the Netherlands. *Work Employ. Soc.* 19, 503–525. doi: 10.1177/0950017005055668

Dearing, E., Kreider, H., Simpkins, S., and Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: longitudinal associations between and within families. *J. Educ. Psychol.* 98, 653–664. doi: 10.1037/0022-0663.98.4.653

DeLuca, S., and Rosenblatt, P. (2010). Does moving to better neighborhoods lead to better schooling opportunities? parental school choice in an experimental housing voucher program. *Teachers College Record* 112, 1441–1489. Available online at: http://www.tcrecord.org/Content.asp?ContentId=15683

Diez, J., Gatt, S., and Racionero, S. (2011). Placing immigrant and minority family and community members at the school's centre: the role of community participation. *Eur. J. Edu.* 46, 184–196. doi: 10.1111/j.1465-3435.2011.01474.x

Dustmann, C. (2004). Parental background, secondary school track choice, and wages. *Oxford Econ. Papers* 56, 209–230. doi: 10.1093/oep/gpf048

Egido, I. (2014). *Marcos Normativos de la Participación de las Familias en los Sistemas Educativos Europeos. Una Visión Comparada, enMinisterio Educación, La Participación de las Familias en la Educación Escolar, Madrid*. ed C. E. del Estado, Madrid: Ministerio de Educación, Cultura y Deporte.

Elboj, C., Puigdellívol, I., Soler, M., and Valls, R. (2002). *Comunidades de Aprendizaje. Transformar la Educación*. Barcelona: Graó.

Epstein, J. (2001). *School, Family, and Community Partnerships. Preparing Educators and Improving Schools*. Boulder, CO: Westview Press.

Epstein, J. L. (1991). "Effects on student achievement of teachers' practices of parent involvement," in *Advances in Reading/Language Research: A Research Annual, Vol. 5. Literacy Through Family, Community, and School Interaction*, ed S. B. Silvern (Elsevier Science; JAI Press), 261–276.

European Commission (2009). *Education and Training Strategy 2020*. Available online at http://ec.europa.eu/education/policy/strategicframework_en

European Commission (2010a). *Conclusions "Science Against Poverty" Conference 8–9 April 2010*. Madrid: Ministerio de Ciencia e Innovación, Gobierno de España; Unión Europea.

European Commission (2010b). Combating poverty and social exclusion. a statistical portrait of the european union 2010. Luxembourg: Publications Office of the European Union.

European Union Agency for Fundamental Rights (2014). *Education: the Situation of Roma in 11 EU Member States. Roma Survey–Data in Focus*. Luxembourg: Publications Office of the European Union.

Fall, A.-M., and Roberts, G. (2012). High school dropouts: interactions between social context self perceptions, school engagement, and student dropout. *J. Adolesc.* 35, 787–798. doi: 10.1016/j.adolescence.2011.11.004

Ferguson, H., Bovaird,. S., and Mueller, M. (2007). The impact of poverty on educational outcomes for children. *Paediatr. Child Health* 12, 701–706.

Flecha, R. (2009). Cambio, inclusión y calidad en las comunidades de Aprendizaje. *Cultura Edu.* 21, 157–169. doi: 10.1174/113564009788345835

Flecha, R. (2015). *Successful Educational Action for Inclusion and Social Cohesion in Europe*. Cham: Springer International Publishing Company. doi: 10.1007/978-3-319-11176-6

Flecha, R., and Soler, M. (2013). Turning difficulties into possibilities: engaging roma families and students in school through dialogic learning. *Cambridge J. Educ.* 43, 451–465. doi: 10.1080/0305764XX.2013.819068

Flecha, R., Soler-Gallart, M., and Sordé, T. (2015). Social impact: Europe must fund social sciences. *Nature* 528:193. doi: 10.1038/528193d

Freire, P. (1997). *A la Sombra de Este Árbol.* Barcelona: El Roure.

Furstenberg, F., Cook, J., Eccles, G. H., Elder, J.r., and Sameroff, A. (1999). *Managing to Make It: Urban Families and Adolescent Success*. Chicago,IL: University of Chicago Press.

García-Carrión, R., Molina-Luque, F., and Molina Roldán, S. (2017). How do vulnerable youth complete secondary education? the key role of families and the community. *J. Youth Studies* 21, 701–716. doi: 10.1080/13676261.2017.1406660

García-Yeste, C. (2014). Overcoming stereotypes through the other women's communicative daily life stories. *Qualitative Inquiry* 20, 923–929. doi: 10.1177/1077800414537218

Giddens, A. (1995). *Modernidad e Identidad del Yo*. Barcelona: Península.

Girbés-Peco, S., Macías, F., and Álvarez, P. (2015). De la escuela gueto a una comunidad de aprendizaje: un estudio de caso sobre la superación de la pobreza a través de una educación de éxito. *Int. Multidisciplinary J. Soc. Sci.* 4, 88–116. doi: 10.17583/rimcis.2015.04

Giroux, H. (1988). *Teachers as intellectuals*. New York, NY: Bergin and Garvey.

Giroux, H. A., and Flecha, R. (1992). *Igualdad Educativa y Diferencia Cultural*. Barcelona: Roure.

Gómez, A. (2014). New developments in mixed methods with vulnerable groups. *J. Mixed Methods Res.* 3, 317–320. doi: 10.1177/1558689814527879

Gómez, A., and Holford, J. (2011). Contribuciones al éxito educativo desde la metodología comunicativa. *Revista Educación y Pedagogía* 56, 21–29. Available online at: https://aprendeenlinea.udea.edu.co/revistas/index.php/revistaeyp/article/viewFile/9817/9016

Gómez, A., Puigvert, L., and Flecha, R. (2011). Critical communicative methodology: informing real social transformation through research. *Qualitative Inquiry* 17, 235–245. doi: 10.1177/1077800410397802

Gómez, A., Racionero, S., and Sordé, T. (2010). Ten years of critical communicative methodology. *Int. Rev. Qual. Res.* 3, 17–44. doi: 10.1525/irqr.2010.3.1.17

Gómez, J., Latorre, A., Sánchez, M., and Felcha, R. (2006). *Metodología Comunicativa Crítica*. Barcelona: Hipatia.

Habermas, J. (1984). *The Theory of Communicative Action–Reason and Rationalization of Society*, *Vol. 1*. Boston, MA: Beacon Press.

Henderson, A. T., and Mapp, K. L. (2002). *A New Wave of Evidence: The Impact of School, Family, and Community Connections on Student Achievement*. National Center for Family and Community Connections with Schools, Southwest Educational Development Laboratory. Southwest Educational Development Lab, Austin, TX.

Hidalgo, N. M., Epstein, J. K., and Siu, S. (2002). "Research on families, schools, and communities. a multicultural perspective," in *Handbook of Research on Multicultural Education*, eds J. A. Banks and Y. C. A. Banks. (New York, NY: Macmillan), 498–524.

INCLUD-ED (2007). *D.4. 1.Report 2: Theories, Reforms and Outcomes in European Educational Systems*. Available online at: http://creaub.info/included/wp-content/uploads/2010/12/3_D.4.1-Report-2.pdf

INCLUD-ED (2011). *Actuaciones de Éxito en las Escuelas Europeas*. Madrid: IFIE.

INCLUD-ED Consortium (2009). *Actions for Success in Schools in Europe*. Brussels: European Commission.

Jose, P. E., Rata, A., and Richards, A. (2017). The effects of home–school dissonance on individual and school outcomes for Māori and European New Zealand adolescents. *Front. Edu.* 2:53. doi: 10.3389/feduc.2017.00053

Koutroba, K., Vanvakari, M., and Steliou, M. (2006). Factors correlated with teachers' attitudes towards the inclusion of pupils with special educational needs in cyprus. *Eur. J. Special Needs Educ.* 21, 381–394. doi: 10.1080/08856250600956162

Krause, A., and Schüller, S. (2014). *Evidence and persistence of education inequality in an early-tracking system–The German Case–. FBK-IRVAPP Working Paper No. 2014-07*. Research Institute for the Evaluation of Public Policies.

Macías, F., and Redondo, G. (2012). Pueblo gitano, género y educación: investigar para excluir o investigar para transformar. *Int. J. Sociol. Educ.* 1, 71–92. doi: 10.4452/rise.v1ii1.140

Malecki, C. K., and Demaray, M. K. (2006). Social support as a buffer in the relationship between socioeconomic status and academic performance *School Psychol. Q.* 21, 375–395. doi: 10.1037/h0084129

McLoyd (1998). Socioeconomic disadvantage and child development. *Am Psychol.* 53, 185–204.

Merriam, S. B., and Kee, Y. (2014). Promoting community wellbeing: the case for lifelong learning for older adults. *Adult Educ. Q.* 64, 128–144. doi: 10.1177/0741713613513633

Miguel-Luken, V., and Solana-Solana, M. (2017). Immigrants in the educational system in spain: who persists? *Soc. Indic. Res.* 132, 733–755. doi: 10.1007/s11205-016-1323-4

OCDE (1997). *Parents as Partners in Schooling.* París: Centre for Educational Research and Innovation.

Ogbu, J. (1997). "Racial stratification and education in the united states: why inequality persist," in *Education: Culture, Economy, Society*, eds A. Halsey, H. Lauder, P. Brown and A. Stuart Wells (Londres: Oxford University Press), 765–778.

Oliver, E., de Botton, L., Soler, M., and Merrill, B. (2011). Cultural intelligence to overcome educational exclusion. *Qualitative Inquiry* 17, 267–276. doi: 10.1177/1077800410397805

Oreopoulos, P., Page, M., and Stevens, A. (2006). The intergenerational effects of compulsory schooling. *J. Labor Econ.* 24, 729–760. doi: 10.1086/506484

Orfield, G., and Lee, C. (2005). *Why Segregation Matters: Poverty and Educational Inequality*. Cambridge, MA: The Civil Rights Project.

Pomerantz, E. M., Grolnick, W. S., and Price, C. E. (2005). "The role of parents in how children approach achievement: a dynamic process perspective," in *Handbook of Competence and Motivation,* eds A. J. Elliot and C. S. Dweck (New York, NY: Guilford Publications), 229–278.

Puigvert, L., Christou, M., and Holford, J. (2012). Critical communicative methodology: including vulnerable voices in research through dialogue. *Cambridge J. Edu.* 42, 513–526. doi: 10.1080/0305764XX.2012.733341

Racionero-Plaza, S., and Puig, P. (2017). La confluencia entre comunidades de aprendizaje y otros proyectos: el caso de los crfa en perú y guatemala. *Multidisciplinary J. Edu. Res.* 7, 339–358. doi: 10.17583/remie.2017.3023

Ramis, M., Martín, N., Íñiguez, T., Martin, N., and Iñiguez, T. (2014). How the dialogue in communicative daily life stories transforms women's analyses of why they suffered gender violence. *Qualitative Inquiry* 20, 876–882. doi: 10.1177/1077800414537210

Redding, S. (2000). *Familias y Centros Escolares*. Ginebra: Oficina Internacional de Educación (IBE).

Rogoff, B., Goodman Turkanis, C., and Bartlett, L. (2001). *Learning Together: Children and Adults in a School Community*. New York, NY: Oxford University Press.

Rusk, D. (2003). *Cities Without Suburbs. 3rd Edn*. Washington, DC: Woodrow Wilson Press.

Santa Cruz, I., Siles, G., and Vrecer, N. (2011). Invest for the long term or attend to immediate needs? Schools and the employment of less educated youths and adults. *Eur. J. Educ.* 46, 197–208. doi: 10.1111/j.1465-3435.2011.01475.x

Sheldon, S. B., and Epstein, J. L. (2002). Improving student behavior and school discipline with family and community involvement. *Edu. Urban Soc.* 35, 4–26. doi: 10.1177/001312402237212

Teddlie, C., and Reynolds, D. (2001). Countering the critics: responses to recent critics of school effectiveness research. *School Effectiveness School Improvement* 12, 41–82. doi: 10.1076/sesi.12.1.41.3458

Tellado, I. (2017). Bridges between individuals and communities: dialogic participation fueling meaningful social engagement. *Res. Ageing Social Policy* 5, 8–31. doi: 10.4471/rasp.2017.2389

Tellado, I., and Sava, S. (2010). The role of non-expert adult guidance in the dialogic construction of knowledge. *Revista de Psicodidáctica* 15, 163–176. Available online at: http://www.ehu.eus/ojs/index.php/psicodidactica/article/view/822/694

Touraine, A. (1997). *Podremos Vivir Juntos? Iguales y Diferentes*. Buenos Aires: Fondo de Cultura Económica.

UNESCO (2016). *Recommendation on Adult Learning and Education*. Paris: UNESCO. Available online at: http://unesdoc.unesco.org/images/0024/002451/245179e.pdf

UNESCO, UNDP, UNFPA, UNHCR, UNICEF, UNWOMEN, ILO (2015). *Education 2030–Incheon Declaration and Framework for Action for the Implementation of Sustainable Development Goal 4* (Accessed November 9, 2017). Available online at http://unesdoc.unesco.org/images/0024/002456/245656e.pdf

Valls, R. (2000). *Comunidades de Aprendizaje: Una Práctica Educativa de Aprendizaje Dialógico Para la Sociedad de la Información*. Dissertation thesis, Universidad de Barcelona.

Valls, R., and Padros, M. (2011). Using dialogic research to overcome poverty: from principles to action. *Eur. J. Edu.* 46, 173–183. doi: 10.1111/j.1465-3435.2011.01473.x

Weis, L., and Fine, M. (1993). *Beyond Silenced Voices Class, Race, and Gender in United States Schools*. New York, NY: State University of New York Press.

Wenger, E. (2001). *Comunidades de Práctica. Aprendizaje, Significados e* Identidad. Barcelona: Paidós.

Willis, P. (1981). *Learning to Labour: How Working Class Kids Get Working Class Jobs*. Aldershot: Gower Publishing.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer CD and handling editor declared their shared affiliation at time of review.

frontiers in Psychology

ORIGINAL RESEARCH
published: 19 September 2018
doi: 10.3389/fpsyg.2018.01744

Interactive Learning Environments for the Educational Improvement of Students With Disabilities in Special Schools

Rocío García-Carrión[1], Silvia Molina Roldán[2] and Esther Roca Campos[3]*

[1] Faculty of Psychology and Education, University of Deusto, Bilbao, Spain, [2] Department of Pedagogy, Universitat Rovira i Virgili, Tarragona, Spain, [3] Faculty of Psychology, Teacher Training and Sciences of Education, Universidad Católica de Valencia, Valencia, Spain

Providing an inclusive and quality education for all contributes toward the Sustainable Development Goals of the United Nations. High-quality learning environments based on what works in education benefit all students and can be particularly beneficial for children with disabilities. This article contributes to advance knowledge to enhance the quality of education of students with disabilities that are educated in special schools. This research analyses in which ways, if any, interactive learning environments can be developed in special schools and create better learning opportunities for children with disabilities. A case study was conducted with students with disabilities (N = 36) and teaching staff in a special school, involving interviews and focus groups. We argue that rethinking the learning context by introducing instruction models based on interaction benefit children with disabilities and provide high-quality learning and safe and supportive relationships for these students, thereby promoting their educational and social inclusion.

Keywords: interaction, learning, disabilities, inclusion, special schools

OPEN ACCESS

Edited by:
Isabel Menezes, Universidade do Porto, Portugal

Reviewed by:
Manuela Sanches-Ferreira, Politécnico do Porto, Portugal
Gregor Ross Maxwell, UiT The Arctic University of Norway, Norway

****Correspondence:***
Silvia Molina
silvia.molina@urv.cat

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Psychology

Received: *27 May 2018*
Accepted: *29 August 2018*
Published: *19 September 2018*

Citation:
García-Carrión R, Molina Roldán S and Roca Campos E (2018) Interactive Learning Environments for the Educational Improvement of Students With Disabilities in Special Schools. Front. Psychol. 9:1744. doi: 10.3389/fpsyg.2018.01744

INTRODUCTION

Globally, children with disabilities achieve low educational outcomes, show significantly lower rates of completion in elementary education, and face more barriers in the transition to higher levels of education, which in the long term has an impact on social exclusion and poverty in the adulthood (World Health Organization, 2011). The Convention on the Rights of Persons with Disabilities reaffirmed the international commitment to facilitate these persons the access to "an inclusive, quality, and free primary education and secondary education on an equal basis with others in the communities in which they live" (United Nations, 2007). This commitment is aligned to the global priority of ensuring inclusive and quality education for all to improve people's lives and achieve a sustainable development.

Considering the international movement toward inclusive education, much research has focused on exploring inclusive pedagogies and teachers practice serving students with disabilities in mainstream schools (Florian and Black-Hawkins, 2011). However, students with special needs are still educated in special schools. In Europe, it occurs in varying proportions depending on the country, from a reduced percentage in Iceland, where more than 90% of these students are in mainstream schools, up to about 100% in the Walloon region of Belgium. In Spain, where this

study has been conducted, the percentage of students with special needs enrolled in special schools is 17% (World Health Organization, 2011).

When compared to mainstream schools, special schools fail to provide students with special needs a maximum level of attainment in instrumental learning (language and mathematics), which seem to be explained, at least partially, by the different characteristics of both learning environments (Kocaj et al., 2014). Indeed, decades of research has provided evidence of the benefits of inclusive versus special education for students with special needs (Dunn, 1968; Calberg and Kavale, 1980; Madden and Slavin, 1983). Focusing not only on the educational placement but also on the quality of the education provided can contribute to enrich the learning opportunities of students that are not yet being educated with their non-disabled peers (Lacey and Scull, 2015). The role that psychology can have in promoting inclusive education has been claimed, being dialog a key aspect that has been emphasized (Kershner, 2016).

Particularly, in trying to identify the characteristics that can enhance the quality of special schools as a learning environment for children, it is relevant to consider research in psychology of education that has attributed a key role to interaction and dialog to explain learning processes, in an approach that has been conceptualized as the dialogic turn of educational psychology (Racionero and Padrós, 2010), and according to which interactive and dialogic learning environments maximize students' learning opportunities and results. This approach has been developed based on the contributions of the sociocultural theory of learning initiated by Vygotsky, which explain learning and cognitive development as cultural processes that occur in the interaction with others (Vygotsky, 1962, 1978; Rogoff, 1990; Cole, 1996; Wenger, 1998). Dialog also plays a key role for learning, as it allows sharing knowledge, thoughts, and purposes (Rogoff, 1990; Bruner, 1996) and create knowledge together (Vygotsky, 1962; Edwards and Mercer, 1987; Wells, 1999; Flecha, 2000).

The social and intersubjective character of learning applies also for students with disabilities as, according to Vygotsky (1978), the students with disabilities benefit from interactive learning contexts to advance toward higher levels of learning and higher stages of development. Interactions with peers with higher levels of academic competency has been highlighted as a facilitator of greater contact of students with special needs with the general curriculum and greater learning progress of these students in regular schools (Slavin, 1996; Hanushek et al., 2003; Carter et al., 2005; Justice et al., 2014).

Recent research on learning environments that emphasize dialogical interactions and argumentation has found that these learning environments contribute to better instrumental learning outcomes of students with special needs (including vocabulary, reading, and writing) (Hand et al., 2013). Similarly, the efficacy of implementing interactive learning environments has been shown to improve prosocial behavior among elementary students (Villardón-Gallego et al., 2018). When interaction in cooperative learning is promoted, benefits are achieved both in terms of learning and social acceptance, as special education students benefit of improved self-esteem, a safer learning environment, and better learning outcomes (Jenkins et al., 2003). Students with moderate to severe intellectual disabilities gain peer acceptance, popularity, and frequency of interactions with their peers without disabilities (Piercy et al., 2002). Specific interventions based on promoting peer support have demonstrated promoting academic engagement and improvement (Carter et al., 2015, 2017), enhanced interactions and socialization (Schoger, 2006; Kohler et al., 2007; Schmidt and Stichter, 2012; Carter et al., 2015, 2017; Chung and Douglas, 2015; Lane et al., 2015; Simpson and Bui, 2017), and language development (Schmidt and Stichter, 2012).

However, scientific literature on the benefits of interactive learning environments for students with special needs are mainly focused on mainstream schools and in relation to students without special needs. Students with the most severe disabilities, who need extensive support for both access the curriculum content and non-academic skills such as interacting with others, tend to be underrepresented in the literature (Browder et al., 2014), and we still need to know which can be the effects that interactive learning environments in special segregated settings can have in special education students, to improve both their academic and social competencies.

From the perspective of providing an education of the highest quality that ensures the inclusion of all the diversity of students, and capitalizing on the benefits of interaction for learning, previous research has shown the benefits of a particular interactive learning environment, interactive groups (IG), to achieve the best levels of school success and group cohesion for all (Valls and Kyriakides, 2013; Aubert et al., 2017). Particularly, the benefits of IG for mathematics learning has been demonstrated (Díez-Palomar and Olivé, 2015; García-Carrión and Díez-Palomar, 2015). With IG, classes are organized in small heterogeneous groups of students that work together on a learning activity (mainly of instrumental content, i.e., literacy or math). Students complete the activity relying on peer interaction and mutual help, and with the support of an adult volunteer from the community that dynamize interactions. In these groups, different knowledge and abilities are shared to help everyone's learning. IG have been identified by EU-funded research "INCLUD-ED strategies for inclusion and social cohesion in Europe from education" (FP6, European Commission, 2013) as a Successful Educational Action, because they have demonstrated to improve educational results in the different contexts where they have been implemented (Valero et al., 2018), and therefore have universal components that could be transferred to and recreated in other educational contexts (Flecha, 2015).

When implemented in mainstream schools, grouping together students with and without disabilities, IG have demonstrated to contribute to the educational inclusion of students with (and without) disabilities with positive effects both in instrumental learning and in group cohesion (García Carrión et al., 2016). However, we still do not know whether and how IG could be applied in special schools, how this implementation could respond to the challenge of achieving positive outcomes for children with special needs (Lindsay, 2016), and how this application could contribute to inclusion from special schools. In this article, we analyze the process of recreation of IG in a special school, particularly in an elementary classroom with

students with disabilities learning mathematics. The aim of the study is twofold: (a) to examine how IG can be implemented in special schools and (b) to identify the improvements, if any, that this interactive learning environment has entailed for the participants. We also analyze the challenges that the school faces in this process to enhance the quality of education and opportunities of inclusion for all students.

MATERIALS AND METHODS

To carry out this research, we used the case study method, which has focused on a public special school located on the outskirts of a town in the province of Valencia, Spain. This school is distant from the urban center of the town and welcomes students from different municipalities in Valencia. The school, committed to inclusion despite being a segregated educational placement, has been working on the implementation of successful educational actions such as IG and Dialogic Literary Gatherings (García-Carrión, 2015) with its students for 2 years. The study conducted was an instrumental case study (Stake, 1995), as it allowed achieving a deep understanding of how the interactive learning environment is being implemented in the special school and how it is contributing to improve students' educational opportunities.

Participants

For the case study on the implementation and impact of interactive learning environments, we focused on the Primary Education group, which comprises 36 students from 6 to 14 years old with different disabilities including intellectual disability, cerebral palsy, and autism. Most of these students had participated in the interactive learning environment for three school years, and others did it for one or two school years; therefore, the number of students participating in the groups varied between school years in a range between 25 and 30 students. More detailed information about the students is presented in **Table 1**.

TABLE 1 | Students' characteristics.

		F	%
Gender	Male	22	61
	Female	14	39
Age	6	3	8
	7	2	6
	8	2	6
	9	4	11
	10	8	22
	11	4	11
	12	4	11
	13	5	14
	14	4	11
Disability	Intellectual disability	13	36
	Autism spectrum disorder	11	31
	Intellectual and physical	8	22
	Others	4	11
Communication	Oral	14	39
	AAC systems	5	14
	Oral and AAC systems	2	6
	Language delay	15	42
Years participating	1 year	6	17
	2 years	6	17
	3 years	23	64
	Not available	1	3
Total		36	100

TABLE 2 | Data collection techniques.

Data collection techniques	Participants
Exploratory focus group	School teachers. The participants were 10 teachers that had been continuously implementing successful educational actions for more than one school year.
In-depth interview	School principal
Communicative focus group	Primary education teachers. The participants were three teachers of primary education students who participate in the interactive learning environment studied.
	Primary education students. The participants were four primary education students who participate in the interactive learning environment studied.

Our methodological approach draws on the Communicative Methodology (Puigvert et al., 2012), an innovative approach to conduct research aimed at overcoming inequalities. Aligned with the transformative paradigm (Mertens, 2007), its main objective goes beyond to understand social and educational realities, but to discern between exclusionary and transformative elements that contribute to hinder or to overcome inequalities in the field of study. Due to the transformative orientation of this methodology, it is particularly useful in the investigation of issues that affect vulnerable groups, such as students with disabilities.

The data collection techniques used are detailed in **Table 2**, according to the timeline they were implemented.

Methodological Process

One of the researchers involved in the project was in charge of contacting and visiting the school for the data collection process. Based on a previous relationship with the teachers, who had already introduced a research-based approach in the school, the researcher contacted the school principal about participating in the study. Once obtained the school's positive reply to participate, the researcher visited the school to give the staff additional details of the research process. Information about the school functioning, characteristics of the students, and teacher's practice was provided to the researcher in several meetings with the staff. In a subsequent visit, the exploratory focus group with the school teachers was carried out to identify relevant topics on the development of interactive learning environments in the school. Participants agreed to provide researchers access to the relevant data for the purpose of the study. Both teachers and families were informed of the nature of the research, stressing that children's participation was anonymous and voluntary. Likewise, it was explained that

TABLE 3 | Categories of analysis.

		Category	Definition
Characteristics of the interactive learning environment		a) Characteristics of the development of an interactive learning environment in the process of implementing IG in the school	Characteristics of the learning environment created that show the implementation of interaction and dialog typical of IG and the way it has been implemented in the particular context
	Improvements achieved	b) Learning improvements achieved	Evidence of improvements achieved in instrumental learning, behavioral learning, and learning of communicative abilities
		c) Improvements achieved in students' relationships and group cohesion	Evidence of improvements achieved in students' relationships and class group cohesion
		d) Impact of the improvements in different moments, activities, and spaces	Evidence of improvements achieved in learning and students' relationships and group cohesion beyond the interactive learning situation
		e) Factors associated to successful operation and results of the interactive learning environment created in the school	Relationships between the characteristics of the learning environment created and the improvements achieved (learning and relationships)
		f) Challenges for the full implementation of IG in the special school and maximize its inclusive potential	Differences between IG and the actual implementation of the interactive learning environment in the school, challenges identified in the process of full implementation of IG, and connections with the results achieved

collected data would be treated with confidentiality and used solely for research purposes. Written informed consents were obtained from the principal, teachers, and the students' parents. Ethical requirements were addressed following the Ethics Review Procedure established by the European Commission (2013) for EU research.

The topics identified in the exploratory focus group oriented the subsequent data collection to deepen in their understanding. Previous knowledge on the benefits of IG in mainstream schools identified by research was also used to guide the data collection. Finally, the interview and focus groups evolved around six topics that were subsequently used to create the categories of analysis (see **Table 3**). In the case of the focus groups with students, only the topics (a) to (d) were considered, and the focus group was conducted with the assistance of two teachers, who facilitated the communication with the students, as all of them had communication difficulties. Some of the students use regularly augmentative and alternative communication systems, while others usually communicate orally but in the focus group used pictograms to support their communication.

Interviews and focus groups were always conducted in the school for the participants' convenience, with the same researcher involved in the data collection. They were audio recorded and subsequently transcribed verbatim, and notes were also taken during the students' focus group. In all cases, the teachers and the principal had beforehand the questions for the focus groups or interviews in order to facilitate a previous reflection to the students on the object of study. Following the communicative orientation, both the interview and the focus groups were based on an intersubjective dialog between the researcher and the participants, aiming to reach an agreement on the interpretation of the reality that was object of study and therefore joint creation of knowledge (Gomez et al., 2011).

Data Analysis

A system of categories was created deductively following the topics identified with the teachers and informed by the literature. The categorization of the data has been based on the researchers' agreement on the category assignment of each piece of data. In **Table 3**, the categories are defined. The three coders (grounded in a content analysis approach) conducted and shared their coding and resolved any discrepancies using a consensus-based approach.

RESULTS

Our analysis shed light on the conditions to create an interactive learning environment in a special school with a reorganization of the existing resources and the transformations generated in the pattern of classroom interaction to improve students' behavior and learning (see **Figure 1**). The transformative dimensions of this case study do not dismiss the complex challenges and limitations faced by professionals to create better conditions for learning and development in the context analyzed. An account on those challenges is also provided.

Creating an Interactive Learning Environment in Special Education

In this special school, students from different elementary classrooms share together an hour session per week to work in an interactive learning environment: six small heterogeneous groups are created; each group has a different activity lasting around 15 min each focused on instrumental learning, mostly mathematics, resembling the operation of IG. In each group, four or five students work with the support of an adult, in this case a member of the school staff. Due to the specificity of the school and their students, three particular aspects are carefully

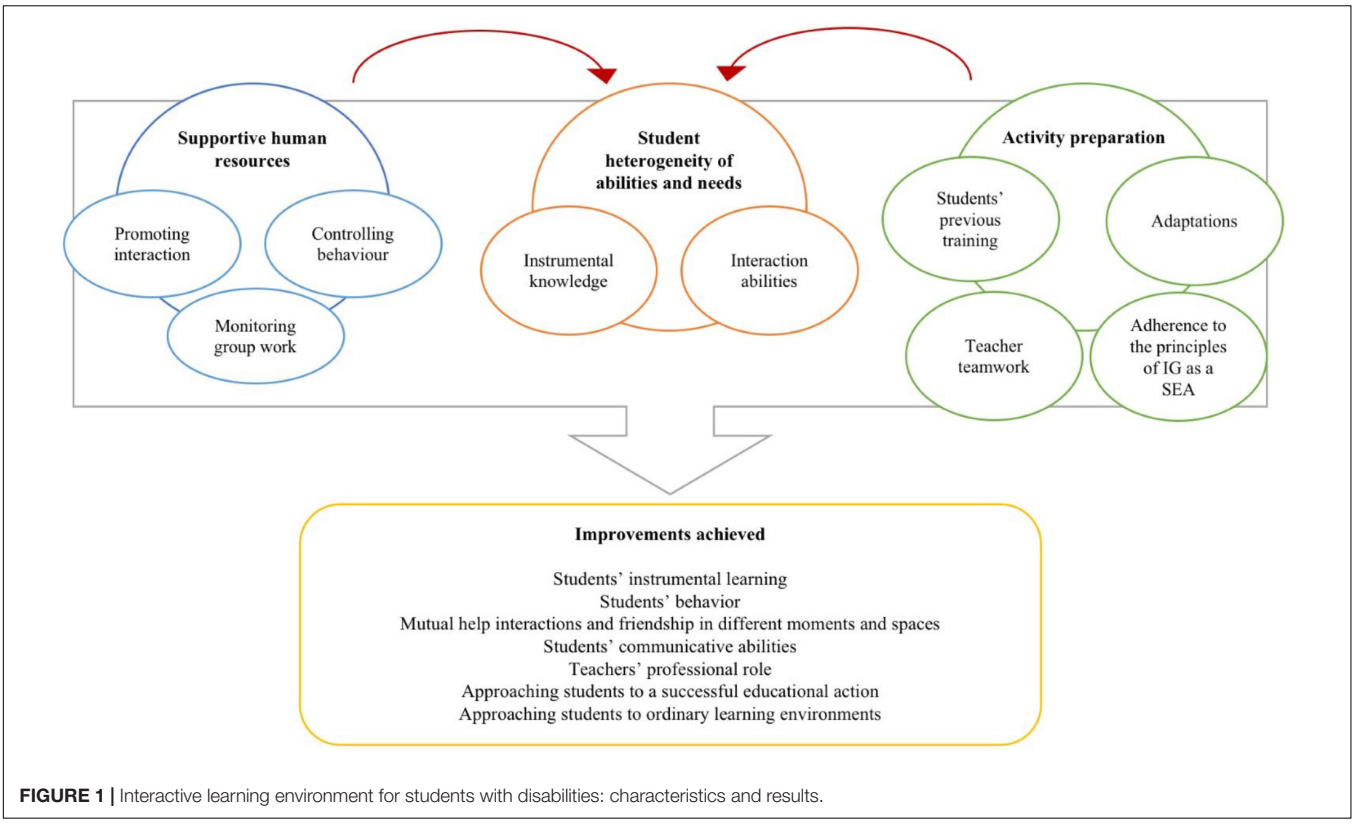

FIGURE 1 | Interactive learning environment for students with disabilities: characteristics and results.

designed to maximize students' learning opportunities in this environment: (a) heterogeneity within the groups, (b) the role of the adults, and (c) the preparation of the activity.

Enhancing Richness of Interactions Within the Existing Diversity

Whereas all students share the characteristic of having a disability, the group of students cannot be considered homogeneous, as diversity among students is huge and difficulties and abilities vary very much. In this case, beyond the usual criteria of diversity – gender, culture, language, or level of achievement–, other criteria are taken into account to organize the groups, these are as follows: (a) students' level of achievement and their ability to contribute to other students' learning, (b) students' communicative competence and ability to interact with others, and (c) students' behavior. As teachers explain, taking into account these criteria, students are distributed in the groups based on both the difficulties they have and on what they can contribute to the others, and these contributions evolve around two key components of IG: instrumental learning and interaction. These groups are organized to operate for a whole school year. However, as their functioning is permanently assessed to ensure that learning and interaction are maximized, teachers can agree to redistribute some of the students if they observe that it might benefit the students.

> So, when we started doing the groups, it was a bit different from what is normally done in the ordinary schools, we had to look for heterogeneity within the diversity that we had. Then, when we started working with these groups we decided that in each group there had to be at least one student or two that contributed knowledge to the rest, (...) another one that does not have as much cognitive level but would contribute with the procedural part, that is, we see that he or she provides many interactions, then we include one student or two with this ability, depending, and then other students who receive interactions. Then, the groups are composed like this. And it may be that also within the group, as we have many children with behavioral problems, we do not put several students with behavior problems in the same group but they are each in a group (Teacher, Focus group).

Due to the high degree of diversity, teachers' concerns referred to how all participants would take advantage of participating in these groups. Reaching a challenging learning situation for all and avoiding that those with higher levels work below their possibilities entailed organizing the groups according to the principle of high expectations and setting the learning objectives at the highest level. Consequently, some students might be in a situation far beyond their learning possibilities at that moment; however, these cognitively challenging situations are relevant for them because those are mediated by interactions and stimulation from others that foster their learning, even if they would not achieve the highest objective set:

> There is always one thing that is clear: that there are no children in the groups wasting their time, that is, something they already know to be repeating it, because if they already know it they have already learned it. Instead we look for maximum learning. So that's

> why we always include students who we know they will not get the objective at that point, or maybe they will never get to, (. . .), which is a problem we have. But, those students are the ones that they benefit to come and to receive interactions. (. . .) (Teacher, Focus group)

Furthermore, the interactive environment scaffolds the students to follow their individual plans and to reach their individual goals:

> Maybe he will not understand the concept "up and down," but in the interaction within the group he places [an object] like the rest of his classmates, which is also an individual goal. So, the intention is that what is [taught] in the groups is part of his individual plan as an objective (Teacher, Focus group).

More Adults With More Diverse Roles to Support Students' Learning

The adults facilitating the groups have the role to promote supportive learning interactions among student. In this school, however, the number of adults increases as compared to IG in mainstream schools as well as the diversity of their roles, to respond to students' needs. Two adults participate in each group instead of one which is the usual in IG; their role is the same: to promote peer interactions around the learning activity. In addition, when there are students with behavior disorders, an additional adult is part of the group and takes care of behavioral problems eventually. Another professional supervises the different groups to ensure they are working effectively and provides additional support if necessary. These professionals can be the teacher, educators, or speech therapists.

Previous Training to Allow Students Taking Advantage of Interactions

When the session starts, students first need to know and understand the task they need to solve and then do it relying on the mutual support among students and adults. When students are not familiar with the activity, most of the time is spent in understanding what they have to do, and leave little time to work effectively. For this reason, teachers prepare the students in advance to get familiar with the task and activating the learning process, in order to make the most of the interactive situation. By observing the students, teachers realized the group experienced difficulties to perform the task when the students had not practiced the activity beforehand. It seemed crucial for the children succeed to know and to understand the task previously. So, they decided to anticipate the learning as explained:

> It was an activity that was not trained. Here the school kids need to repeat the activity many times to know... Then, if they had not understood how they had to do it... The problem is that they did not know what to do, the problem was not that they did not know how to count from 1 to 10 (...) the kids that have done that before, get in front of the activity and know what they have to do, they know what it is about,. (Teacher, Focus group).

Having practiced the activity and having clearer its objective, students do not have to spend time in understanding what they have to do but directly to solve the activity interactively, and adults do not have to focus on explaining the activity but on promoting learning interactions.

> What has that provoked? It has created moments in which if I know how to do it and how to solve it I am able to help you, okay? Then we have seen that there are kids that help their peers to do the activity because "I know how to do it" (Principal School, interview).

Carefully Designed Instruction and Systematic Evaluation

The different decisions on how to create this interactive learning environment in the school – such as the criteria of heterogeneity to organize the groups and the adults' roles – have been made based on an agreement between the teaching staff. Teachers meet regularly to coordinate their work, including the decisions on the contents they are going to teach or practice in the groups, the activities they will propose to the students, and the most adequate materials for their students. Previously, the proposed activities are prepared by different groups of teachers that focus each on a particular block of contents (numbers, basic concepts, calculation, shape, series, etc.). The different proposals are shared and discussed in these coordination meetings, that result in a detailed planning of the sessions.

> In terms of preparing the activity, adapting the material, and all the work previous to the groups, everything is established in meetings with all the staff, where the content blocks are specified: basic concepts, numbering, operations... There, the kind of activities and the specific objective are already specified: numbering from 1 to 10, numbering from 1 to 15... and it is also sequenced. In this way, the professionals develop these activities by teams, then they share them, all together, with an example of how to carry out this activity (...) For example, teachers who work on number and quantity, the whole year will be working on number and quantity, (...) and then, they present those activities in a session, and all the others presents theirs, then people say "hey, you planned to use clamps and that is very difficult for our students, you have to change it to..." (...) then you have to remember that they can use stickers, or Velcro... or think how to do it (Teacher, Focus group).

Activity adaptation is one important task of the teachers when planning the sessions. When implemented in mainstream schools, IG also contemplate the adaptation of activities and materials to allow the participation of students with special needs; the activity is the same for all the group members – otherwise interaction on the activity would be blocked – but students can accede in different ways. However, in special schools, adaptations become especially important because the diversity among students is much greater than in ordinary schools and difficulties and abilities vary very much. In the studied school, one barrier that teachers have to overcome to allow all students' participation is the lack of literacy skills of many students, that can complicate their participation in activities mediated by written information or require writing to solve them. For this reason, activities are usually done with manipulative materials to avoid the lack of literacy skills in many students being a barrier for the learning of mathematics. The diversity of skills also includes students that are not able to speak, and others that

can write but with means alternative to a pen, for instance. This diversity is considered when activities and materials are prepared. In addition, during the sessions, each participating adult has available the information on each student's skills in order to adjust the demands and supports to them:

> Within the group you can find children who write, who do not write, who use a Dymo labeler to write, or maybe they do know the numbers but as they do not write they have a Velcro adaptation... or they can speak, or they cannot speak... then depending what you find, right? Then, at each table, the children are placed and there is a sign in the table that indicates what each child can do, because not all of us know all the students. Then I come to a group and I say, look, Marcos, I know he can write, he can speak, but he cannot count or whatever. And then this gives you clues to work in the groups so that they can help each other, or to make the adaptations of material, that in many cases has to be adapted to Velcro type (. . .), because they know the numbers but they cannot write them, then you give them the option to solve it by taking a Velcro and placing, right? (Teacher, Focus group).

Teachers explain that these adaptations are crucial because the success of the activity depends partly on it. Therefore, they are not decided individually by a teacher, but debated and decided through agreement among the teaching team, with the ultimate objective that all students can participate and have access to the learning contents through diverse means.

Teachers also conduct systematic evaluations after each session, in which the functioning of the session and the activity are assessed. In these evaluations teachers analyze, on the one hand, that the basic principles of IG are followed (e.g., interaction, high expectations) and, on the other hand, that good results are obtained in terms of quantity and quality of interactions among students, completion of the activity and students' learning. The teachers take notes during the sessions about the aspects that need to be improved to allow an enhancement of the interaction and learning opportunities for all students.

> There is always an evaluation after the group. The person who has been supervising has a sheet where she takes notes of what she observes "I see that this group has finished the activity very soon" "I see that in this group only one knew to do the activity, therefore, we have to improve it." Then, after the group, there is a weekly evaluation meeting and all doubts are adjusted, okay? (...) but never losing sight of the basis of the [successful] action [IG], this is always there! That is, the improvement of the interaction, the objective that children have to learn, that children have to carry out the activity. We never lose sight of that. That is the goal, then all our dialogs are aimed at the improvement of that. That is to say, all the activity has to be focused to improve learning, and everyone's participation (School principal, interview).

Transformation of Traditional Patterns of Classroom Interaction: Better Conditions for Caring and Supportive Learning Environments

Teachers observations and evaluation of this interactive learning environment reported a positive impact on increasing supportive and caring interactions that fostered behavioral and learning improvements among students.

Increasing Supportive Interactions Within the Groups and Beyond the Classroom

Creating an interactive learning environment in the classroom shifted the pattern of interaction students had engaged, so far. As teachers reported, their students had a trajectory of very individual learning, but this interactive environment facilitated the opportunities to help each other and learn together. Both the principal and the teachers agree that 'offering help' and 'asking for support' emerged as two common interaction behaviors in the group:

> They help each other. I have seen this, I have seen a child being able to hold the hand of a classmate and help him point, and trying to explain it to him, with his words, very basic, but... eh... "look" "here" "there" "the number" and help him and tell him (School principal, Interview).
> Teacher 1: the students themselves are already helping each other, right? and they imitate our role (. . .)... if they do not know for example the number 8, no? they are counting, and they get number 8, you see [one child] in the class holding another child's hand, he is doing the sequence to count 8 and even gives to choose between two numbers, or even say "look here," that has improved immensely.
> Teacher 2: Or ask for help too, maybe someone who at one point says "do you help me?". When you have worked a lot on the idea "ask someone to help you" or "ask someone..." well, they can also say it, that is already spontaneous in class,. (Teachers, Focus group).

Furthermore, the students in the focus group talk about mutual help, and they explain it when they are asked about what they like the most of working in these groups. In the conversation with the researcher and the teachers they increase awareness about the added value of these supportive interactions. They explain, for example, that Pilar helps Rafael taking his hand because he cannot move it alone, Fatima helps Álvaro to stick stickers, and Inés helps Wazir bringing the paper closer.

Students have learnt to help each other despite their limitations and tend to use their skills to help the others. Experiencing caring and supportive interactions in the groups helped students to move from a deficit thinking mindset toward an asset-based mindset, focusing in their strengths and opportunities rather on their problems:

> Helping each other was one of the things that I saw the most difficult, because everyone has their own limitations and their own difficulties. And they have started to say "no, no, I can move my hand, I will help those who cannot move their hand "right? Or "I can speak, I will be the one who speaks about this to those who cannot speak, and I will indicate on the tablet where or how they can search." For me that has been spectacular,. (School principal, Interview).

In this regard, according to the teachers, having the opportunity to help others has meant a change for many of them, who until that moment had only been the recipients of help. It has changed their self-concept and their beliefs about their capabilities, has empowered them, and, in some cases, it

has brought changes also in their behavior, individually and as a group.

> I think it has also raised their self-esteem, feeling able to help others (...) Fatima was a student with... very low expectations towards her, she had many behavioral problems, she was super absentee... (...) in the groups, she realized she is capable of helping the classmates... not always the one being helped or knowing the least or the one punished, but feeling "I am capable of doing it" has made her grow as a person, and now most of the time she is always helping her classmates, that is, she acts as a role model, helps them raise their hand, creates many interactions, asks questions, I don't know... she has a totally different attitude than she had three years ago, (. . .), for me it is one of the most important cases I've seen how it has improved (Teacher, Focus group).
>
> I also see the idea that "we are a group," "we have to take this activity forward and we have to do it," right? And I think that there has been a lot of improvement in caring relationships and classroom climate, how they talk to each other, how they respect each other, right? uh... some are also aware that "I have more capacity than him" right? And the way they treat each other, with respect, the attitude, teach us a lot. You can see it, and it is when you realize "this is the way it is, this is what solidarity means." (School principal, Interview).

The generalization of help, care and friendship to diverse situations and moments has been identified as especially important for the children with the most severe disabilities that have very limited possibilities of interaction and in the school are recipients of basal stimulation. As a result of participating in interactive learning environments in the classroom, the number and quality of interactions that these students receive from their peers has increased:

> they were all students with cerebral palsy in the same class, who did not have interactions with any other student, that is, they did not relate to each other and in the only moment they could relate was in the playground if the students approached (...). So, the tutors thought that for them it could be a moment of interactions, and since these groups have been created there are many more interactions both in the groups and in the playground moments, the students are much closer,. (Teacher, Focus group).

Some students take the lead to interact with these children and encourage other peers to follow their example, thus promoting the social inclusion of these more handicapped children within the peer group:

> a child who has cerebral palsy, who at any time would have been in the playground and if the adult did not come he did not have anyone else's interaction, (...) and after starting working in groups, for example, Ines is a girl who (. . .) interacts a lot with him and in the playground, makes other girls go with the basal children [highly affected children, receiving basal stimulation], that is to say, the interaction has increased a lot especially with the basal children, who were the ones who were a little more. . . within our special school, those who were most excluded. And then (...) a friendship group has been created and they are helping each other and calling each other (...) and you see them in the playground as they walk around with them, (. . .) they have changed a lot (...),. (Teacher, Focus group).

Supportive interactions have also brought the possibility for many students to "know each other" and these interactions have led to the development of new friendships. The students themselves report they listen more to each other, help each other, pay more attention to others and talk more among them. These interactions resulted in new friendships and caring relationships beyond the classroom. For instance, some students spontaneously spent their free time to play together instead of individually. The playground and the lunch time are other spaces and times in which children have been observed to help each other and build their friendship. Episodes like these show that learning interactions and mutual help have been assumed by the students as part of their everyday relationships.

> Yes, I have seen it in the playground, for instance I see it a lot, how they are solidary among them, they help each other "because he is my friend" ok? In the playground (. . .) I think they have improved the coexistence (School principal, Interview)

Improvement in Students' Behavior

Teachers have observed a clear and generalized improvement in students' behavior in different aspects. On the one hand, the students with the most disruptive behavior, have reduced their behavioral problems, to the point that by the end of the school year there were no teacher intervention to address behavioral issues. This has been partly achieved thanks to the peer group influence, where other peers can act as role models in this interactive learning environment. The improved behavior has in turn had an impact on an increased possibility for these students to participate in the learning activity in their group and improve their instrumental learning.

> I see children with many behavioral problems that paralyze them to learn anything. The child we are talking about, for example, (. . .), he was not able to be in a group, if you are taking off your shoes, you are getting up, you are dancing, that is... (. . .) I think that the progress has been huge, because seeing the others has been very important. It is now more obvious to me that what we [teachers] say to them does not have the same influence as a classmate. I can tell him "Marcos put on the shoe" 500 times and the 501st he listens to me, but maybe another classmate is the one who says that and he reacts differently (. . .). I don't know, I have realized over time that they have much more power to modify that type of behavior (School principal, Interview).

Aggressive behaviors have also been reduced. There are children whose aggressive behavior has reduced in the groups sessions, while in the regular classroom activities these behaviors persist, which demonstrates the connection between the interactive learning environment and the behavioral change of these children. Again, sharing the learning activities with peers has had an impact on this change, as well as the role of adults focusing on monitoring negative behaviors.

> Manuel, for example, is a student who is in the class and has behavior problems continuously, hitting... that is, very aggressive, at any time. And in the groups (. . .) he is in a group where there is an adult with a support role behind him, right? at first there were many behavioral problems, then the adult is a bit like modeling, right? that is to say, if perhaps he directed the hand like he was going to stretch the hair to a classmate, the adult redirected his

> hand from behind without interrupting in the activity and said, "do you want to ask for help?" Then, compared to how bad he behaved and the times he had to be taken out of the group (. . .), he has changed a lot, and in the ordinary classroom he still has behavior problems, but in the groups misconduct has diminished dramatically, (. . .) now he is be able to ask a classmate "do you help me?", (. . .) he has done it. I think that the groups have been important and it [behavior] has been a key objective for him, to be reduced, because in class there is still misconduct and in the groups has decreased, that is, maybe you can find that he gives you a slap once, but for an entire hour that has changed a lot in Manuel (Teacher, Focus group).

The improvement of both disruptive and aggressive behavior were important learning objectives that were achieved with these children. Beyond these cases, in general, students learnt to work cooperatively, which allowed teachers to focus less on the rules to follow and more on the contents to learn.

> suddenly at the end of last year there was a stability, there was calm. . . the behaviors were more controlled, the children were already well adapted, very used to working in this way, the professionals too, and the environmental noise dropped... and it was like: more peace, hard-working, now. (...) They arrived and suddenly they were all sitting, waiting.... With an attitude totally... and it was like... Wow! It's fantastic! how good! while the past year was crazy... (Teacher, Focus group).

Therefore, through sustained implementation of this interactive learning environment behavioral improvements were observed and reported – leading to a learning environment free of violence, free of distractions, quiet, and focused on the activity – that are a precondition for learning.

Communicative Abilities and Improvement in Instrumental Learning

All students participating in the case study present communicative problems derived from their disability, although these difficulties vary between the students. Being communication a means for both learning and social relationship, having the possibility of communicating and interacting during more time and with more people, promoted an important change: from previous individualized one-to-one attention with the professionals to a multiple group interaction. Enhanced possibilities of using communication has allowed students to perform better and to be able to complete the learning tasks. Teachers recorded several improvements in instrumental learning, and these are clearly related to the contents learned interactively in the groups, which are mainly mathematical concepts.

> Then we have another student who, for example, has a lot of difficulties in his speech and he had many difficulties with seriation, to do a number series, right? (...) so he is already capable of counting, sometimes helped or pointed out by his colleagues, but he is really expanding the number series. He maybe stayed in a very short number, but it has been expanding. I mean, I have seen, in general, in our students, yes, I have noticed improvements in mathematics (Teacher, Focus group).

The students themselves explained in the focus group that in these groups they "learnt more numbers" and also "learnt to help each other and ask for help," seeing both achievements connected.

The same systematicity teachers use to evaluate the functioning of these sessions is used to evaluate students' progress. The objectives of each students' individual plan are permanently assessed, and they consider that these objectives are achieved when a high rate of success is obtained. Besides the achievement of learning objectives, students' progress is also evidenced by the progressive need of less supports:

> Have you noticed that the contents of your individual programming have increased in level, have improved or...?
> Yes. Yes, we also have... our evaluation is: when you are working, the objective has to be achieved 8 out of 10 times, that is, there must be a lot of frequency, 8 out of 10 times that is achieved without any kind of help. And if not, then you reflect the type of help they need. And yes, we have noticed when... well, because the type of help can be total or partial, physical or verbal... or a gesture that is a signal, and then, yes, we see the progress... the type of aid they need decreases (Teacher, Focus group).

Teachers' Progress in Their Professional Role

Regarding teachers, the development of this interactive learning environment has been an opportunity for them to improve their students' learning opportunities and results. It has entailed, on the one hand, an increase of teachers' learning expectations of their students and a clear change in the way teachers speak about their students in the evaluation meetings. The language of possibility now prevails over the language of deficit, and it is especially observable for classrooms that are organized as interactive learning environments. Now teachers do not focus their discussions on their students' limitations to learn but on what the school can do to improve their education to better adjust the educational actions to the students' needs to enhance their progress.

> regarding dialogues, for example I have attended meetings and... the way teachers talk about the students and about the way we are going to improve the action [the groups], (. . .) it is significant. That is, the perspective (. . .) Here we come to talk about the student and here we come to talk to improve the adjustment to the action [the groups] for the students to progress. I go to other types of meetings where there are no [successful educational] actions and it [the lack of progress] is the students' fault (School, Interview)

In this regard, teachers' training is considered to have a great importance in the school. As the objective is to recreate the best way possible IG in the school, the scientific and theoretical basis of this action is made available to teachers so that they have access to this information through original sources, and not only by informal explanations from the most experienced teachers. However, to enhance the impact on students' learning, teachers consider the school still has room to improve finding ways to ensure that all teachers in the school have this information.

> Teacher's training (. . .). Because maybe you'll find "I've read, I'll tell you, I'll explain to you..." But it is not the same what I tell you, what you interpret that (. . .) and what you are going to do exactly, right? I believe that all teachers' training is necessary, that everybody knows exactly how interactive groups are made (...). What we did was to distribute articles, no? in the school there are articles related to interactive groups, their implementation... and also the training at the school level (Teacher, Focus group).

On the other hand, the development of an interactive learning environment has entailed a new and effective approach to their profession, which makes them feel they have improved as teachers. They feel that the joint work they do to plan, evaluate, and improve the intervention with their students has made them improve as professionals. According to the principal, these aspects have improved both in the students' teachers and other teachers and educators who participate giving support.

> Improvement, first the teachers' training, argumentation of the teaching staff, the expectations of the teachers and educators because we work together, because even if they have a support role (. . .) [they] participate. I mean, they have improved as professionals (School principal, Interview).

Finally, the satisfaction with the work done and the impact observed in the students has made them regain hope, excitement, and meaning with their profession.

> For me it has been... I don't know, as recovering hope, and give it to our students within education. An improvement of their dignity, because we have dignified them, we have given them the word, we have given them voice and they have assumed it (School principal, Interview).

DISCUSSION

This case study shows that it is possible to create interactive learning contexts in special schools that lead to an improvement of the quality of education that is offered to a collective of students that too often have been educated in contexts of poor interactions and low expectations. In this school, the interactive learning environment analyzed has been created in the process of recreating IG, a successful educational action that is aligned with the main theories of learning and that has demonstrated maximize the opportunities for learning and social cohesion of diverse groups of students in the different contexts where they have been implemented. This recreation process has made available to the students most in need the educational actions that are bringing the best results in mainstream schools. As a result, students have improved their learning, their behavior, they have increased and improved their interactions with other students, have known better their peers and created friendship, and teachers have also improved as professionals.

The analysis of this interactive learning environment shows the improvements achieved are related to several conditions the teachers created for its success. The intervention is carefully designed, evaluated, and also build on teachers' knowledge on productive dialog and interactions that foster learning and development of all students (Littleton and Mercer, 2013). Specifically, the characteristics identified that are related to the improvements achieved are as follows: an adequate training of teachers on interactive learning environments; the heterogeneous composition of the groups to promote the maximum number and diversity of interactions; the high expectations of teachers on all their students and offering them high quality education; and permanent monitoring and evaluation meetings. All these conditions reflect one main transformation in the teachers and the school: they have overcome the language of deficit to use the language of possibility. The transformation observed among the students when, for instance, they become more aware of their capabilities and use them to learn and help others learn, suggests that this language of possibility has been assumed by the students too.

However, there are several challenges teachers face in this process. The first one is the scarcity of special schools that implement IG and can be used as examples or models. Following this limitation, there is also a lack of research on the effects of IG in this type of educational contexts and on the particularities of its implementation in these schools, if any, that can enhance its success. This makes teachers feel not completely sure that they are working properly when they adapt the activity to the students' needs while adhering as much as possible to the principles of IG and dialogic learning.

The second challenge that the school faces to recreate IG in the special school context is to guarantee the participation of all students, without any exception. Some children have serious behavioral problems, including self-inflicted injury, which makes safer for them and their peers not to participate and stay in a quieter environment. For other children, specifically some of those who have a cerebral palsy, their disability entails health problems that require permanent attention, including for instance postural changes and sleeping to prevent crisis. Teachers are concerned, on the one hand, to find ways to include those children that are not participating and, on the other hand, to make possible an active participation for those seriously affected by their disability.

Finally, the third challenge is the inclusion of volunteers from the community to facilitate the interaction in the groups. This school is physically isolated, placed 4 km far from the town. This placement, decided at a time when people with disabilities were not only segregated but also hidden, is a barrier that needs to be overcome to make the school be part of the town community life and to implement IG with family and community members as volunteers.

Despite these barriers, our findings are encouraging as they show a positive progress in the ongoing process of recreating IG in the special school context. Importantly, the evidence provided do not aim to support a defense of special schools as the preferred context to educate students with disabilities, but it opens new possibilities to improve the quality of education provided to students with disabilities in any educational context where they are placed, including those educated in special schools.

AUTHOR CONTRIBUTIONS

RG-C and SMR conceived the original idea and developed the theoretical framework. ERC collected the data, carried out the interviews, and observations. SMR and RG-C analyzed the data with the support of ERC. SMR wrote the first draft of the manuscript with the support of ERC. RG-C revised and edited the final version of the manuscript and supervised the project.

FUNDING

INTER-ACT. Interactive Learning Environments for the Inclusion of students with and without disabilities: improving learning, development and relationships. Spanish National Programme for Research Aimed at the Challenges of Society. Ministry of Economy, Industry and Competitiveness. Reference Number: EDU2017-88666-R.

REFERENCES

Aubert, A., Molina, S., Shubert, T., and Vidu, A. (2017). Learning and inclusivity via interactive groups in early childhood education and care in the Hope school. Spain. *Learn. Cult. Soc. Interact.* 13, 90–103. doi: 10.1016/j.lcsi.2017.03.002

Browder, D. M., Wood, L., Thompson, J., and Ribuffo, C. (2014). *Evidence-Based Practices for Students with Severe Disabilities (Document No. IC-3). Retrieved From University of Florida, Collaboration for Effective Educator, Development, Accountability, and Reform Center*. Available at: http://ceedar.education.ufl.edu/tools/innovation-configurations/

Bruner, J. (1996). *The Culture of Education*. Cambridge, MA: Harvard University Press.

Calberg, C., and Kavale, K. (1980). The efficacy of special versus regular class placement for exceptional children: a meta-analysis. *J. Spec. Educ.* 14, 295–309. doi: 10.1177/002246698001400304

Carter, E. W., Cushing, L. S., Clark, N. M., and Kennedy, C. H. (2005). Effects of peer support interventions on students' access to the general curriculum and social interactions. *Res. Pract. Pers. Severe Disabil.* 30, 15–25. doi: 10.2511/rpsd.30.1.15

Carter, E. W., Gustafson, J. R., Sreckovic, M. A., Dykstra Steinbrenner, J. R., Pierce, N. P., Bord, A., et al. (2017). Efficacy of peer support interventions in general education classrooms for high school students with autism spectrum disorder. *Remedial Spec. Educ.* 38, 207–221. doi: 10.1177/0741932516672067

Carter, E. W., Moss, C. K., Asmus, J., Fesperman, E., Cooney, M., Brock, M. E., et al. (2015). Promoting inclusion, social connections, and learning through peer support arrangements. *Teach. Except. Child.* 48, 9–18. doi: 10.1177/0040059915594784

Chung, Y. C., and Douglas, K. H. (2015). A peer interaction package for students with autism spectrum disorders who use speech-generating devices. *J. Dev. Phys. Disabil.* 27, 831–849. doi: 10.1007/s10882-015-9461-1

Cole, M. (1996). *Cultural Psychology: a Once and Future Discipline*. Cambridge, MA: Harvard University Press.

Díez-Palomar, J., and Olivé, J. C. (2015). Using dialogic talk to teach mathematics: the case of interactive groups. *ZDM* 47, 1299–1312. doi: 10.1007/s11858-015-0728-x

Dunn, L. M. (1968). Special education for the mildy retarded. is much of it justificable? *Except. Child.* 35, 5–22. doi: 10.1177/001440296803500101

Edwards, D., and Mercer, N. (1987). *Common Knowledge: the Development of Joint Understanding in the Classroom*. Abingdon: Routledge.

European Commission (2013). *Ethics for Researchers. Facilitating Research Excellence in FP7. European Union*. Available at: http://ec.europa.eu/research/participants/data/ref/fp7/89888/ethics-for-researchers_en.pdf

Flecha, R. (2000). *Sharing Words: Theory and Practice of Dialogic Learning*. Lanham, MD: Rowman & Littlefield.

Flecha, R. (2015). *Successful Educational Action for Inclusion and Social Cohesion in Europe*. Berlin: Springer Publishing Company. doi: 10.1007/978-3-319-11176-6

Florian, L., and Black-Hawkins, K. (2011). Exploring inclusive pedagogy. *Br. Educ. Res. J.* 37, 813–828. doi: 10.1080/01411926.2010.501096

García Carrión, R., Molina Roldán, S., Grande López, L. A., and Buslón Valdez, N. (2016). Análisis de las interacciones entre alumnado y diversas personas adultas en actuaciones educativas de éxito: hacia la inclusión de todos y todas. *Rev. Latinoam. Educ. Inclusiva* 10, 115–132. doi: 10.4067/S0718-73782016000100007

García-Carrión, R. (2015). What the dialogic literary gatherings did for me. *Qual. Inquiry* 21, 913–919. doi: 10.1177/1077800415614305

García-Carrión, R., and Díez-Palomar, J. (2015). Learning communities: pathways for educational success and social transformation through interactive groups in mathematics. *Eur. Educ. Res. J.* 14, 151–166. doi: 10.1177/1474904115571793

Gomez, A., Puigvert, L., and Flecha, R. (2011). Critical communicative methodology: informing real social transformation through research. *Qual. Inquiry* 17, 235–245. doi: 10.1177/1077800410397802

Hand, B., Therrien, W., and Shelley, M. (2013). The effectiveness of argument-based teaching & learning approach for improving the vocabulary, reading, writing ability of students with special needs in inclusive education. *Korean J. Spec. Educ.* 48, 301–317.

Hanushek, E. A., Kain, J. F., Markman, J. M., and Rivkin, S. G. (2003). Does peer ability affect student achievement? *J. Appl. Econom.* 18, 527–544. doi: 10.1002/jae.741

Jenkins, J. R., Antil, L. R., Wayne, S. K., and Vadasy, P. F. (2003). How cooperative learning works for special education and remedial students. *Except. Child.* 69, 279–292. doi: 10.1177/001440290306900302

Justice, L. M., Logan, J. A. R., Lin, T. J., and Kaderavek, J. N. (2014). Peer effects in early childhood education: testing the assumptions of special-education inclusion. *Psychol. Sci.* 25, 1722–1729. doi: 10.1177/0956797614538978

Kershner, R. (2016). Including psychology in inclusive pedagogy: enriching the dialogue? *Int. J. Educ. Psychol.* 5, 112–139. doi: 10.17583/ijep.2016.2109

Kocaj, A., Kuhl, P., Kroth, A. J., Pant, H. A., and Stanat, P. (2014). Where do students with special educational needs learn better? A comparison of achievement between regular primary schools and special schools. *Kolner Z. Soz. Sozialpsychol.* 66, 165–191. doi: 10.1007/s11577-014-0253-x

Kohler, F. W., Greteman, C., Raschke, D., and Highnam, C. (2007). Using a buddy skills package to increase the social interactions between a preschooler with autism and her peers. *Top. Early Child. Spec. Educ.* 27, 155–163. doi: 10.1177/02711214070270030601

Lacey, P., and Scull, J. (2015). "Inclusive education for learners with severe, profound and multiple learning difficulties in england," in *Including Learners With Low-Incidence Disabilities*, Vol. 5, ed. E. A. West (Bingley: Emerald Group Publishing Limited), 241–268. doi: 10.1108/S1479-363620140000005017

Lane, J. D., Gast, D. L., Shepley, C., and Ledford, J. R. (2015). Including social opportunities during small group instruction of preschool children with social-communication delays. *J. Early Interv.* 37, 3–22. doi: 10.1177/1053815115588828

Lindsay, G. (2016). Grand challenge: priorities for research in special educational needs. *Front. Educ.* 1:1. doi: 10.3389/feduc.2016.00001

Littleton, K., and Mercer, N. (2013). *Interthinking: Putting Talk to Work*. Abingdon: Routledge.

Madden, N. A., and Slavin, R. E. (1983). Mainstreaming students with mild academic handicaps: academic and social outcomes. *Rev. Educ. Res.* 84, 131–138. doi: 10.3102/00346543053004519

Mertens, D. M. (2007). Transformative paradigm: mixed methods and social justice. *J. Mix. Methods Res.* 1, 212–225. doi: 10.1016/j.evalprogplan.2017.09.010

Piercy, M., Wilton, K., and Townsend, M. (2002). Promoting the social acceptance of young children with, moderate-severe intellectual disabilities using cooperative-learning techniques. *Am. J. Ment. Retard.* 107, 352–360. doi: 10.1352/0895-8017(2002)107<0352:PTSAOY>2.0.CO;2

Puigvert, L., Christou, M., and Holford, J. (2012). Critical communicative methodology?: including vulnerable voices in research through dialogue. *Cambridge J. Educ.* 42, 513–526. doi: 10.1080/0305764X.2012.733341

Racionero, S., and Padrós, M. (2010). The dialogic turn in educational psychology. *Rev. Psicodidáctica* 15, 143–162.

Rogoff, B. (1990). *Apprenticeship in Thinking: Cognitive Development in Social Context*. Oxford: Oxford University Press.

Schmidt, C., and Stichter, J. P. (2012). The use of peer-mediated interventions to promote the generalization of social competence for adolescents with high-functioning autism and asperger's syndrome. *Exceptionality* 20, 94–113. doi: 10.1080/09362835.2012.669303

Schoger, K. D. (2006). Reverse inclusion: providing peer social interaction opportunities to students placed in self-contained special education classrooms. *Teach. Except. Child. Plus* 2:11.

Simpson, L. A., and Bui, Y. (2017). Reading buddies: a strategy to increase peer interaction in students with autism. *Interv. Sch. Clin.* 53, 44–49. doi: 10.1177/1053451217692570

Slavin, R. E. (1996). Research on cooperative learning and achievement: what we know, what we need to know. *Contemp. Educ. Psychol.* 21, 43–69. doi: 10.1006/ceps.1996.0004

Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage.

United Nations (2007). *Convention on the Rights of Persons with Disabilities*. Available at: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html

Valero, D., Redondo-Sama, G., and Elboj, C. (2018). Interactive groups for immigrant students: a factor for success in the path of immigrant students. *Int. J. Inclusive Educ.* 22, 787–802. doi: 10.1080/13603116.2017.1408712

Valls, R., and Kyriakides, L. (2013). The power of interactive groups: how diversity of adults volunteering in classroom groups can promote inclusion and success for children of vulnerable minority ethnic populations. *Cambridge J. Educ.* 43, 17–33. doi: 10.1080/0305764X.2012.749213

Villardón-Gallego, L., García-Carrión, R., Yáñez-Marquina, L., and Estévez, A. (2018). Impact of the interactive learning environments in children's prosocial behavior. *Sustainability* 10, 1–12. doi: 10.3390/su10072138

Vygotsky, L. S. (1962). *Thought and Language*, ed. A. Kozulin, Cambridge, MA: MIT Press. doi: 10.1037/11193-000

Vygotsky, L. S. (1978). *Mind in Society. The Development of Higher Psychological Processes.* eds and trans. M. Cole, V. John-Steiner, E. Souberman, and S. Scribner (Cambridge, MA: Harvard University Press).

Wells, G. (1999). *Dialogic Inquiry: Toward a Sociocultural Practice and Theory of Education*. Boston, MA: Cambridge University Press. doi: 10.1017/CBO9780511605895

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press. doi: 10.1017/CBO9780511803932

World Health Organization (2011). *World Report on Disability*. Geneva: World Health Organization.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

ORIGINAL RESEARCH
published: 24 October 2018
doi: 10.3389/fpsyg.2018.01996

Reconstruction of Autobiographical Memories of Violent Sexual-Affective Relationships Through Scientific Reading on Love: A Psycho-Educational Intervention to Prevent Gender Violence

Sandra Racionero-Plaza[1], Leire Ugalde-Lujambio[2], Lídia Puigvert[3,4] and Emilia Aiello[5]*

[1] Department of Psychology, Universidad Loyola Andalucía, Seville, Spain, [2] Department of Educational Organization and Didactics, University of the Basque Country, Bilbao, Spain, [3] Department of Sociological Theory, University of Barcelona, Barcelona, Spain, [4] Affiliated Member of the Centre for Community, Gender and Social Justice, Institute of Criminology, University of Cambridge, Cambridge, United Kingdom, [5] Community of Researchers on Excellence for All (CREA), University of Barcelona, Barcelona, Spain

OPEN ACCESS

Edited by:
Roseli Rodrigues De Mello, Universidade Federal de São Carlos, Brazil

Reviewed by:
Jo Lampert, La Trobe University, Australia
Renata Maria Moschen Nascente, Universidade Federal de São Carlos, Brazil

***Correspondence:**
Sandra Racionero-Plaza
racionero-plaza@uwalumni.com

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Psychology

Received: *30 May 2018*
Accepted: *28 September 2018*
Published: *24 October 2018*

Citation:
Racionero-Plaza S, Ugalde-Lujambio L, Puigvert L and Aiello E (2018) Reconstruction of Autobiographical Memories of Violent Sexual-Affective Relationships Through Scientific Reading on Love: A Psycho-Educational Intervention to Prevent Gender Violence. Front. Psychol. 9:1996. doi: 10.3389/fpsyg.2018.01996

Violence in sexual-affective relationships among teens and young people is recognized as a social, educational, and health problem that has increased worldwide in recent years. Educational institutions, as central developmental contexts in adolescence, are key in preventing and responding to gender violence through implementing successful actions. In order to scientifically support that task, the research reported in this article presents and discusses a psycho-educational intervention focused on autobiographical memory reconstruction that proved to be successful in raising young women's critical consciousness about the force of the coercive discourse upon sexual-affective experiences and memories. We examined among a sample of young women (n = 32, age range 17–30) whether reading a scholarly text about love, the *Radical Love* book, modified autobiographical memories of violent sexual-affective relationships in line with preventing future victimization. This group was compared with a control group (n = 31, age range 17–30). Memory reports were collected before and after the reading and coded to analyze their content, both quantitatively and qualitatively. Memory quality features were assessed with the Memory Quality Questionnaire (MMQ). A focus group was also conducted to examine the personal impact of the intervention on participants. Compared with controls, the experimental group had stronger critical memories (of episodes involving violence), an average decrease in positive emotions induced by recall, and an average increase in negative emotions. The results show the effectiveness of the reading intervention designed in relation to gender violence prevention, as they indicate the ability of the psycho-educational action to debilitate the force of the coercive discourse in young women's memories. The findings both advance knowledge on the reconstructive nature of autobiographical memories of violent sexual-affective relationships in female youth and indicate the potential of memory-based interventions

as an instrument to prevent and reduce gender violence in school contexts. Teachers and teaching staff, and educational psychologists, among others, can benefit from these results by expanding the tools they have to address gender violence among female adolescents and youth.

Keywords: gender violence, prevention, autobiographical memory, reading, youth, successful actions, effective interventions

INTRODUCTION

Violence in sexual-affective relationships among teens and young people is recognized as a social and health problem that has increased worldwide in recent years. Data indicate that 32% of women in North America, 38% in Latin America and the Caribbean, 46% in Europe, 64% in Africa, 67% in Asia, and 68% in Oceania have experienced intimate partner violence (IPV) at least once in their lifetime (United Nations Statistics Division, 2015). Thirty percentage of young females aged 15–19 are victims of violence in their sexual-affective relationships (World Health Organization, 2015), and this abuse often begins in preadolescence (Banyard and Cross, 2008; Leen et al., 2013).

A study on the prevalence of sexual aggression among young people in 10 European countries (Austria, Belgium, Cyprus, Greece, Lithuania, the Netherlands, Poland, Portugal, Slovakia, and Spain) found that between 19.7 and 52.2% of females aged 18–27 reported having experienced at least one incident of sexual victimization (Krahé et al., 2015). Along this line, the European Union Agency for Fundamental Rights (2014) estimated that 35% of European women age 15 or older are victims of physical and sexual violence. In a sample of women aged 15–22 from Sweden, 21% reported having been psychologically, sexually, and physically abused. This study also shows that this victimization is related to suffering sexually transmitted diseases (Blom et al., 2016). In Germany, in a sample of teens aged 14–18, 65.7% of females declared that they had suffered at least one type of disrespectful behavior or violence, 61% emotionally difficult situations, 26% unwanted sexual behavior, and 11% physical violence. In this same study, adolescents who were victims of partner abuse had a lower quality of life compared with female teenagers who were not victimized (Blattner et al., 2015). In the United States, in a sample of adolescents aged 14–21, 51% of females reported being victims of at least one type of abuse: psychological, physical or sexual (Ybarra et al., 2016). In another study conducted in the United States, 22% of adult female victims of rape reported that their first experience of IPV occurred when they were between 11 and 17 years old (Black et al., 2011). In Canada, the Enquête Sociale Générale found that 37% of women had been sexually assaulted, 71% of whom were between 15 and 24 years old (Statistique Canada, 2015). Importantly, several studies have shown that IPV at a young age occurs in both stable and sporadic sexual-affective relationships and among women with different socioeconomic statuses (Trygged et al., 2014; Bay-Cheng and Bruns, 2016). The consequences of this violence in adolescence and youth are numerous and introduce major obstacles for positive development.

At the psychological level, young women may experience symptoms of depression and anxiety (Ackard et al., 2007; Exner-Cortens et al., 2013), post-traumatic stress disorders (Wolitzky-Taylor et al., 2008), suboptimal psychosocial functioning, impaired self-esteem (Chiodo et al., 2012), and suicidal ideation (Ely et al., 2011; Exner-Cortens et al., 2013), as well as cognitive and emotional damage, which influences their long-term development (Ackard and Neumark-Sztainer, 2002).

Research has also shown that victims of IPV may engage in unhealthy behaviors, such as using tobacco, drugs and alcohol, and may exhibit antisocial behaviors (Roberts et al., 2003; Exner-Cortens et al., 2013; Foshee et al., 2013; Gilmore et al., 2016) and eating disorders (Ackard and Neumark-Sztainer, 2002; Sharp and Keyton, 2016). Additionally, many of those adverse consequences may extend into adulthood and increase the likelihood of establishing violent relationships later in life (Sunday et al., 2011; Turanovic and Pratt, 2015). At the educational level, evidence demonstrates an increase in the dropout rate and a decline in academic performance among victims of gender violence (Banyard and Cross, 2008; Holmes and Sher, 2013). In addition, these women are at higher risk for victimization during college (Smith et al., 2003).

A large number of studies have focused on investigating the causes, risk factors, and predictors of gender violence (Sheridan and Lyndon, 2012; Karlsson et al., 2016; Kast et al., 2016). Among those many series of factors, evidence supports the existence of a *coercive discourse* (Puigvert and Flecha, 2018), a discourse which, shaped by an imbalance in power within relationships, influences socialization into linking attractiveness to people with violent attitudes and behaviors, while non-violent people and relationships are – because of this coercive discourse – mostly perceived as convenient but not exciting. Importantly, the scientific examination of this coercive discourse indicates that its implicit pattern of attraction may be learned through direct and/or indirect experience throughout the lifespan, adolescence being a key period in which such learning can occur (Gómez, 2015). In the vast majority of media, movies, songs, video clips, TV shows, youth literature, and Internet forums, the male characters presented as most attractive and successful have dominant, aggressive, and sexist behaviors and attitudes toward women (Gómez, 2015). This can later affect some young women's sexual-affective preferences and choices (Rebellon and Manasse, 2004; McDaniel, 2005; Montañés et al., 2013), talking then about *coerced preferences* (Puigvert and Flecha, 2018), i.e., preferences which are coercively shaped and driven by the existing dominant discourse. Likewise, research has shown that dialogs among friends can create expectations about behavior and gender in relation to the aggressive behavior of men (Kimmel, 1996;

Giordano, 2003), so conversations within peer groups are likely to be shaped by the coercive discourse and might reproduce it. Yet the fact that the coercive discourse, and different kinds of masculinities and emotions (Ramírez Rodriguez et al., 2017) have been socially constructed opens up the possibility for the subjects to enact their own agency and free choice, and modify the influence of such discourse (Gómez, 2015; Puigvert, 2016).

The gender studies literature has indicated the importance of examining the self-experience of violent intimate relationships to better understand the socialization process in this area for every individual (Oliver and Valls, 2004). In this exploration, the first sexual-affective experiences – in both stable and sporadic relationships – are critical because they become an important basis of interpretation and behavior in subsequent relationships (Gómez, 2015). Life narratives are central in this sense (McAdams, 1998; Bruner, 2004; Akanle, 2018); *what* we remember about our personal past – that is, our autobiographical memories (Conway and Pleydell-Pearce, 2000) - and *how* we remember it influence our sense of self, current emotions, and prospective thinking. This is due to the key psychological functions that autobiographical memories accomplish. When we share autobiographical memories with others, we create and strengthen social bonds (Conway, 2003), and based on our personal memories, we make sense of our life, make decisions, plan our future (Klein et al., 2010; Vranic et al., 2018), and, overall, develop an identity (Baddeley, 2014). In the words of Kandel (2007, p. 10): "we are who we are because of what we learn and what we remember."

Yet not all memories are equally relevant at all stages of life. Studies in the area of autobiographical memory have shown that most accessible memories are subject to the objectives of the "self" in every developmental stage (Conway and Holmes, 2004). With regard to our study, research has indicated that among adolescents and young people, the most salient memories are linked with love and the establishment of sexual-affective relationships (Conway and Holmes, 2004), that is, relationships which involve affective and sexual experiences in the form of dating, stable relationships, "hooking up," etc. Recalling those memories not only maintains but also fosters feelings of intimacy and connection with the person who is remembered (Alea and Bluck, 2007). When speaking about memories of violent sexual-affective relationships, the transformation of such feelings of intimacy and connection – if any – with the perpetrator of violence becomes essential in order to prevent future victimization. In spite of the ability of autobiographical memories to influence prospective thinking (Williams et al., 2008; Klein et al., 2010), emotional wellbeing, and overall health (Rubin, 2010) the study of autobiographical memories of violent sexual-affective relationships as a way to tackle violence against women from a preventive perspective has been very scarce, even more from the point of view of interventions in school settings. In regard with this last aspect, literature in educational sciences shows that much needs to and can be done.

Research in education has well established the important role of schools, as central developmental contexts, in tackling all kinds of violence, including violence against girls and young women (Fineran and Bennett, 1999; Lavoie et al., 2000; Silverman et al., 2001). The benefits of addressing violent relationships in schools go beyond solving problems in social relations, but they reach academic achievement and learning processes, as they are inseparable from students' emotional wellbeing (Eisenbraun, 2007). Once violence decreases, learning and achievement improve. For the specific case of gender violence, school-based research has shown that it is a type of violence that is too often involved in bullying in schools (Díaz-Aguado, 2006). Nonetheless, few studies about school violence address the gender violence dimension in specific ways (Farrington, 1993; O'Moore and Minton, 2005; Banks, 2010; Yoneyama and Naito, 2010). In terms of intervention, schools are ideal settings for the implementation of preventive strategies and programs (Ozer, 2006; Lundgren and Amin, 2015), and for the case of gender violence prevention even more, as schools, high schools and colleges are among the most essential settings for socialization in youth (Theimann, 2016).

Some prevention strategies in secondary schools have proven their efficacy at an international level. One example is *Safe Dates*, an evidence-based program focused on prevention of dating violence among teens (Foshee et al., 2014). Another example is *The Fourth R*, which has shown to be able to reduce violence in teen couples, and gives the possibility to other socialization agents, such as family members and teachers, to access the intervention strategies (Wolfe et al., 2009). Nevertheless, a meta-analysis of school-based interventions addressed to prevent and reduce violence in teen dating relationships concludes that in spite of some promising results, many initiatives implemented in educational settings are not decreasing violent relationships significantly (De La Rue et al., 2017). Therefore, it is central to advance toward the identification of educational actions that evidence their impact in preventing and responding to gender violence. Out study is a contribution in this regard.

Also, despite the relevance of autobiographical memories of violent sexual-affective relationships in relation to future victimization, existing prevention programs in schools rarely deal with personal memories. In addition, interventions in high schools are mostly designed without differentiating between young women who had any experience of violent sexual-affective relationships, stable or sporadic, and young women who had not. Nonetheless, the existing data already shared in the beginning of this introduction makes clear that victims of gender violence are found among very young females, so specific intervention strategies addressing those females' needs appear necessary.

Current Study

Memories of violent sexual-affective relationships which, due to the coercive discourse, might include feelings of attraction and desire, place some young females at risk of victimization, given the prospective functions of such memories. Along the line of social impact of research (Reale et al., 2017; Soler-Gallart, 2017; Pulido et al., 2018), and in relation to key related findings from the Free Teen Desire project (Puigvert, 2015/2016), our study sought contributing to prevent gender violence revictimization.

This task appeared promising in the light of scientific evidence from the field of memory studies.

Different from other types of human memories, autobiographical memories are malleable in nature (Cohen and Conway, 2008) - that is, they can be reconstructed through specific learning experiences and social interactions (Stone et al., 2010; Hirst and Rajaram, 2014). With regard to the topic under study here, this opens a window for memory-based interventions in schools that support the agency of young women to reconstruct memories of violent sexual-affective relationships, raising awareness on these personal experiences and changing the valence and arousal of the emotional memories toward increasing rejection of violent relationships experienced. That is the kind of intervention that we designed for the study reported in this article, an intervention which consisted of reading on love and attraction from a scientific perspective (Gómez, 2015) to support the possibility of memory recall and memory reconstruction if freely chosen by the participants in the enactment of their agency. The design of this intervention was framed by the current "social turn" in memory research (Hirst and Rajaram, 2014), which states that social interactions, social experiences, certain artefacts, and other sociocultural mediators scaffold individuals' memory construction and reconstruction (Nelson and Fivush, 2004; Wagoner and Gillespie, 2014).

MATERIALS AND METHODS

Participants

The original sample comprised 75 college females attending a public university in a city in northern Spain. 10 participants were removed from analysis for failing to complete the task of reading the book chapters. Among the 65 young females included in the analyses, the ages ranged from 17 to 27 years (M = 20.16 years, SD = 2.77). Participants were recruited from in-person advertisements in some of their undergraduate classes and were not students of the researchers at that time. They were informed that participation was sought "for research on autobiographical memories of sexual-affective relationships from a gender perspective." Inclusion criteria involved self-identification as having experienced IPV - as defined by the international scientific community (Breiding et al., 2015) - to some degree in a sporadic or stable intimate relationship and not having any diagnosed memory deficit. The researcher gave examples of concrete behaviors involving physical, psychological, and sexual violence according to the international definition of IPV (Breiding et al., 2015) that could be familiar for the participants. Ethically, this supported greater reliability in the self-identification, as well as prevented from being the writing of the memory reports triggers in the self-identification.

Material and Procedure

This research study followed all ethical standards for research involving human participants from Horizon 2020 (European Commission) as well as from the Declaration of Helsinki (World Medical Association [WMA], 2013). Before participants being involved in the study, the researchers fully informed them about the research and they completed written Informed Consent. Research participants had time to read the consent form and to ask questions to the researchers. Explanations were given by the researchers when necessary. The information provided in the consent form explained the objective of the study, the voluntary nature of participation, the possibility to withdraw from the study at any time, the procedure to collect the data, the materials and measures to be used, and the anonymity and privacy statement.

An *ad hoc* Ethics Committee was established for this specific study. The president of this Committee was Dr. Marta Soler, member of Ethical Review Panels of research projects of the European Framework Program. The other two members of the Committee were Dr. Teresa Sordé and Dr. Patricia Melgar. Teresa Sordé is evaluator of projects presented to calls of the European Research Framework Program. Patricia Melgar is founder member of the Plataforma Unitària contra les Violències de Gènere (Unitary platform against gender violence) in Catalonia (Spain). This Ethics Committee revised and approved the study.

Recall 1

After the study was presented and the participants responded to initial background questions, they proceeded with the memory-sharing portion of the research. This occurred in a typical classroom at the university. Female participants were asked to recall sexual-affective relationship memories with a male who had any violent attitude or behavior with them included in the international definition of IPV (Breiding et al., 2015). Specifically, participants were told that the memory could be about a sexual-affective relationship (sporadic or stable) that happened long ago or more recently, as long as the memory was accessible and related to a relationship with a man with violent behavior. The researcher also explained that it was possible that they had mixed feelings (positive and negative) or even only positive feelings toward the man and the relationship and that this was fine to report. Participants were given a few minutes to think about the relationship and events related to it, and then, they were asked to "write about where you were, what you did, and what you were thinking and feeling."

The specific instructions were: "Now I want you to think about one or more episodes that were particularly meaningful to you in that sexual-affective relationship and your reactions to it. Try to just think freely about the event/s and the relationship, your experience of it, and what has happened since. Write down whatever comes to mind. I'm going to give you about 10 min to think about the event, your memory of it, and your reaction to it." The experimenter allowed participants approximately 20 min to write about their memories. Their memories were probed to exhaustion. Participants wrote their memories in a computer at the university and left the document there. Later, the document was saved by the researchers in a USB and deleted from the computers, which belonged to the university. This ensured no possibility for the participants to go back to their writings.

After the reports were collected, participants completed the MMQ (Alea and Bluck, 2007).

Writing the memories in private – instead of sharing them orally in an interview – had the benefit of giving more intimacy to the female participant, as memories of violent sexual-affective experiences are personal, intimate, and highly emotional, and thus can be difficult to disclose to a researcher, someone who the participant does not know, and in a face-to-face situation. Likewise, the writing contributes to mitigate the effects of social desirability, which could manifest in loss of sincerity or less sharing of recalled memories. The writing of memory reports of traumatic and highly emotional autobiographical memories, as well as 20-min timing for the writing, is common in research designs of studies focused on this and similar topics (Alea, 2010; Harris et al., 2010).

Intervention

Participants were randomly assigned to an intervention group and to a control group, in which no intervention was applied. Before they left the room, participants were asked for their email addresses, and an electronic copy of selected pages (chapters 1, 3, 4, and 5) of the Spanish version (Gómez, 2004) of the book *Radical Love. A Revolution for the 21st Century* was sent immediately to participants in the intervention condition. They were given 10 days to read this material. No instructions were given regarding how and where to do the reading except that it must be performed individually. The timing of 10 days responds to ensuring enough time to make a comprehensive individual reading of the four chapters of the *Radical Love* book.

Recall 2

Exactly 10 days after the reading, the researchers emailed participants and asked them to recall the same event in their autobiographical memory that they had written about in the initial session. The instructions were, "First, please just think freely about the event/s and the relationship, your experience, and your feelings about it. Then, write your memories of the episodes (including thoughts, feelings, and experience) in a blank electronic document for 20 min (or less, if that is enough for you)." Participants were also asked to fill in a blank copy of the MMQ after they wrote down the memory report. Researchers asked participants to complete and return the memory report and the questionnaire by email as soon as possible. If participants did not respond within 2 days, the experimenters sent them a reminder email.

The Book *Radical Love*

A revolution for the 21st century (Gómez, 2015) was selected as a central stimulus in the intervention for the following reasons. First, it is a scholarly book that presents a social theory on love that states that love and attraction among humans have social roots. In this sense, the text reviews, discusses, and builds on theories on love and intimacy and elaborates the argument that patterns of attractiveness (what is considered attractive) have been constructed throughout history through social interactions and agents of socialization. In pointing to the social nature of love and attraction, the text makes clear the centrality of all subjects, of their human agency, to freely choose in the sexual and affective life, knowing the existence of coercive discourses. Second, the text includes the points of view of female and male adolescents collected from magazines, communicative life stories, and focus groups. In these texts, young participants share their thoughts about different types of male behavior and attitudes toward women and what many of these men think, demystifying any positive image of those masculinities. Third, the book employs a "language of desire" (Flecha and Puigvert, 2010), which describes reality in terms of like, desire, emotions, and feelings, in contrast to a "language of ethics," which analyzes reality in terms of what is good and what is bad. Other research has shown that using a "language of desire" - instead of a "language of ethics" alone - is much more effective for deeply understanding and discussing the coercive discourse and, particularly, for individuals having real freedom to decide, dismantling attraction to violent masculinities (Puigvert, 2016). For the aforementioned reasons, *Radical Love* (Gómez, 2015) aids in separating attractiveness and violence.

Communicative discussion group after post-test with seven participants. Some of the participants in the intervention group asked the experimenters for a space to share their experiences of reading the book and what it had meant to them. Following the ethical conduct which is expected from researchers using the communicative methodology employed in the study (Gómez et al., 2011), the investigators responded to the participants' demand organizing a communicative discussion group with the participants who asked for group sharing of their experience in the study. Indeed, the researchers had foreseen that this participants' petition could arise given the emotional implications of the intervention. The final group comprised seven participants, who voluntarily nominated themselves to participate. The discussion in the focus group was centered on a broad theme: what the intervention meant to the participants and did for them. The researchers also participated in the dialog from their expert knowledge, providing support to participants when necessary.

Measures and Instruments

Memory Quality

Memory quality was assessed with items from the MQQ (Alea and Bluck, 2007). Specifically, questions were employed that focused on (a) feelings and emotions induced by the recall of the memory and (b) the last time participants had shared these memories. Regarding the first set of questions, all followed the simple format "Did this memory make you feel. . . (circle one number for each emotion)," and participants chose among happy, sad, afraid, surprised, and angry. Responses to all questions were given on a 5-point Likert scale ranging from not at all (1) to extremely (5). Regarding the last time they had shared these memories, the question posed to participants was "When was the last time you talked about or shared this memory with others? (check all that apply)," with possible responses being "yesterday," "a week ago," "a month ago," "a year ago," "more than a year ago," "never," and "others, please describe."

Data Analysis

Coding of Memory Reports

The themes present in participants' memory reports in both the intervention and control conditions were coded by the

researchers in a line-by-line fashion. The early coding framework was built following a deductive flexible approach. We employed a main general category called "critical memory," defined by Flecha et al. (2017). This theme was refined throughout the data analysis to respond to features related to that theme which emerged more strongly when the written memories were examined in detail. In particular, we used a subset (20%) of the transcripts to test the significance of the "critical memory" theme and see the potential emergence of other features relevant to this theme. The category "critical memory" included two codes and accounted for a significant number of statements given by our participants. Consensus for the coding was achieved through discussion. Discrepancies were resolved primarily by clarifying the interpretation of fragments of the written memories in relation to the definition of the main theme analyzed, along the lines that follow. According to the definition of "critical memory" (Flecha et al., 2017), text from the memory reports was coded as such when that piece of a participant's narrative shared two subthemes at the same time: (a) Intimate Partner Violence (Code: IPV) and (b) Critical Consciousness (Code: CC). Code IPV implies explanation of episodes of IPV – as defined by the international scientific community (Breiding et al., 2015) – that described *violent episodes* and *violent details* in the stable or sporadic intimate relationship, including unwanted sexual contact, stalking acts, coercive control, defamation on social media, public humiliation, etc. Code CC indicates critical consciousness about the episode of IPV explained in the memory report (coded as IPV) as expressed through details about one's behavior and/or feelings, and/or those of other close ones in relation to the violent episode and/or behavior and/or attitudes of the perpetrator. Sometimes, one's feelings and behaviors are presented as analyzed through the lenses of the coercive discourse. Also, *critical consciousness* often results in making negative judgments about the violent episode and/or behavior and/or attitudes of the man. Those details work to explore and unpack the violent episode and the violent relationship at a deeper level. These memories are *critical* because they provide new insight into the memory, give new meaning to the experience and, of interest to this study, help encourage rejection of the experience and the perpetrator's behavior and can empower the woman in relation to what occurred and to her sexual-affective future (Flecha et al., 2017).

After the category "critical memory" (Flecha et al., 2017), particularly its associated codes were refined, we individually coded all memory reports and the transcript of the focus group using NVivo software. We resolved disagreements by discussion. We identified theme frequencies and theme coverage percentage in the memory reports of participants in every condition. This served us to summarize some of the major qualitative themes generated from participants' memory reports (Hesse-Biber, 2016). Qualitative analyses of the memory reports were also performed using the same codes – so that qualitative analyses were conducted of the same text that had been quantified – in order to understand the meanings constructed by participants and which were ascribed to critical memories. For the quantitative data, we conducted *t*-test analyses to examine whether there were differences in theme frequencies and theme coverage percentages between the pre-test and the post-test in the intervention condition (writing of memories and reading) and in the control condition (writing of memories with no reading). The same analyses were performed to explore whether there were differences between the pre-test and the post-test in every condition for results from the two selected questions of the MMQ. One of the questions examined the emotions induced by the recall of the autobiographical memories, and the other one examined the sharing of the memory with others. Data from the focus group was analyzed qualitatively searching for what the experience meant for the participants in the intervention group, focusing on personal impact. Additionally, a deductive analysis of the transcribed verbal data from the focus group was performed examining presence of "critical memories" in the group discussion. Contrasting this analysis of data from the focus group with data from the memory reports, which had been analyzed quantitatively and qualitatively, allowed raising trustworthiness (Lincoln and Guba, 1985), as well as it informed about consistency of the codes employed (Hesse-Biber, 2016).

RESULTS

Critical Memories

The participants who read *Radical Love* experienced a significant increase in critical memories related to the sexual-affective relationship shared in the memory report (see **Table 1**). This implied recalling and disclosing more episodic details of the relationship related to disdain, humiliation, and other IPV characteristics, accompanied by self-consciousness.

The increase in critical memories occurred for both theme coverage $t(25) = 3.65$, $p < 0.05$, Cohen's $d = -0.91$ (see **Figure 1**), and theme reference $t(25) = 2.19$ $p < 0.05$, Cohen's $d = -0.66$ (see **Figure 2**) in the memory reports, and it did not occur in the controls for theme coverage, $t(8) = 1.87$, $p > 0.05$, Cohen's $d = -0.18$ or theme reference, $t(8) = 0.63$, $p > 0.05$, Cohen's $d = 0.16$.

The qualitative analysis of the memory reports and the focus group for the "critical memories" theme informed us about the particular details participants recalled after reading the book *Radical Love*. The reading helped participants deepen their thinking into violent events in the relationship, helped them characterize the relationship as IPV, and increased their awareness of the type of relationship they had experienced.

One of the participants, Eva, shared her memory of a one-night encounter. A man with whom she had intercourse after he pressured her and ignored Eva the day afterward, disseminated a lie on social media about what had happened that night, identifying Eva in those messages. Eva was disappointed about what had occurred, particularly with the lying. In her memory narrative, she reported that after some time, the man pressured her to meet, and she accepted.

In what follows, the first part of the memory report written by Eva before she read *Radical Love* is presented:

> We met a night during the summer, in a disco. We were both drunk, and we had almost not talked when we engaged

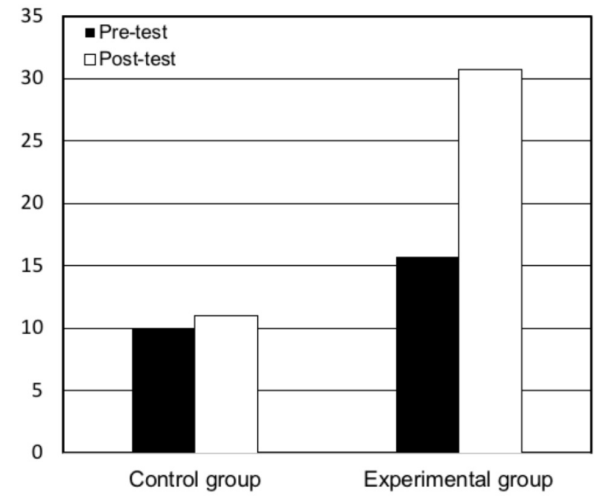

FIGURE 1 | Pre- and post-test mean of coverage of critical memories by condition.

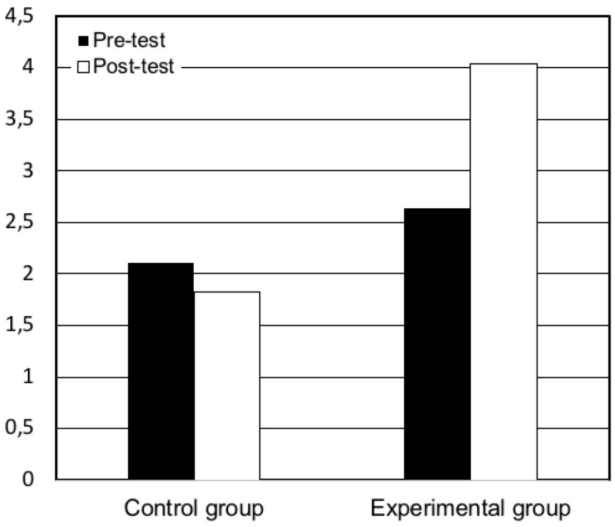

FIGURE 2 | Pre- and post-test mean of reference to critical memories by condition.

> in heavy petting. We were feeling very good and decided to go to the beach to be more relaxed. We did not make it, but we had a lot of sex. At sunrise, we decided to go back to the disco. (. . .).
>
> After that, I didn't meet him because I didn't think that he was my type, and *I did not like that he said things that did not happen*. Though finally, *he pressured me to meet*, and my friends encouraged me to do it, and I accepted. (. . .)
> He was handsome, nice, successful with girls, and funny, but he never made me feel comfortable [P #2]

In this first written narrative, Eva refers to the man's violent behavior only once, not for what happened that night but that he pressured her to meet after that first encounter. In addition, Eva shares her feelings (disappointment, dislike) about the violent behavior of the man toward her: making a story up and disseminating it among her peers. A selection from Eva's report explaining the same part of the episode, but now after the reading, follows:

> That night, our aim was, basically, to have sex with the greatest number possible of guys, in order for us to feel cool, I guess. After engaging in petting with some guys, this one was the last one I had sex with that night. We were feeling good and went to the beach. *To be honest, he pressured me so much to do so*.
> *He kept pressuring me to meet*, and, finally, I decided to get together. *One friend told me he was a jerk and not to meet him*. But all the other ones encouraged me to give him an opportunity (. . .).
> *Right now, he is a person that I disdain so much* [P #2]

Here, Eva includes more critical memories. She reports two violent behaviors of the man toward her. First, and most important, Eva shares that the man pressured her so much to have sex. She adds that she is being honest in saying so. Second, she again explains that the man pressured her to meet after that violent sporadic relationship, but in this second version of the memory report, Eva emphasizes the coercive behavior of the man as she adds "kept" when referring to the man pressing her to meet. Third, and importantly, in the post reading version of Eva's memory report, while she again mentions her friends when explaining the second time she met with the man, she states in the first place that among her friends, there was one who did not encourage her to get together but said that the man was a "jerk." Afterward, Eva adds that the other friends thought differently and encouraged her to give him a second chance. Four, after the reading, Eva includes in her report that she feels disdain toward that violent man. All these available details after the reading are substantial differences in comparison with the first version of Eva's memory report, show more explicitly the influence of

TABLE 1 | Pre- and post-test critical memories.

	Experimental group (n = 32)				Control group (n = 31)			
Theme	**Pre-mean**	**SD**	**Post-mean**	**SD**	**Pre-mean**	**SD**	**Post-mean**	**SD**
Coverage[a]	15.75	14.86	30.72	18.4	9.97	3.67	11.00	7.2
Reference[a]	2.63	1.69	4.04	2.49	2.11	2.26	1.82	1.33

[a]*Experimental group increased significantly after the intervention.*

the coercive discourse, and have important implications for awareness and prevention.

The events reported by the participants while in the communicative discussion group reflected well the influence of the coercive discourse in the sexual affective relationships reported, and contained details of critical memories, with explicit expression of situations of IPV and indicating awareness of those. In one of the moments of the group discussion, the participants focused on situations in which they did not want to have sex, but the guy coerced them. Idoia shared her story in this regard, in which can be observed: (a) a situation of IPV, (b) details about her emotions in the event, and (c) Idoia's consciousness about her own behavior and feelings in the relationship while being critical about those:

> It is assumed that if that person [the partner] is going to be angry if you are not going to do that [having sex] is because *you should not be with that person*. I think *all of us have made that mistake* [having sex under duress], perhaps because of fear of losing him or because, *in fact, you feel comfortable with that person.* [P #03]

Afterward, Nerea intervened building upon Idoia's reflection. Nerea interprets Idoia's story through the lenses of the influence of the coercive discourse which presents violent behaviors and attitudes as attractive. The participants manifested their agency to transform these situations; they shared that once they assume the event as it is, violent, and are critical about it, then "you feel so bad" and "absurd" and come to question their remaining in the relationship. In Nerea's words:

> *You do not want to see what is happening because you love him.* After that, *you are aware and you feel so bad*, and you think, fuck! I am absurd; *I do not know why I have been enduring him*. [P #10]

Emotions Induced by Memory Recall

The question of whether emotions induced by memory recall could change as a consequence of the reading was explored through an analysis of differences between the pre-test and post-test responses for one question on the MQQ (Alea and Bluck, 2007) that asked the following to participants in both conditions: "Did this memory make you feel... (circle one number for each emotion)." Responses were given on a 5-point Likert scale, ranging from not at all (1) to extremely (5), and the emotions explored were happy, afraid, surprised, and angry. Thus, dependent sample *t*-tests were conducted separately for the intervention and control groups. The results (see **Table 2**) suggested that the emotions induced by the recall of the memories changed between the pre-test and the post-test in both groups. However, the direction of the change was different between conditions for some of the emotions. Participants in the experimental group presented a significant decrease in happiness when recalling the memory after the intervention, $t(31) = 1.73$, $p < 0.1$, Cohen's $d = 0.29$, and increases in feelings of concern $t(31) = 1.31$, $p > 0.1$, Cohen's $d = -0.51$, surprise, $t(31) = 0.63$, $p > 0.1$, Cohen's $d = -0.10$, and anger, $t(31) = 0.50$, $p > 0.1$, Cohen's $d = -0.06$. Feelings of happiness when recalling the memories increased significantly in the control group $t(30) = 0.62$, $p < 0.1$, Cohen's $d = -0.10$; concern did not change, $t(28) = 0.16$; $p > 0.1$, Cohen's $d = 0.02$; and surprise, $t(30) = 1.28$, $p > 0.1$, Cohen's $d = 0.19$, and anger, $t(30) = 1.77$, $p < 0.1$, Cohen's $d = 0.25$, decreased, the latter significantly.

Memory Sharing and Talk

The MQQ question about sharing and talking with others regarding particular memories related to the sexual-affective relationship was also incorporated in the analysis. Participants were asked: "When was the last time you talked about or shared this memory with others?" The answer was quantified on a 7-point scale ranging from "yesterday" to "never" and included the option of "Other, please describe." To examine whether there were differences between the pre-test and the post-test in terms of the last time participants had shared or talked about the memory with others, a dependent sample *t test* was performed in every group condition. In the experimental group, the frequency with which memories were shared after the intervention increased significantly, $t(31) = 2.41$; $p < 0.05$, Cohen's $d = 0.29$, while in the control group, the frequency of memory sharing was unchanged, $t(30) = 1.66$; $p > 0.1$, Cohen's $d = 0.17$. Thus, the reading encouraged participants to talk about or share their memories with others more (see **Table 3**).

In particular, changes in memory sharing in the experimental group occurred in two main categories, with a number of participants changing after the reading from sharing their memories of the relationship "a year ago" to "yesterday" - that is, the day before the second measurement. In the pre-test, 3% of participants selected the "yesterday" option, and 19% selected "a year ago." Later, in the post-test, 19% of participants selected "yesterday," and 7% selected "a year ago."

In addition, the results from the focus group informed us about *how* the sharing of memories with others occurred. One way participants shared their personal reflections evoked by the reading was through cell phone apps and other social media, as well as by meeting physically. For example, one of the participants said that while she was reading, she shared the main messages from the text with her friends through online chatting on WhatsApp because she realized that the lessons in the book applied not only to herself but also to her female friends who had had similar experiences of violent sexual-affective relationships. After sharing online, they ended up meeting at the participant's house:

> Participant: And while I was reading, I was chatting on WhatsApp with a friend: "Hey! I'm reading this, and this happens to you!," and my friend said "Oh, keep reading, I would like to know more! Keep sending audios because I don't understand this part..."
> Researcher: So, did you explain it to your friend?
> Participant: Yes, and after that, she came to my house, and I told her: "Ok, this situation is similar to your situation, you know, you can't continue with this, eh... No!"

Prospective Thinking and Decision Making

In addition, the results from the qualitative analysis of the second version of the memory reports indicated that the experience of reading *Radical Love* (Gómez, 2015) led some participants to make decisions about introducing changes in the relationship if they were still in it, including freeing the relationship from violence and/or leaving the relationship temporarily: "Now I know that I can't let him treat me like that" [P #17], "I have decided to stop talking to him for some time" [P #29]. Some participants also manifested engaging in new prospective thinking that consisted of avoiding the relationship with that same man at that time or with similar men in the future: "I know that I would never have a relationship with him or with men like him" [P #06]. What is more, one participant decided to break with the relationship weeks after the intervention.

DISCUSSION

Reconstructing Memories About Violent Sexual-Affective Experiences to Prevent Gender Violence Among Youth

The coercive discourse, which presents male violent behavior and attitudes toward women as attractive, has been identified in research as one more cause for violence against women (Valls et al., 2008). Our study examined the effectiveness of reading a scholarly text that questions such discourse to reconstruct young women's autobiographical memories of violent sexual-affective relationships along preventive lines. The findings demonstrate that reading *Radical Love: A revolution for the 21st Century* (Gómez, 2004, 2015) did support changes in the autobiographical memories in two ways. The first was in their semantic and emotional content: the reading produced greater accessibility to and sharing of critical memories, an increase in negative emotions, and a decrease in positive emotions induced by the recall of the memory. Second, the reading increased the talking about and sharing of the memories recalled, and the reconstructed memories fostered prospective thinking that could support the avoidance of violent sexual-affective relationships in the future and even breaking with the violent relationship if it was present by the time of the study.

These results are consistent with central findings on the malleability of autobiographical memories and its social nature; they are subjective remembering of first-person experiences filled with emotion (Conway and Pleydell-Pearce, 2000; Cohen and Conway, 2008). Thus, one can look at the past and remember it differently depending on particular moods, time periods, new objectives of the self, and important life experiences, among other factors (Conway and Holmes, 2004). Our study provided data showing that reading *Radical Love* favored participants' awareness about the influence of the coercive discourse in sexual-affective life in general, and also in their own past experiences. Upon such knowledge, the young women exercised their agency and decided to revise their memories of sporadic or stable violent sexual-affective relationships, which allowed them to look at their past critically and freely, beyond the lenses of the coercive discourse. The memory reconstruction resulted from this process. Our findings also shed new light on the power of a particular direction in memory reconstruction (which implies decreasing positive emotions and raising critical memories)

TABLE 2 | Pre- and post-test differences in emotions induced by memory recall.

	Experimental group (n = 32)				Control group (n = 31)			
Subscale	**Pre-mean**	**SD**	**Post-mean**	**SD**	**Pre-mean**	**SD**	**Post-mean**	**SD**
Happy[a,b]	2.91	1.15	2.56	1.24	2.74	1.59	2.90	1.56
Concerned	2.28	1.17	2.44	1.27	2.10	1.32	2.07	0.92
Surprised	2.78	1.34	2.91	1.09	3.06	1.31	2.81	1.19
Angry[c]	2.69	1.33	2.78	1.24	2.61	1.31	2.29	1.24

[a] *Experimental group decreased significantly after the intervention.* [b] *Control group increased significantly.* [c] *Control group decreased significantly.*

TABLE 3 | Last occurrence of sharing and talking about memory.

	Experimental group (n = 32)		Control group (n = 31)	
Scale	**Pre-test number (%)**	**Post-test number (%)**	**Pre-test number (%)**	**Post-test number (%)**
Yesterday	1 (3)	6 (19)	3 (10)	4 (13)
A week ago	12 (37)	12 (37)	8 (26)	13 (42)
A month ago	5 (16)	5 (16)	7 (23)	7 (23)
A year ago	6 (19)	2 (6)	0	0
More than a year ago	2 (6)	2 (6)	2 (6)	2 (6)
Never	0	0	1 (3)	0
Others	5 (16)	4 (13)	9 (29)	5 (16)
No response	1 (3)	1 (3)	1 (3)	0

to prevent gender violence among young women. Apart from confirming the reconstructive nature of autobiographical memories of violent sexual-affective relationships, our study shed light on how one simple intervention, reading *Radical Love* (Gómez, 2015), can scaffold such reconstruction in specific ways, *via* knowledge and human agency which can drive questioning coercive social influences in the interpretation of one's past, supporting the prevention of IPV, namely, increasing both critical memories of violent sexual-affective experiences and negative emotions induced by the recall of those memories. Moreover, after the experience some participant women freely decided to abandon or take distance from the relationship if it was present by the time of the study and/or planning for a future with relationships with men with non-violent behavior and attitudes.

In line with the "social turn in memory research" (Hirst and Rajaram, 2014), our findings also reiterate the need to account for the social aspects of memory in order to understand human memory more deeply, showing, in particular, the importance of social context in the construction and reconstruction of autobiographical memories of sexual-affective experiences. Literature in sociology and gender studies has shown that attraction patterns are affected by a coercive discourse (Puigvert and Flecha, 2018) in which male with violent behavior and attitudes are presented as most sexually attractive. This coercive discourse often permeates the media, the peer group, and other socialization agents. Nonetheless, social and educational research has indicated that given their social construction, those attraction patterns can be changed with new interactions and social experiences that can drive learning new attraction patterns where desire is linked to dialog and respect. That learning can protect adolescents from gender violence (Gómez, 2015; Puigvert, 2015/2016). The research in the psychology of memory reported here adds to that literature, showing that the weakening of the association between attraction and violence – imposed by the coercive discourse – can also occur in personal memories of violent sexual-affective relationships, which play a crucial role in the development of the self (Conway and Pleydell-Pearce, 2000) and in planning the personal future (Klein et al., 2010). Our study has shown that by engaging in a concrete social experience, i.e., reading a book that empties men with violent behavior and attitudes of attractiveness, autobiographical memories of violent sexual-affective relationships can be revised semantically and emotionally in ways that weaken the connection between attractiveness and violence. The reading made participants move from more positive to more negative emotions when the memory of the relationship was recalled, as well as reading *Radical Love* (Gómez, 2015) supported the accessibility to details of the experience that demonstrated the violent character of the intimate relationship, as well as it raised reference to oneself in terms of adding details about one's behavior and/or feelings, and/or those of other close ones in relation to the violent episodes and relationship. This notion of memory plasticity as a result of new social stimuli has been well developed in the literature on memory, including neuroscience and biology perspectives (Santiago Ramón, 1894; Bailey et al., 2015), but its application to the prevention of violence against young women is novel, even more, in its application to education.

Specifically, the reading of *Radical Love* supported the accessibility to critical memories of the violent sexual-affective relationship and aided in their disclosure. After reading, participants shared more details (facts and feelings) in their memory reports that informed about the violent or unhealthy nature of the relationship. This did not occur among the controls. The critical episodic details shared involved references to tension, lies, control, pressure, and despising, along with a certain critical awareness about the violent nature of the behavior and/or attitudes of the man in the relationship toward the woman sharing the memory. Although all participants identified as having experienced a negative sexual-affective relationship, as this was a selection criterion of the study, critical memories –as defined in this study – were loose in the first round of reports. This reveals that reading *Radical Love* increased the accessibility to critical memories and raised awareness, showing the dynamic character of autobiographical memories (Wang, 2016).

The self-discrepancy approach also helps interpreting our results. Applied to intimate relationships, self-discrepancy theory (Higgins, 1987) indicates that real-ideal discrepancy supports relationship dissatisfaction (Casad et al., 2015). Our data showed that through the reading, the women in the intervention group accessed and disclosed more details of the unhealthy relationship they had, this making them more conscious about the *real* type of relationship they had as was evidenced in their own words in the memory narratives after the reading as well as in the focus group. Also, the decrease in happiness in the intervention group when recalling the memory after the reading (which did not happen in the control group) and the decisions and prospective thinking that some participants shared after the reading, such as ending the reported relationship and/or deciding not to have similar relationships in the future, can be explained by real-ideal discrepancy regarding the relationship they had. Further examination of the specific interactions among accessibility to critical memories, increased critical consciousness, real-ideal discrepancy, and impacts on the directive functions of autobiographical memories are a promising area of research in the application of memory studies to the prevention and overcoming of gender violence among youth.

After the reading, females in the intervention group felt less happy, more concerned, and angrier when recalling the relationship. The opposite trend occurred among the controls. This finding is meaningful from the perspective of the interactions between memory and emotion. Prior research has shown that emotions and emotional goals experienced at the time of autobiographical retrieval can influence the information recalled (Holland and Kensinger, 2010). Feeling less happy, more concerned, and more surprised with the new recall could influence the recall of more critical memories. Likewise, it could be plausible that recalling critical episodic details and non-positive emotional contents after the reading might enhance feelings of sadness, surprise, and concern. Building on the results of this study, future research could explore the particular connections among critical memories, the emotional content of memories, and the emotions induced by recall. This inquiry could advance our understanding of the relationship between emotions and autobiographical memories of violent

sexual-affective relationships, and it could shed some light upon what element (critical memories, emotional memory contents, or recalled-induced emotions) is best to focus on first in terms of memory-based interventions that aim to prevent gender violence from schools.

Additionally, reading *Radical Love* encouraged participants to share their memory with others. Participants in the focus group explained that they shared the lessons from the book and their revised memories with female friends who they thought and/or knew had similar sexual experiences. This did not occur in the control group. The experimental participants explained that they did so because they thought that it could help other women avoiding the same experiences. This result shows that social experiences, like reading on a topic connected to memories that are most central at a particular life stage: love and attraction (Conway and Holmes, 2004), make the *social* (Alea and Bluck, 2003) and the *directive* (McAdams et al., 2001) functions of autobiographical memories of sexual-affective relationships interact. More specifically, our finding points to a new social function of sharing autobiographical memories of violent sexual-affective relationships after reading *Radical Love*: cultivating friendship through female solidarity. Future research could examine with more detail the extent at which this sharing develops or maintain intimacy, teach and inform, and establish empathy with female friends, as other studies have pointed out such outcomes from autobiographical memory sharing in general (Alea and Bluck, 2007) but not for the case of memories of gender violence in particular. Even how such sharing contributes to meaning making in the young women involved in the intervention seems relevant to be further investigated in the light of other studies on personal meaning fueled by one's commitment to others' wellbeing (Tellado, 2017; Garcia et al., 2018). Generally, this unexpected result expanded the social impact of the study (Flecha et al., 2015), opening possibilities of transformative memory reconstruction in other young women beyond the study participants.

Limitations and Future Research

There are limitations in the research reported. One of them is related to the stability of change. The measures of memory (memory reports and questionnaires) were conducted 10 days after the reading material was given to participants. To examine the persistence of change or the degree of persistence, this measurement should be repeated beyond the following 10 days, such as in 1- or 3-month intervals. The availability of such data could reveal more about the power of *Radical Love* to reconstruct emotional memories of violent relationships in the mid- and long term, as we are seeking more stable changes in cognition and emotion that can support prevention of gender violence throughout development. A second limitation might be, particularly for certain researchers in the emotion field, the self-reported nature of the study. It could be questioned whether there was a discrepancy between what the participants expressed that they felt and what they actually felt during their experience of the IPV and during their recall of the memory itself. It could be argued in this sense that the results are affected by social desirability and, more broadly, by the well-examined power of individual motivations on recall (McDonald and Hirt, 1997). Nonetheless, this second limitation could be contested from the autobiographical memory literature itself, which states that what matters most in human memory is the account of a memory that a person gives to herself and to others, as that is how the memory becomes recoded every time the person shares it (Stone et al., 2010). Nevertheless, the two limitations mentioned are addressed in a new research project (CREA, 2017/2019) in which some of the authors of this article are now engaged; it includes a repeated-measures longitudinal study that observes with behavioral and psychophysiological data the sustained impact of various actions of preventive socialization of gender violence upon the transformative reconstruction both of memories of violent sexual-affective experiences and of implicit emotional reactions associated to the recall of those memories. This new project is conducted in high schools and includes, among others, the intervention reported in this article.

A third limitation in our study is that participants in the reading condition also shared their experiences more with friends. While this is a result of the intervention, this sharing could also be in part responsible for the increase in critical memories. The complex ways in which emotion and memory interact have been pointed out before in our discussion (Holland and Kensinger, 2010). Future analyses could explore the relationship between sharing both the content of the book and one's memories with others, and changes (if any) in critical memories and emotions induced by the recall of autobiographical memories of violent sexual-affective experiences. This directive for future research in the area of autobiographical memory about gender violence is again strengthened by research framed by the "social turn" in memory studies (Hirst and Rajaram, 2014), which indicates that memories are affected (in its coding and retrieval phases) by social interaction, in which verbal communication and dialog with others about memories (Hedrick et al., 2009) seems to play a central role in memory consolidation and construction. According to this area of research, memory scholars should devote more efforts to explore the scaffolding mechanisms of memory (Nelson and Fivush, 2004). Our study, with its findings on the scaffolding role of reading *Radical Love* upon memory, as well as with its results on memory sharing produced by reading address that demand. Pursuing this line of research with longitudinal studies and similar interventions will advance the understanding of the mediated nature of memory and cognition (Vygotsky, 1980).

Practical Implications

From the point of view of implications for practice, this research was particularly relevant and innovative. A novel meta-analysis of school-based programs implemented in secondary schools that sought to prevent or reduce incidents of dating violence, concluded the need for incorporating skill-building components (De La Rue et al., 2017). Also, other reviews of intervention strategies in education have indicated the necessity to provide adolescents and youth with the tools to be more critical about violence (Aiello et al., 2018), including gender violence in their everyday experiences and respond to them (Eisenbraun, 2007). Our study provides one evidence-based instrument that teachers,

school psychologists, and other educational agents can employ to tackle gender violence from schools and which precisely provides students with cognitive tools to better manage and respond to violence in sexual-affective relationships and to be critical with the coercive discourse that much affects their developmental contexts. Additionally, this intervention, while preventive, takes into account that a relevant number of young women in secondary schools and first college years have already experienced sporadic or stable sexual-affective relationships, and some of those are violent. In terms of innovation, the psycho-educational intervention that we studied is also novel because actions to prevent and respond to gender violence among young women from schools have not usually included the perspective of memory reconstruction.

Educationally, our study adds to the line of research on educational actions that foster preventive socialization of gender violence by evidencing the power of reading scientific literature that empties violence of attractiveness for autobiographical memory reconstruction as a vehicle for preventing and reducing violence against young women. Overall, the findings from our study suggest that educational programs addressed to youth and which seek to prevent and respond to gender violence in stable and sporadic intimate relationships can benefit from incorporating memory-based interventions from a reconstructive and transformative perspective. Schools can employ this educational action as part of a program of gender violence prevention and intervention, with the multiple benefits that addressing this problem has for achievement, sense of school belonging and overall mental health of future generations (De La Rue et al., 2017).

AUTHOR CONTRIBUTIONS

SR-P and LU-L conducted the research and investigation process. LP contributed to the conceptualization of the study in relation to the Free_Teen_Desire project. LU-L performed the data collection and SR-P conducted the data analysis, with a particular focus on memory. SR-P, LU-L, LP, and EA contributed to the formal analyses and discussion of the data. SR-P, LU-L, LP, and EA collaborated in writing the manuscript, revised it and approved the submitted version.

REFERENCES

Ackard, D. M., Eisenberg, M. E., and Neumark-Sztainer, D. (2007). Long-term impact of adolescent dating violence on the behavioural and psychological health of male and female youth. *J. Pediatr.* 151, 476–481. doi: 10.1016/j.jpeds.2007.04.034

Ackard, D. M., and Neumark-Sztainer, D. (2002). Date violence and date rape among adolescents: associations with disordered eating behaviours and psychological health. *Child Abuse Negl.* 26, 455–473. doi: 10.1016/S0145-2134(02)00322-8

Aiello, E., Puigvert, L., and Schubert, T. (2018). Preventing violent radicalization of youth through dialogic evidence-based policies. *Int. Sociol.* 33, 435–453. doi: 10.1177/0268580918775882

Akanle, O. (2018). International migration narratives: systemic global politics, irregular and return migrations. *Int. Sociol.* 3, 161–170. doi: 10.1177/0268580918757105

Alea, N. (2010). The prevalence and quality of silent, socially silent, and disclosed autobiographical memories across adulthood. *Memory* 18, 142–158. doi: 10.1080/09658210903176486

Alea, N., and Bluck, S. (2003). Why are you telling me that? A conceptual model of the social function of autobiographical memory. *Memory* 11, 165–178. doi: 10.1080/741938207

Alea, N., and Bluck, S. (2007). I'll keep you in mind: the intimacy function of autobiographical memory. *Appl. Cogn. Psychol.* 21, 1031–1111. doi: 10.1002/acp.1316

Baddeley, A. (2014). *Essentials of Human Memory*. Hove: Psychology Press.

Bailey, C. H., Kandel, E. R., and Harris, K. M. (2015). Structural components of synaptic plasticity and memory consolidation. *Cold Spring Harb. Perspect. Biol.* 7:a021758. doi: 10.1101/cshperspect.a021758

Banks, S. M. (2010). Addressing violence in middle schools. *Clearing House* 73, 209–210. doi: 10.1080/00098650009600952

Banyard, V. L., and Cross, C. (2008). Consequences of teen dating violence: understanding intervening variables in ecological context. *Violence Against Women* 14, 998–1013. doi: 10.1177/1077801208322058

Bay-Cheng, L. Y., and Bruns, A. E. (2016). Yes, But. Young Women's views of unwanted sex at the intersection of gender and class. *Psychol. Women Q.* 14, 204–217. doi: 10.1177/0361684316653902

Black, M. C., Basile, K. C., Breiding, M. J., Smith, S. G., Walters, M. L., Merrick, M. T., et al. (2011). *The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report*. Atlanta, GA: National Center for Injury Prevention and Control.

Blattner, B., Liepe, K., Schultes, K., Hehl, L., and Brzank, P. (2015). Non-respectful behavior and violence in romantic relationships between adolescents: prevalence and quality of life among hesse pupils. *Gesundheitswesen* 77, 895–900. doi: 10.1055/s-0034-1387714

Blom, H., Hogberg, U., Olofsson, N., and Dannielson, I. (2016). Multiple violence victimisation associated with sexual ill health and sexual risk behaviours in Swedish youth. *Eur. J. Contracept. Reprod. Health Care* 21, 49–56. doi: 10.3109/13625187.2015.108922

Breiding, M. J., Basile, K. C., Smith, S. G., Black, M. C., and Mahendra, R. R. (2015). *Intimate Partner Violence Surveillance: Uniform Definitions and Recommended Data Elements, Version 2.0*. Atlanta: National Centre for Injury Prevention and Control, Centre for Disease Control and Prevention.

Bruner, J. (2004). Life as narrative. *Soc. Res.* 71, 691–710.

Casad, B. J., Salazar, M. M., and Macina, V. (2015). The real versus the ideal: predicting relationship satisfaction and well-being from endorsement of marriage myths and benevolent sexism. *Psychol. Women Q.* 39, 119–129. doi: 10.1177/036168431452830

Chiodo, D., Crooks, C. V., Wolfe, D. A., McIsaac, C., Hughes, R., and Jaffe, P. G. (2012). Longitudinal prediction and concurrent functioning of adolescent girls demonstrating various profiles of dating violence and victimization. *Prev. Sci.* 13, 350–359. doi: 10.1007/s11121-011-0236-3

Cohen, G., and Conway, M. A. (eds) (2008). *Memory in the Real World*, 3rd Edn, London: Psychology Press, 21–90.

Conway, M. A. (2003). Cognitive-affective mechanisms and processes in autobiographical memory – Commentary. *Memory* 11, 217–224. doi: 10.1080/741938205

Conway, M. A., and Holmes, A. (2004). Psychosocial stages and the availability of autobiographical memories. *J. Pers.* 72, 461–480. doi: 10.1111/j.0022-3506.2004.00269.x

Conway, M. A., and Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychol. Rev.* 107, 261–288. doi: 10.1037/0033-295X.107.2.261

CREA (2017/2019). *MEMO4LOVE: Social Interactions and Dialogues that Transform Memories and Promote Sexual-Affective Relationships Free of Violence from High Schools*. R + D National Plan. Madrid: Spanish Ministry of Economy and Competitiveness.

De La Rue, L., Polanin, J. R., Espelage, D. L., and Pigott, T. D. (2017). A meta-analysis of school-based interventions aimed to prevent or reduce violence in teen dating relationships. *Rev. Educ. Res.* 8, 7–34. doi: 10.3102/0034654316632061

Díaz-Aguado, M. J. (2006). Sexismo, violencia de género y acoso escolar. Propuestas para una prevención integral de la violencia. *Revista de Estudios de Juventud* 73, 38–57.

Eisenbraun, K. D. (2007). Violence in schools: prevalence, prediction, and prevention. *Agress. Violent Behav.* 12, 459–469. doi: 10.1016/j.avb.2006.09.00

Ely, G. E., Nugent, W. R., Cerel, J., and Vimbba, M. (2011). The relationship between suicidal thinking and dating violence in a sample of adolescent abortion patients. *Crisis* 32, 246–253. doi: 10.1027/0227-5910/a000082

European Union Agency for Fundamental Rights (2014). *Victims of Crime in EU: the Extent and Nature of Support for Victims*. Available at: http://fra.europa.eu/en/publication/2014/victims-crime-eu-extent-and-nature-support-victims

Exner-Cortens, D., Eckenrode, J., and Rothman, E. (2013). Longitudinal associations between teen dating violence victimization and adverse health outcomes. *Pediatrics* 131, 71–78. doi: 10.1542/peds.2012-1029

Farrington, D. (1993). Understanding and preventing bullying. *Crime Justice Rev. Res.* 17, 381–458. doi: 10.1086/449217

Fineran, S., and Bennett, L. (1999). Gender and power issues of peer sexual harassment among teenagers. *J. Interpers. Violence* 14, 626–641. doi: 10.1177/088626099014006004

Flecha, A., and Puigvert, L. (2010). "Contributions to social theory from dialogic feminism: giving voice to all women," in *Examining Social Theory*, ed. D. Chapman (New York, NY: Peter Lang), 161–174.

Flecha, R., Oliver, E., Puigvert, L., and Soler, M. (2017). *Analitical Categories that Result from the Research Line on Preventive Socialization of Gender Violence Developed by CREA*. Available at: https://archive.org/stream/CategoriasAnalisisSPV/categorias%20analisis%20SPV_djvu.txt.

Flecha, R., Soler, M., and Sordé, T. (2015). Europe must fund social sciences. *Nature* 520, 193–193. doi: 10.1038/528193d

Foshee, V. A., McNaughton, H. L., Gottfredson, N. C., Chang, L. Y., and Ennett, S. T. (2013). A longitudinal examination of psychological, behavioural, academic, and relationship consequences of dating abuse victimization among a primarily rural sample of adolescents. *J. Adolesc. Health* 53, 723–729. doi: 10.1016/j.jadohealth.2013.06.016

Foshee, V. A., Reyes, L. M., Agnew-Brune, C. B., Simon T. R., Vagi, K. J., Lee, R. D., et al. (2014). The effects of the evidence-based safe dates dating abuse prevention program on other youth violence outcomes. *Prev. Sci.* 15, 907–916. doi: 10.1007/s11121-014-0472-4

Garcia, C., Gairal, R., Munté, A., and Plaja, T. (2018). Dialogic literary gatherings and out-of-home child care: creation of new meanings through classic literature. *Child Fam. Soc. Work* 23, 62–70. doi: 10.1111/cfs.12384

Gilmore, A. K., Granato, H. F., Wilson, S. M., and George, W. H. (2016). Sexual assault and heavy episodic drinking among women of asian/pacific islander ancestry and women of european ancestry. *Psychol. Women Q.* 19, 441–459. doi: 10.1177/0361684316648312

Giordano, P. C. (2003). Relationships in adolescence. *Annu. Rev. Sociol.* 29, 257–281. doi: 10.1146/annurev.soc.29.010202.100

Gómez, A., Puigvert, L., and Flecha, R. (2011). Critical communicative methodology: informing real social transformation through research. *Qualit. Inq.* 17, 235–245. doi: 10.1177/1077800410397802

Gómez, J. (2004). *El amor en la Sociedad del Riesgo. Una tentativa educativa*. Barcelona: Hipatia.

Gómez, J. (2015). *Radical Love: A Revolution for the 21st century*. New York, NY: Peter Lang.

Harris, C. B., Barnier, A. J., Sutton, J., and Keil, P. G. (2010). How did you feel when "The Crocodile Hunter" died? Voiing and silencing in conversation influences memory for an autobiographical event. *Memory* 18, 185–197. doi: 10.1080/09658210903153915

Hedrick, M., Haden, C. A., and Ornstein, P. A. (2009). Elaborative talk during and after an event: conversational style influences children's memory reports. *J. Cogn. Dev.* 10, 188–209. doi: 10.1080/15248370903155841

Hesse-Biber, S. (2016). Qualitative or mixed methods research inquiry approaches: some loose guidelines for publishing in sex roles. *Sex Roles* 74, 6–9. doi: 10.1007/s11199-015-0568-8

Higgins, E. T. (1987). Self-Discrepancy: a theory self and affect. *Psychol. Rev.* 94, 319–340. doi: 10.1037/0033-295X.94.3.319

Hirst, W., and Rajaram, S. (2014). Towards a social turn in memory: an introduction to a special issue on social memory. *J. Appl. Res. Mem. Cogn.* 3, 239–243. doi: 10.1016/j.jarmac.2014.10.001

Holland, A., and Kensinger, E. A. (2010). The importance of regulatory goal states for autobiographical memory: a reply to Levine and Rubin reply. *Phys. Life Rev.* 7, 136–138. doi: 10.1016/j.plrev.2010.01.014

Holmes, K., and Sher, L. (2013). Dating violence and suicidal behaviour in adolescents. *Int. J. Adolesc. Med. Health* 25, 257–261. doi: 10.1515/ijamh-2013-0059

Kandel, E. R. (2007). *In Search of Memory: The Emergence of a New Science of Mind*. New York, NY: W. W. Norton and Company.

Karlsson, M. E., Temple, J. R., Weston, R., and Le, V. D. (2016). Witnessing interparental violence and acceptance of dating violence as predictors for teen dating violence victimization. *Violence Against Women* 22, 625–646. doi: 10.1177/1077801215605920

Kast, N., Eisenberg, M., and Sieving, R. (2016). The role of parent communication and connectedness in dating violence victimization among latino adolescents. *J. Interpers. Violence* 31, 1932–1955. doi: 10.1177/0886260515570750

Kimmel, M. (1996). *Manhood in America: a Cultural History*. New York, NY: Free Press.

Klein, S. B., Robertson, T. E., and Delton, A. W. (2010). Facing the future: memory as an evolved system for planning future acts. *Mem. Cognit.* 38, 13–22. doi: 10.3758/MC.38.1.13

Krahé, B., Berger, A., Vanwesenbeeck, I., Bianchi, G., Chliaoutakis, J., Fernández-Fuertes, A. A., et al. (2015). Prevalence and correlates of young people's sexual aggression perpetration and victimization in 10 European countries: a multi-level analysis. *Cult. Health Sex.* 17, 682–699. doi: 10.1080/13691058.2014.989265

Lavoie, F., Robitaille, L., and Hébert, M. (2000). Teen dating relationships and aggression: an exploratory study. *Violence Against Women.* 6, 6–36. doi: 10.1177/10778010022181688

Leen, E., Sorbring, E., Mawer, M., Holdsworth, E., Helsing, B., and Bowen, E. (2013). Prevalence, dynamic risk factors and the efficacy of primary interventions for adolescent dating violence: an international review. *Aggress. Violent Behav.* 18, 159–174. doi: 10.1016/j.avb.2012.11.015

Lincoln, Y. S., and Guba, E. G. (1985). *Naturalistic Inquiry*. Thousand Oaks, CA: Sage.

Lundgren, R., and Amin, A. (2015). Addressing intimate partner violence and sexual violence among adolescents: emerging evidence of effectiveness. *J. Adolesc. Health* 56, S42–S50. doi: 10.1016/j.jadohealth.2014.08.012

McAdams, D. P. (1998). The role of defense in the life story. *J. Pers.* 66, 1125–1146. doi: 10.1111/1467-6494.00044

McAdams, D. P., Reynolds, J., Lewis, M., Patten, A. H., and Bowman, P. J. (2001). When bad things turn good and good things turn bad: sequences of redemption and contamination in life narrative and their relation to psychosocial adaptation in midlife adults and in students. *Pers. Soc. Psychol. Bull.* 27, 474–485. doi: 10.1177/0146167201274008

McDaniel, A. (2005). Young women's dating behavior: why not date a nice guy? *Sex Roles* 53, 347–359. doi: 10.1007/s11199-005-6758-z

McDonald, H. E., and Hirt, E. R. (1997). When expectancy meets desire: motivational effects in reconstructive memory. *J. Pers. Soc. Psychol.* 71, 5–23. doi: 10.1037/0022-3514.72.1.5

Montañés, P., de Lemus, S., Moya, M., Bohner, G., and Megías, J. L. (2013). How attractive are sexist intimates to adolescents? The influence of sexist beliefs and relationship experience. *Psychol. Women Q.* 37, 494–506. doi: 10.1177/0361684313475998

Nelson, K., and Fivush, R. (2004). The emergence of autobiographical memory: a social cultural developmental theory. *Psychol. Rev.* 111, 486–511. doi: 10.1037/0033-295X.111.2.486

Oliver, E., and Valls, R. (2004). *Violencia de Género. Investigaciones Sobre Quiénes, Por qué y Cómo Superarla*. Barcelona: El Roure.

O'Moore, M., and Minton, S. (2005). Evaluation of the effectiveness of an anti-bullying programme in primary schools. *Aggress. Behav.* 31, 609–622. doi: 10.1002/ab.20098

Ozer, E. J. (2006). Contextual effects in school-based violence prevention programs: a conceptual framework and empirical review. *J. Prim. Prev.* 27, 315–340. doi: 10.1007/s10935-006-0036-x

Puigvert, L. (2016). Female university students respond to gender violence through dialogic feminist gatherings. *Int. Multidiscip. J. Soc. Sci.* 5, 183–203. doi: 10.17583/rimcis.2016.2118

Puigvert, L., and Flecha, R. (2018). *Definitions of Coercive Discourse, Coerced Preferences and Coerced Hooking-up. This Work is Licensed Under the Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 International License.* Available at: https://creativecommons.Org/licenses/by-nc-nd/4.0/.

Puigvert, L. (2015/2016). Fee Teen Desire. Transforming adolescents' desires through dialogue for relationships free of violence. Marie Sklodowska-Curie grant, European Union's Horizon 2020 research and innovation programme. Agreement No. 659299.

Pulido, C., Redondo-Sama, G., Sordé-Martí, T., and Flecha, R. (2018). Social impact in social media: a new method to evaluate the social impact of research. *PLoS One* 13:e0203117. doi: 10.1371/journal.pone.0203117

Ramírez Rodriguez, J. C., Gómez González, M. P., Guitiérrez de la Torre, N. C., and Sucilla Rodriguez, M. V. (2017). Masculinidades y emociones como construcciones socioculturales: una revisión bibliométrica. *Masc. Soc. Change* 6, 217–256. doi: 10.17583/mcs.2017.2734

Reale, E., Avramov, D., Canhial, K., Donovan, C., Flecha, R., Holm, P., et al. (2017). A review of literature on evaluating the scientific, social and political impact of social sciences and humanities research. *Res. Eval.* rvx025, 1–11. doi: 10.1093/reseval/rvx025

Rebellon, C. J., and Manasse, M. (2004). Do «Bad boys» really get the girls? Delinquency as a cause and consequence of dating behavior among adolescents. *Justice Q.* 21, 355–389. doi: 10.1080/07418820400095841

Roberts, T. A., Klein, J. D., and Fisher, S. (2003). Longitudinal effect of intimate partner abuse on high-risk behavior among adolescents. *Arch. Pediatr. Adolesc. Med.* 157, 875–881. doi: 10.1001/archpedi.157.9.875

Rubin, D. C. (2010). Emotion and autobiographical memory: considerations from posttraumatic stress disorder. *Phys. Life Rev.* 7, 132–133. doi: 10.1016/j.plrev.2010.01.006

Santiago Ramón, Y. C. (1894). The croonian lecture: la fine structure des centres nerveux. *Proc. R. Soc. Lond. B Biol. Sci.* 55, 444–468.

Sharp, E. A., and Keyton, K. (2016). Caught in a bad romance? The negative effect of normative dating and marital ideologies on women's bodies. *Sex Roles* 75, 15–27. doi: 10.1007/s11199-016-0610-5

Sheridan, L., and Lyndon, A. (2012). The influence of prior relationship, gender, and fear on the consequences of stalking victimization. *Sex Roles* 66, 340–350.

Silverman, J. G., Raj, A., Mucci, L. A., and Hathaway, J. E. (2001). Dating violence against adolescent girls and associated substance use, unhealthy weight control, sexual risk behavior, pregnancy, and suicidality. *JAMA* 286, 572–579. doi: 10.1001/jama.286.5.572

Smith, P. H., White, J. W., and Holland, L. J. (2003). A longitudinal perspective on dating violence among adolescent and college-age women. *Am. J. Public Health* 93, 1104–1109. doi: 10.2105/AJPH.93.7.1104

Soler-Gallart, M. (2017). *Achieving Social Impact. Sociology in the Public Sphere*. Berlin: Springer.

Statistique Canada (2015). *La Victimisation Criminelle au Canada, 2014*. Available at: http://www.statcan.gc.ca/pub/85-002-x/2015001/article/14241-fra.htm

Stone, C. B., Barnier, A. J., Sutton, J., and Hirst, W. (2010). Building consensus about the past: schema consistency and convergence in socially shared retrieval-induced forgetting. *Memory* 18, 170–184. doi: 10.1080/09658210903159003

Sunday, S., Kline, M., Labruna, V., Pelcovitz, D., Salzinger, S., and Kaplan, S. (2011). The role of adolescent physical abuse in adult intimate partner violence. *J. Interpers. Violence* 26, 3773–3789. doi: 10.1177/0886260511403760

Tellado, I. (2017). Bridges between individuals and communities: dialogic participation fueling meaningful social engagement. *Res. Ageing Soc. Policy* 5, 8–31. doi: 10.4471/rasp.2017.2389

Theimann, M. (2016). School as a space of socialization and prevention. *Eur. J. .Criminol.* 13, 67–91. doi: 10.1177/1477370815597254

Trygged, S., Hedlund, E., and Karehol, I. (2014). Living in danger: previous violence, socioeconomic position, and mortality risk among women over a 10-year period. *Soc. Work Public Health* 29, 114–120. doi: 10.1080/19371918.2013.776350

Turanovic, J. J., and Pratt, T. C. (2015). Longitudinal effects of violent victimization during adolescence on adverse outcomes in adulthood: a focus on prosocial attachments. *J. Pediatr.* 166, 1062–1069. doi: 10.1016/j.jpeds.2014.12.059

United Nations Statistics Division (2015). *World's Women 2015. Trends and Statics*. New York, NY: United Nations Statistics Division.

Valls, R., Puigvert, L., and Duque, E. (2008). Gender violence among teenagers-Socialization and prevention. *Violence Against Women* 14, 759–785. doi: 10.1177/1077801208320365

Vranic, A., Jelic, M., and Tonkovic, M. (2018). Functions of autobiographical memories in younger and older adults. *Front. Psychol.* 9:219. doi: 10.3389/fpsyg.2018.00219

Vygotsky, L. S. (1980). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Wagoner, B., and Gillespie, A. (2014). Sociocultural mediators of remembering: an extension of Bartlett's method of repeated reproduction. *Br. J. Soc. Psychol.* 53, 622–639. doi: 10.1111/bjso.12059

Wang, Q. (2016). Remembering the self in cultural contexts: a cultural dynamic theory of autobiographical memory. *Mem. Stud.* 9, 295–304. doi: 10.1177/1750698016645238

Williams, H. L., Conway, M. A., and Cohen, G. (2008). "Autobiographical memory," in *Memory in the Real World*, ed. M. A. Conway (New York, NY: Psychology Press), 21–90.

Wolfe, D. A., Crooks, C., Jaffe, P., Chiodo, D., Hughes, R., Ellis, W., et al. (2009). A school-based program to prevent adolescent dating violence: a cluster randomized trial. *Arch. Pediatr. Adolesc. Med.* 163, 692–699. doi: 10.1001/archpediatrics.2009.69

Wolitzky-Taylor, M. A., Ruggiero, K. J., Danielson, C. K., Resnick, H., Hanson, R. F., Smith, D. W., et al. (2008). Prevalence and correlates of dating violence in a national sample of adolescents. *J. Am. Acad. Child Adolesc. Psychiatr.* 47, 755–762. doi: 10.1097/CHI.0b013e318172ef5f

World Health Organization (2015). *Adolescents: Health Risks and Solutions*. Available at: http://www.who.int/mediacentre/factsheets/fs345/en/

World Medical Association [WMA] (2013). World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA* 310, 2191–2194. doi: 10.1001/jama.2013.281053

Ybarra, M. L., Espelage, D. L., Langhinrichsen-Rohling, J., Korchmaros, J. D., and Boyd, D. (2016). Lifetime prevalence rates and overlap of physical, psychological, and sexual dating abuse perpetration and victimization in a national sample of youth. *Arch. Sex. Behav.* 45, 1083–1099. doi: 10.1007/s10508-016-0748-9

Yoneyama, S., and Naito, A. (2010). Problems with the paradigm: the school as a factor in understanding bullying (with special reference to Japan). *Br. J. Sociol. Educ.* 24, 315–330. doi: 10.1080/01425690301894

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer RN and handling editor declared their shared affiliation at the time of review.

frontiers in Education

SYSTEMATIC REVIEW
published: 01 November 2018
doi: 10.3389/feduc.2018.00089

School Actions to Prevent Gender-Based Violence: A (Quasi-)Systematic Review of the Brazilian and the International Scientific Literature

Bruno C. Prezenszky, Ernesto F. Galli, Denise Bachega and Roseli R. de Mello*

Nucleus of Investigation and Social and Educational Action, Center of Education and Human Sciences, Federal University of São Carlos, São Carlos, Brazil

The study aimed to provide scientific evidence to support school actions for the prevention of gender-based violence (GBV), specifically in the Brazilian context. Brazil presents high GBV indexes, ranking fifth in the world in femicide. With regard to violence in school, girls are the main victims of sexual-based violence and GBV. Preventive actions must be taken to avoid such occurrence. Searches conducted in Brazilian scientific databases retrieved no review of research on GBV prevention, so we conducted a thorough review of the topic, encountering a small number of articles in Brazilian databases. National and international scientific productions on the theme were compared to identify if the low production is characteristic only in Brazil or in the international context as well. Searches were conducted in Brazilian and international databases using GBV and school-related descriptors. A national data search retrieved 431 entries, while 222 papers were obtained in the international literature. The inclusion criteria for the analyses was the mention, in the abstract, of any form of action within school addressing GBV prevention. This screening selected 11 studies in the Brazilian databases and 30 articles in the international literature. Transformative or exclusionary elements were identified in the texts, focusing on different school levels and also lawmaking. Because of restrictions imposed by the data set, a descriptive analysis was conducted. In the international literature, it was possible to identify that recent research has been analyzing actions developed in schools aiming for GBV prevention and some of their impacts. Brazilian literature has been focusing primarily on describing actions rather than evaluating their impacts or describing GBV prevalence. The targeted population includes teachers, sports coaches, male and female students of different educational levels, whole school community, family, and surrounding communities. The actions described in the international dataset are most frequently conducted in an extracurricular context and are primarily focusing on raising awareness about GBV and on providing information. The Brazilian studies indicate

OPEN ACCESS

Edited by:
Isabel Menezes, Universidade do Porto, Portugal

Reviewed by:
Marta Pinto, Universidade do Porto, Portugal
Cinzia Albanesi, Università degli Studi di Bologna, Italy

***Correspondence:**
Bruno C. Prezenszky
brucorpre@gmail.com

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *06 June 2018*
Accepted: *21 September 2018*
Published: *01 November 2018*

Citation:
Prezenszky BC, Galli EF, Bachega D and de Mello RR (2018) School Actions to Prevent Gender-Based Violence: A (Quasi-)Systematic Review of the Brazilian and the International Scientific Literature. Front. Educ. 3:89. doi: 10.3389/feduc.2018.00089

few actions conducted within the school. The analysis indicated characteristics in school-actions that contribute to preventing and overcoming GBV, such as working with the whole school community, empowering women and strengthening egalitarian masculinities, bystander training, and implementing laws and policies.

Keywords: gender-based violence, school, gender-based violence prevention, intervention, violence against women

INTRODUCTION

The study initially aimed to characterize Brazilian scientific production regarding schools' educational actions to prevent gender-based violence (GBV), in order to provide a synthesis of such production. Upon finding only a small amount of scientific articles in Brazilian databases ($n = 6$), we considered it necessary to compare such findings with international research to identify whether the theme is understudied only nationally or worldwide too. Hence, we included a second objective to this study, which was to compare research available in Brazilian databases and in international ones about the theme in order to situate the Brazilian production in the wider context and indicate possibilities of action, evidencing transformative elements identified in the literature. We also present the needs of scientific knowledge for the proposition, implementation, and evaluation of possible actions in the Brazilian educational contexts.

The demands arise from data showing the high amount of people, mainly women, who suffer because of gender-based and sexual violence around the world and in Brazil. In 2013, according to World Health Organization research on violence against women, 35% of women worldwide suffered sexual violence from partners or non-partners, and 38% of women's murders were committed by intimate partners (World Health Organization–W.H.O., 2013), configuring a problem of epidemic proportions.

In Brazil, in 2015, the map of violence highlighted the increase in the number of deaths of women in the country and indicated that Brazil ranks 5th in the world in femicide (Waiselfisz, 2015). This fact becomes more worrisome when we consider that since 2006 the country has a law that was acknowledged as a milestone in the fulfillment of international and constitutional guarantees on women's rights (Barsted and Pitanguy, 2011). Law 11,340/06 (Brasil, 2006), known as the Maria da Penha Law, makes explicit the criminalization of violence against women, creates mechanisms to prevent family violence and domestic violence against women, and guarantees the protection of women and their children to prevent and preclude violent situations. Even though over a decade has passed since this law's approval, the number of women killed because of gender violence remains staggering, and grows across the country (Waiselfisz, 2015).

Also in 2015, the *Enóis - Inteligência Jovem Institute*, in partnership with the institutes *Vladimir Herzog* and *Patrícia Galvão*, conducted a survey of more than 2,300 women aged 14 to 24 years in different Brazilian states. The research results show that 41% of the interviewees have already suffered physical aggression and, within those, 51% were assaulted by a relative, 38% by a partner, 23% by a colleague, 3% by a school teacher, or 3% by a boss or colleague, and 3% by unknowns (ÉNOIS Instituto, 2015). Focusing on youth, a research conducted by the Avon Institute in 2014, with more than 2,000 youths aged 16 to 24 years, revealed that 66% of women had experienced some type of violence or partner control, and that 55% of men had committed violence against their companions (AVON Instituto Data Popular, 2014).

Globally, researchers and international organizations have indicated that violence is reflected directly within the school setting and that girls form one of the groups that is most vulnerable to violence, along with the LGBT population, immigrants, and people with disabilities or those that differ from the local standard (Unicef, 2012; Duque and Teixido, 2016; UNESCO-United Nations Scientific Educational, 2017).

United Nations Children's Emergency Fund - (Unicef, 2012), highlights the importance of combating violence against children and adolescents and lists the forms of school violence that have been denounced: "bullying, sexual and GBV, physical and psychological violence, and violence that includes a dimension external to schools, such as gang culture-associated violence, weapons and fighting" (Unicef, 2012, p. 5). It also indicates that girls are at a higher risk of gender and sexual violence[1], and boys are at higher risk of victimization by physical violence. As previously highlighted, boys also suffer GBV in school, especially those who are identified by others or self-identified as homosexual. The students identified as the most vulnerable to bullying are those of low-income or ethnic, linguistic, and cultural origins other than the "standard" in a region (UNESCO-United Nations Scientific Educational, 2017).

UNESCO-United Nations Scientific Educational (2017) highlights some important aspects of the issue, stressing on the fact that girls are the most affected among the victims:

> Specific data on sexual violence in and around the school setting is limited, since many victims are hesitant to report acts of sexual violence for fear of being shamed or stigmatized or because they

[1]Brazilian Law 11340/2006, that regulates denouncement and punishment of violence against women defines sexual violence as "any conduct that forces a woman to witness, maintain or participate in unwanted sexual relation by the use intimidation, threat, coercion or use of strength; that lures a woman into commercializing ou utilizing in any manner, her sexuality; that impedes her of using any contraceptive method or that forces her into marriage, pregnancy, abortion or prostitution, through the use of coercion, blackmail, bribery or manipulation; or that limits or nullifies the exercise of her sexual and reproductive rights"; and gender violence as "violence suffered by the fact of being a woman, regardless of race, social class, religion, age or any other condition, product of a social system that subjects the feminine sex" (Brasil, 2006, p.19-20).

> are concerned that they will not be believed or will face retaliation from their aggressor or aggressors. Nevertheless, available figures suggest that sexual violence and abuse in schools, perpetuated by staff and by other students, is a reality for many students, particularly girls (p. 9).

> It is worth noting that in schools, the main form of violence that can be observed is bullying, which can be defined as a form of violence constantly repeated, with unequal power relations (Olweus, 2013). According to (Unicef, 2012):

> The most common form of bullying is verbal, which, if left unchecked, can also lead to physical violence. The Study underlines that almost all bullying is sexual or gender-based in nature, aimed at putting pressure on children to conform to cultural values and social attitudes, especially those that define perceived masculine or feminine roles (p. 5).

Hence, it can be stated that school is a space where violence also takes place. But, it also is a space where education about violence and actions to prevent and overcome violence can be addressed and potentialized. Recent research has been dedicated directly to the education about GBV and the development of actions to overcome GBV.

School and the Prevention of Gender Violence and Overcoming Gender Violence

Considering these elements and research on school violence in Brazil, research on violence in schools has mapped its occurrence, as the literature review conducted by Nesello et al. (2014) states, "The existence of violence in the school was reported by 83.4% of the students and 87.3% of the teachers" (Nesello et al., 2014, p. 123). According to these authors, sexual violence has little space in research on violence. Abramovay et al. (2016) point out that more than 70% of the students consider that there has already been some form of schooling in the five most violent capitals of the country, of school violence, and 42% say they have already been beaten at school. The main forms of violence pointed out by them were as follows: "thefts and robberies (19%); other students (12%); threats (12%); cyberbullying (7%); and teachers (7%), while the other types of violence in the total number of schools would not reach 5% "(Abramovay et al., 2016, p. 33).

The seriousness of the problem of violence in the school environment deserves to be highlighted; since, in addition to being constant, as indicated by research on bullying, for example, it has serious consequences such as decrease in academic indexes, dropping out of school, more interpersonal difficulties, depression, anxiety, and suicide (Unicef, 2012; Duque and Teixido, 2016; UNESCO-United Nations Scientific Educational, 2017). In addition, low reporting rates may indicate that, like in universities (Valls et al., 2009), schools fail to sustain means to encourage victims to report and even hinder both actions for victim support and development of preventive programs, since there is little knowledge of the extension of gender violence in educational institutions.

For these reasons, the incorporation of violence prevention in school actions is necessary, but also, because school is one of the main socialization environments for children and young people. As Gómez (2004) points out, the socialization of children and young people initially occurs in the family group, but it also includes the peer group, media, cultural groups, and school.

Research dedicated to understanding the phenomenon, and mainly to overcome it, points to the importance of violence prevention in the first years of school, focusing on the reduction of student aggressiveness, and the importance of community participation in the development of strategies to prevent and overcome violence at school (Tremblay et al., 2008; Oliver, 2014); strengthening of school management and peer group in the development of actions (Duque and Teixido, 2016); and, when it comes to universities, institutional actions in support of victims and receiving complaints (Oliver and Valls, 2004; Rosa et al., 2008).

Ríos (2009) points out that school is an important socialization agent for individuals. Therefore, it can also be an important place for preventing and overcoming violence, once it provides diverse relationships and interactions in which the teacher can act directly in appreciation and consolidation of less violent relations, lessening gender stereotypes. But for this, teachers need to be prepared to work for the prevention and eradication of gender violence, as highlighted by Aguilar et al. (2009); Botton et al. (2012); and Bujosa et al. (2012).

As Gómez (2004) indicates, the primary socializing agents for children are as follows: firstly, family then peer group, school, and media. Thus, the issue of overcoming and preventing GBV should not be restricted to school. The approach should consider the surrounding community as one of the main elements in prevention, mainly because of the importance it has in the socialization of young people. Thus, the articulation between school, families, and the surrounding community strengthens the power of actions for violence prevention in the process of socializing in children and youth.

Considering the fact that, worldwide, in gender violence, whether against women or against LGBT identities, actions are mostly carried out by men; the discussion about masculinities assumes an important place in understanding the phenomenon but also in preventing and overcoming it. The attraction for masculinity models also becomes key in this process.

The violent behavior of men relates to what Flecha et al. (2013) describe as a model of traditional dominant masculinity (TDM). The authors demonstrate that masculinity models are directly related to gender violence, and for the authors, the traditional dominant model contributes to the increase in gender violence.

The TDM model is characterized by unequal values, postures, and behaviors, specifically disdain and violence in relationships (Flecha et al., 2013). Studies such as those of Castro and Mara (2014) that address attraction and the relation with the traditional dominant model that presents violent characteristics and of A. Flecha et al. (2010), which relates the hegemonic model of masculinity to gender violence, emphasize the importance of rethinking masculinity in order to prevent gender violence. Padrós (2012) emphasizes that adolescents are attracted to the traditional dominant model and that is why it is necessary to rethink masculinity.

Gómez (2004) had already addressed the issue of sexual attraction highlighting violence and disdain as relevant factors in understanding people's motivations in their love choices:

> To this we must add that socialization agents, with the media in leadership, are promoting a kind of relationship based on "instinctive" and "chemical" attraction looking at those who are "good" and "hard" facilitating contempt, indifference and ill-treatment (Gómez, 2004, page 131[2]).

His approach highlights the importance of reviewing the form of socialization carried out in school, seeking the transformation of affective-sexual relations. For this reason, Flecha et al. (2013) continued the discussion, addressing the traditional dominant model already presented: the traditional oppressed model and the new masculinities, the latter being a model that prevents gender violence. Traditional oppressed masculinity is the model in which men are socialized not to be aggressive, not sexist, and as people who take care of the house, but however, are not attractive and, for this, end up being oppressed by the traditional model of masculinity and do not succeed in affective-sexual relations.

On the other hand, in the model of new alternative masculinities, which seeks to unite passion and desire with the language of ethics, a man aims to be a person with values: not aggressive and not sexist. This model has three fundamental characteristics: self-confidence, strength, and courage that are necessary to oppose the traditional dominant model and the explicitness of the rejection of the double moral. Self-confidence helps men to assert themselves and to contribute to others by becoming more attractive. It is a fundamental point for there to be no hierarchy of masculinity. Strength and courage help new alternative masculinities to express and reject the traditional dominant model, reject violence as a way of acting, and reject the oppression of other models of masculinity. Finally, the alternative model must demonstrate consistency in his actions in advocating for the end of violence against women in groups or in public and also be attractive and egalitarian in his day to day life, not relating to women who treat him poorly or reject "For NAM men, fighting to end with violence against women involved in DTM and being strong in order to construct egalitarian relationships with egalitarian women" (Flecha et al., 2013, p. 105).

Thus, from the model of new alternative masculinities, it is possible to visualize models of masculinities that are egalitarian and that promote the fight to end violence against women. Vidu et al. (2017) emphasize the importance of the concept of "survivors first," which refers to the importance of considering victims as being a priority in any process that is related to breaking the silence. In all situations, the victims have to be in the first place, and it is not possible to accept any kind of violence. Thus, the importance of the spectator's action in cases of violence, according to scientific evidence, is given as follows:

> The powerful meaning of bystander intervention stresses the importance of empowering "bystanders." According to scientific contributions that have shed light on the crucial role of the Friends of survivors (Banyard et al., 2010), one in three women in college and one in five men have friends who have been told that they were victims of an unwanted sexual experience during their college years. If they do not feel empowered, they will likely not support the victims they may know, which limits the potential for bystander intervention to occur (Vidu et al., 2017, p. 7).

The above-mentioned studies point to pathways in relation to violence prevention, which may guide teacher training as well as the actions of teachers throughout the educational system. But, have actions of this nature been produced in schools and disseminated in a significant national and international context? Have these actions been effective in preventing and overcoming GBV? Faced with these questions, in this article, we address the issue of gender violence against women, focusing on the Brazilian literature on preventive actions in school, and raise relevant indicators in international production that can serve as a contribution to the actions developed in Brazil. In this way, the aim of the present study is to provide scientific evidence that can base school actions for the prevention of GBV, specifically in the Brazilian context, based on the actions that are developed in the national and international contexts.

More specifically, we first seek to characterize the national scientific production about school educational actions for the prevention of GBV and then compare it with the international literature on the subject, in order to locate Brazilian production, indicate possibilities for action, and to point out demands for the scientific knowledge production on proposing, implementing, and evaluating possible actions in schools in the Brazilian contexts.

METHOD

The research presented here involved a literature review at national (Brazil) and international levels, without a delimitation of the publication date. The searches were conducted between October 2017 and December 2017. The Flow Diagram for the search conducted on the databases and selection of papers is available in the **Supplementary Material**.

At the national level, the searches were conducted on the Brazilian online libraries BVS-Psi, Scielo, Bank of Thesis and Dissertations of CAPES[3], and Brazilian Digital Library of Theses and Dissertations, which are the main and most recognized scientific databases in the country. The terms used for the search were the Portuguese expressions for "'gender violence' AND 'school'" and "'violence against women' AND school." In this search, 431 entries were obtained.

At the international level, the search was conducted both in Web of Science and Education Resources Information Center (ERIC) websites for the terms "'gender-based violence'

[2]"A esto hay que añadir que los agentes de socialización, con los medios de comunicación a la cabeza, están promocionando un tipo de relaciones basado en la atracción "instintiva" y "química" que busca a las que están "buenas" ya los "duros", facilitando los desprecios, indiferencias y maltratos." (Gómez, 2004, p. 131).

[3]CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - is a foundation of the Ministry of Education, and it plays a fundamental role in the expansion and consolidation of stricto sensu (master's and doctorate) postgraduate programs nationwide.

AND school AND intervention," "'violence against women' AND school AND intervention," "'gender-based violence' AND school AND prevention," "'violence against women' AND school AND prevention," "'gender-based violence' AND school AND program," and "'violence against women' AND school AND program." Since some articles known by the researchers were not retrieved, a new search was conducted on Web of Science using the terms "'gender violence' AND school AND prevention," "'gender violence' AND school AND intervention," "'gendered violence' AND school AND intervention," and "'gendered violence' AND school AND prevention." Language constraint was not applied, but all articles obtained presented an English language abstract. A total of 222 articles were retrieved. These sources were chosen because of their recognition in the international scientific community.

From the total number of texts obtained, only the papers that mentioned, in the title, abstract, or keywords, some type of action developed in schools aimed at the prevention of gender violence were selected. For the international articles, only those published in scientific journals were selected, while manuals, reports, and newsletters were excluded. The Brazilian dataset also included papers that failed to directly address actions in school, but which mentioned the relationship between school and GBV. From these procedures, we reached a total of 5 theses and dissertations and 6 articles in the national scope and 30 articles in the international scope, totaling 41 works comprising the period between 1999 and 2017. The papers were coded and can be checked in **Table 1** where the code used for each paper and the complete references are given. Texts from the international dataset are indicated with the prefix code In-, the Brazilian thesis and dissertations are indicated by the prefix B/DT, while the Brazilian articles are indicated by the prefix B/A.

The difference between the searches conducted in the Brazilian and the international databases was due to the number of papers obtained in each. The Brazilian search retrieved a total of 11 studies (including journal papers and thesis and dissertations), while the international search retrieved a total of 30 papers. For this reason, we opted to include the dissertations and theses from the Brazilian production. The difference in the quantities will not be explored in the present paper, for it was not the scope of the study. It is important to state, though, that such a difference in search procedures could have an impact on the analysis.

As the number of papers found was not expressive and were greatly diverse (regarding participants, methods, interventions, impact assessment, etc), we opted to perform a descriptive analysis of the data. The only statistical procedure was the calculation of the distribution of some of the characteristics through simple percentage.

We opted to include secondary research (reviews), studies that failed to implement, in fact, an intervention and those that failed to perform an assessment of the direct impacts of interventions. The choice to maintain such papers was because of the recognition of a lack of research that aims to perform such measurements as well as of the difficulty in defining what effects should be assessed or how to propose a standardization for intervention research on the recent theme. The manner in which we conducted the present research provides parameters for the proposition of possible successful interventions. It must be highlighted that there is indeed little research on practices regarding the prevention of gender violence in schools, and because of this, the identification of good or best practices and especially successful is difficult. In other words, the characteristics of the data obtained prevented the adoption of protocols for conducting systematic reviews such as those described in the Campbell Collaboration and others.

According to Mertens (2015) and Creswell's (2012) proposition on conducting literature reviews, the categories emerged from the reading of the texts, instead of pre-defined categories. For the analysis of the texts, a grid of analysis was constructed in which the following were identified: the type of research carried out (bibliographic, action-research, experimental, etc.); the objective of the paper; the characteristics of the actions described in the paper; the target population of these actions; the types of research methods used; the obtained results; and the indicated aspects that contribute to the overcoming of GBV (transformative dimension) and aspects identified as barriers to this overcoming (exclusionary dimension), as described in Gómez et al. (2006) and Gómez et al. (2013) when describing the Critical Communicative Methodology.

Initial criteria were proposed for the categorization of different elements in the papers. In order to increase agreement between researchers in data collection and analysis procedures, an initial analysis was performed with a sample of the data divided among three of the researchers. Based on the agreement between them in the pre-analysis, the initial criteria were reevaluated and additional criteria were proposed. In cases where any one of the researchers was in doubt with the categorization of the papers, the other researchers were consulted and the analytical consensus was reached.

In order for a certain aspect mentioned in the paper to be considered transformative, it was necessary for it to present evidence in the data of this contribution, either by the explicit reduction of violence or by the promotion of contributing elements and theoretical basis. Exclusionary aspects were those that had a relationship mentioned in the literature with the increase or continuity of gender violence. After identifying such elements (exclusionary and transformative), they were grouped according to similarities: texts that indicated the same transformative elements were grouped together, and the same was done for the exclusionary elements.

RESULTS

Having the texts analyzed according to the categories that emerged from their contents, we were able to compare the Brazilian and international productions and to describe the transformative and exclusionary elements for the topic. The elements that emerged from the analysis of the publications were as follows: study objective; the characteristics of the actions described in the paper; target population; type of research; and results of the interventions.

TABLE 1 | Codification of the works analyzed.

Code	Title	Authors	Year
NATIONAL			
B/DT1	A intersetorialidade no enfrentamento a violência contra a mulher: uma análise da experiência do município de Santo André-SP	Denúbila, LA	2015
B/DT2	As contribuições do currículo da formação para a prática pedagógica docente com gênero e sexualidade na educação básica	Santos, MCG	2016
B/DT3	Questões de gênero e sexualidade na escola: discutindo políticas públicas e formação pedagógica.	Rocha, NHN	2016
B/DT4	As Representações Sobre Sexualidade: em foco o programa educacional de atenção ao jovem	Rodrigues, FFS	2012
B/DT5	"Marias também têm força": a emergência do discurso de enfrentamento à violência contra a mulher na rede pública de ensino de Caruaru.	Oliveira, KL	2016
B/A1	Violência por parceiro íntimo entre estudantes de duas universidades do Estado de São Paulo, Brasil	Flake TA, Barros C, Schraiber LB, Menezes PR	2013
B/A2	Violência nos relacionamentos afetivo-sexuais entre adolescentes de Porto Alegre, Rio Grande do Sul, Brasil: busca de ajuda e rede de apoio	Soares, JSF; Lopes, MJM; Njaine, K	2013
B/A3	Abordagem da Violência contra a Mulher no Ensino Médico: um Relato de Experiência	Machado, DF; Mclellan, KCP; Murta-nascimento, C; Castanheira, ERL;Almeida, MAS	2016
B/A4	Atenção integral à saúde de mulheres em situação de violência de gênero – uma alternativa para a atenção primária em saúde	Ana Flávia Pires Lucas D'oliveira; Lilia Blima Schraiber; Heloisa Hanada; Julia Durand	2009
B/A5	Estereótipos de gênero e sexismo ambivalente em adolescentes masculinos de 12 a 16 anos	Mesquita F, Marcos; Batista, Marcos Antônio; Eufrásio, Cremilda.	2011
B/A6	Projeto "Abrace Seu Bairro": prevenção da violência no meio escolar e melhoria da qualidade de vida	Ruth Blay Levisky	2009
INTERNATIONAL			
In1	A rigorous review of global research evidence on policy and practice on school-related GBV	Parkes, Jenny; Heslop, Jo; Ross, Freya Johnson; Westerveld, Rosie; Unterhalter, Elaine	
In2	Creating programs for safe schools: opportunities and challenges in relation to GBV in South Africa.	Mlamleli, Olly; Mabelane, Pontsho; Napo, Vernet; Sibiya, Ntombi; Free, Valerie	2000
In3	Empowering women through education: evidence from Sierra Leone. NBER Working Paper No. 18016	Mocan, Naci H.; Cannonier, Colin	2012
In4	The evolution of policy enactment on GBV in schools	Parkes, Jenny	2016
In5	The role of teachers in delivering education about respectful relationships: exploring teacher and student perspectives	Ollis, Debbie	2014
In6	Violence against women in the family home: acknowledging the role of education and the opportunities to utilize technology in prevention efforts	Guggisberg, Marika	2017
In7	"Coaching boys into men": a cluster-randomized controlled trial of a dating violence prevention program	Miller, Elizabeth; Tancredi, Daniel J.; Mccauley, Heather L.; Et Al.	2012
In8	Creating attitudinal change through teaching how a course on "women and violence" changes students' attitudes about violence against women	Currier, Danielle M.; Carlson, Jessica H.	2009
In9	Fostering relationality when implementing and evaluating a collective-drama approach to preventing violence against women	Community Education Team (Brunk, Gouid, Sivak, Spencer, And Richard Walsh-bowers)	1999
In10	Youth envisioning safe schools: a participatory video approach	Lange, Naydene De; Geldenhuys, Mart-mari	2012
In11	A systematic review of interventions for preventing adolescent intimate partner violence	De Koker, Petra; Mathews, Catherine; Zuch, Melanie; Et Al.	2014
In12	Addressing intimate partner violence and sexual violence among adolescents: emerging evidence of effectiveness	Lundgren, Rebecka; Amin, Avni	2015
In13	Applying systems theory to the evaluation of a whole school approach to violence prevention	Kearney, Sarah; Leung, Loksee; Joyce, Andrew; Et Al.	2016
In14	Athletic coaches as violence prevention advocates	Maria Catrina D. Jaime, Heather L. Mccauley, Daniel J. Tancredi, Et Al.	2015
In15	A 6-week school curriculum improves boys' attitudes and behaviors related to GBV in Kenya	Keller, Jennifer; Mboya, Benjamin O.; Sinclair, Jake; Et Al	2017
In16	Engaging boys in eradicating GBV: a pilot study of a promundo-adapted program	Foley, Allison; Powell-williams, Todd; Davies, Kim	2015

(Continued)

TABLE 1 | Continued

Code	Title	Authors	Year
In17	Preventing peer violence against children: methods and baseline data of a cluster randomized controlled trial in Pakistan	Mcfarlane, Judith; Karmaliani, Rozina; Khuwaja, Hussain Maqbool Ahmed; et al.	2017
In18	Qualitative Evaluation of the Mentors in Violence Prevention Pilot in Scottish High Schools	Williams, Damien J.; Neville, Fergus G.	2017
In19	A cluster-randomized trial of a middle school gender violence prevention program: design, rationale, and sample characteristics	Abebe, Kaleab Z.; Jones, Kelley A.; Ciaravino, Samantha; Ripper, Lisa; Paglisotti, Taylor; Morrow, Sarah Elizabeth; Grafals, Melanie; Van Dusen, Courtney; Miller, Elizabeth	2017
In20	Bullying and gender. Prevention from school organization	Elena Duque1 and Joan Teixido	2016
In21	Exploring the potential for changing gender norms among cricket coaches and athletes in India	Elizabeth Miller, Madhumita Das, Ravi Verma, Brian O'connor, Sancheeta Ghosh,Maria Catrina D. Jaime, And Heather L. Mccauley	2015
In22	Educating to prevent gender violence from the classroom: the case of galician schools in nursery and primary level	J. Eliseo Valle Aparicio	2015
In23	A transformative approach to prevent peer violence in schools: contributions from communicative research methods	Maria Padrós	2014
In24	Sexism and bullying among adolescents	Ovejero, Yuber, Larrañaga and Navarro	2013
In25	The social justice roots of the mentors in violence prevention model and its application in a high school setting	Jackson Katz1, H. Alan Heisterkamp, and Wm. Michael Fleming	2011
In26	"I want to I can... prevent violence": raising awareness of dating violence through a brief intervention	Susan Pick, Iwin Leenen, Martha Givaudan, Andrea Prado	2010
In27	Exploring gender differences in dating violence/harassment prevention programming in middle schools: results from a randomized experiment	Bruce G. Taylor and Nan Stein and Frances F. Burden	2010
In28	PROGRAMA GENER@T: social Educational Programme for the Prevention of Dating Violence among Adolescents	Mateos, Ainoa; Amorós, Pere; Pastor, Crescencia; Cojocaru, Daniela	2013
In29	Cyber dating abuse in affective and sexual relationships: a literature review	Flach, Roberta Matassoli Duran; Deslandes, Suely Ferreira;	2017
In30	Youth Feminity, Bodies And Aesthetic Productions In High School	Tomasini, Marina	2015

B/DT, Brazilian Thesis or Dissertation; B/A, Brazilian article; In, International article.

About the Objectives of the Papers

The objectives of the various papers were grouped into four categories, described below. This grouping was proposed from the identification of coincident elements in the objectives described, although there were differences in their writing. Some of the papers presented more than one objective, so they were classified in more than one category (namely, In2, In6, In9, In20, In28, In29).

(a) To evaluate the results of actions/programs/projects: 19 papers (In2, In3, In7, In7, In9, In9, In13, In14, In15, In16, In17, In18, In23, In25, B/DT2, B/DT5, B/A2) are related to the evaluation of existing programs, that is, verifying their impacts and success in overcoming GBV or in elements related to this overcoming. Such evaluation was the objective most frequently cited in the papers ($n = 19$, 46.3%). It is important to emphasize that these evaluations were of different natures, such as reports of how the participants felt (In30), agreement with myths about rape (In29), perception of reduction in the number of occurrences of gender violence (In54), or ability to identify actions such as gender violence (In54).

(b) To evaluate the prevalence of GBV or an indicative (bias) of the problem: 10 studies (In6, In10, In19, In21, In22, In24, In28, In29, In30, B/A1, B/DT4, B/DT5) verified the situation of gender violence in certain places, the call signs of the situations, and the macho beliefs of a particular population but failed to highlight proposals for solving the problem. This goal was the second most frequently cited (n = 12, or 29.3%).

(c) To describe actions/programs/projects to overcome GBV: works that were dedicated to describe programs, projects to overcome violence, or only some actions (In2, In6, In9, In12, In20, In28, In29, B/A3, B/A4, B/A6). This category of objectives was present in a total of 11 (n = 11) papers, and it is the third most frequent category.

(d) Analyze the available knowledge (literature reviews...): six papers (In1, In4, In11, In20, B/A3, and B/DT3) aimed at reviewing the literature, either on the analysis of prevention programs or on the knowledge produced on this matter, totaling 14.6% of the papers analyzed.

These categories allowed to verify the Brazilian and international contributions in relation to the preventive studies of gender violence. The distribution of the articles in relation to the objectives is shown in **Table 2** below.

Considering the data presented, it is possible to state that the objectives of the papers mainly focused on evaluating the results of GBV prevention actions and programs. The next most frequent objectives were the assessment of GBV prevalence and the description of programs and actions. If we separate the analysis between national and international literatures, it can

TABLE 2 | Objectives of the papers.

	Evaluate actions	Evaluate prevalence GBV	Describe actions	Analyse available knowledge
National and international	$n = 18$, $f = 46.3\%$	$n = 12$, $f = 29.3\%$	$n = 11$, $f = 268.5\%$	$n = 6$, $f = 14.6\%$
International literature	$n = 16$, $i = 53.3\%$	$n = 9$, $i = 30\%$	$N = 7$, $i = 23.3\%$	$N = 4$, $i = 13.3\%$
National literature	$n = 3$, $b = 27.3\%$	$n = 3$, $b = 27.3\%$	$n = 4$, $b = 36.4\%$	$n = 2$, $b = 18.2\%$

n, number of articles identified in the category; f, frequency in the category summing international and national articles (total n = 41); b, frequency in the category related to the Brazilian total (Brazilian n = 11); i, frequency in the category related to the international total (total international n = 30).
obs, the sum of percentages exceeds 100% because some articles had more than one objective.

be observed that over half of the papers in the international literature aimed at evaluating the effects of GBV prevention actions.

In the Brazilian literature, a more even distribution in the categories was observed, with a slight majority of the studies aiming at describing the prevention actions. This indicates a significant difference in the comparison between the national and international literatures in favor of the second one.

About the Characteristics of the Actions

In the category "Description of actions," the characteristics of the activities described in the papers can be grouped, that is to say, to the scope in which they were implemented (curricular or extracurricular) or to the format of the activities (In-person groups/online discussion forums; Training and information activities/Awareness; organizational areas —committees—legal propositions/public policies, such as laws or institutional structuring and policies). It is important to emphasize that the sum of the articles in the categories exceeds the total of articles and the relative percentages exceed 100%, because some articles described the accomplishment of actions in different formats. Also, some of the articles indicated that no intervention actions had been carried out because they were exploratory, preparatory to future program implementation or to review the literature.

Scope

This category is related to the school activities that are present in the school curriculum and the activities that are carried out in the school, but which occur at other times and are not directly linked to the curriculum. Twelve ($n = 12$) articles were used to analyze curricular activities (In8, In11, In13, In15, In19, In20, In23, In27, In28, B/DT2, B/DT5 and B/A3), and seventeen ($n = 17$) articles were dedicated to the analysis of extracurricular activities (In2, In5, In7, In9, In10, In11, In13, In12, In14, In16, In17, In18, In20, DT5), as can be seen in **Table 3**.

As it can be observed, considering all the studies, the activities were mainly developed in an extracurricular context. When separating Brazilian and international productions, it is possible to observe that in the international scope, most of the works dealt with extracurricular actions ($n = 17$, or 56.6% of international ones) in comparison with curricular actions ($n = 7$, or 23.3%). It can be emphasized that only five studies (In1, In21, In22, In24, and In30) failed to address preventive actions or 16% of international productions.

TABLE 3 | School scope of actions.

Basis	Curricular	Extracurricular
National and international	$n = 12$, $f = 29.3\%$	$n = 18$, $f = 43.9\%$
International	$n = 9$, $i = 30\%$	$n = 16$, $i = 53.3\%$
National	$n = 3$, $b = 27.3\%$	$n = 2$, $b = 18.2\%$

n, number of articles identified in the category; f, frequency in the category adding international and national articles (total n = 41); i, frequency in the category in relation to the total of international (total international n = 30); b, frequency in the category in relation to the total number of Brazilians (Brazilian n = 11).
Obs, the sum of percentages is not 100% because some articles did not describe actions.

At the national level, curricular actions ($n = 3$, or 27.3%) were more frequent than those conducted in an extracurricular context ($n = 2$, or 18.2%). However, it is important to emphasize that, considering that these are the possibilities of action in school, they refer, together, to only 45% of the works at the national level, which means that most of the works carried out actions in other spheres (B/DT1 and B/A4) and public policies (B/DT3) or fail to describe actions (B/DT4, B/A1, B/A2, B/A5, or 36% of national literature).

Activity Format

This item referred to the characteristics of actions taken to prevent GBV and whether they were more participatory, such as group discussions, or a more informative character in order to disseminate knowledge (such as campaigns on specific dates, lectures, pamphlets, etc), as shown in **Table 4**.

In-person Groups/Online discussion forums: refers to the format used to carry out prevention or research activities on the topic. Papers in which actions aimed at discussing the GBV situation and its prevention through discussion groups or face-to-face forums, as well as those carried out online, fall into this subcategory (In6, In7, In10, In11, In12, In18, In19, In28, B/DT3, B/DT5, and B/A6). There were 11 articles or 26.8% of the total articles.

Informative activities: this subcategory refers to the papers that presented informative and awareness raising actions about GBV; that is, the format failed to have an action developed in the GBV practice but only had the education of people as the identification of types of violence or elements of gender inequality, in activities such as lectures or theatrical performances. The actions were described in 18 papers (In2, In5, In7, In8, In9, In11, In18, In19, In20, In25, In26, In27, In28, In29, B/DT1, B/DT5, B/A4, B/A6) or 43.9% of the total.

Organizational levels

This subcategory refers to actions related to the organization of committees or commissions in school that coordinate GBV prevention actions. These actions were present in four articles (In4, In20, In23, and In29), totaling 9.7% of the studies analyzed.

TABLE 4 | Format of activities.

	In-person groups/online forums	Informative activities/awareness	Organizational areas-committees	Legal propositions
National and internationals	$n = 11$, $f = 26.8\%$	$n = 18$, $f = 43.9\%$	$n = 4$, $f = 9.7\%$	$n = 4$, $f = 9.7\%$
Internationals	$n = 8$, $i = 26.7\%$	$n = 14$, $i = 46.7\%$	$n = 4$, $i = 13.3\%$	$n = 3$, $i = 10\%$
Nationals	$n = 3$, $b = 27.3\%$	$n = 4$, $b = 36.4\%$	$n = 0$, $b = 0\%$	$N = 1$, $b = 9\%$

n, number of articles identified in the category; f, frequency in the category adding international and national articles (total n = 41); i, frequency in the category in relation to the total of international (international total n = 30); b, frequency in the category in relation to the total number of Brazilians (Brazilian n = 11).

Legal propositions

Legal propositions refer to works that describe the implementation of laws and public policies, analyzing their effects or describing them. In this work, we identified four actions (In2, In3, In4, B/DT1).

Considering the data presented above, most of the papers (18 articles, or 43% of the works) present actions that focus on awareness and informative activities and more often in the extracurricular context ($n = 18$, or 43% of articles). With regard to the national work, the data point out that there are also a greater number of works in the subcategory of awareness and formative and informative activities ($n = 4$).

Target Population

Initially, this item was analyzed aiming to identify the target population of the actions developed within the projects of prevention of gender violence. It should be noted, however, that some of the articles analyzed failed to present intervention actions. In these cases, the research participants were considered as the target population. In this way, we identified seven population groups, described below, and sometimes the same work was focused on more than one population. The frequency of populations in the papers are described in **Table 5**.

Students were the most frequent target population of the actions described in the papers, present in 29 of them (In1, In5, In7, In8, In9, In10, In11, In12, In13, In15, In16, In17, In18, In18, In19, In21, B/A2, B/A3, B/A5, B/DT2, B/ DT3, B/DT 4, B/DT5) or 70% of studies. The educational levels to which they belonged ranged from kindergarten (e.g., In22) to university level (e.g., In8). There was also wide variation regarding nationality, ethnic origin, and educational context (e.g., Pakistan In17, Scotland In18, South Africa In2, Liberia In4, Brazil (B/DT,B/A), USA In7, India In21, Sierra Leon In3). There were also papers focusing on both male and female students (e.g., In 12). They also worked on issues of self-protection for girls (e.g., In3, and In12), as well as interventions for active viewers (e.g., In27) and construction of nonviolent models (e.g., In27).

Among the students, there were studies focusing on the general population of students in a given school (e.g., In20), as well as some with specific populations, such as athletes (e.g., In21) and theater groups (e.g., In9 and B/DT5).

Among works aiming at actions with students, eight were Brazilian productions (B/A1, B/A2, B/A3, B/A5, B/DT2, B/DT3, B/DT4, B/DT5) that accounted for 72% of the Brazilian studies. Similarly, studies with this population totaled 70% ($n = 21$) of international studies.

Teachers/Coaches

Some of the actions or surveys focused on the teacher or the coach. These two groups were categorized together by representing people who are not peers of the students and represent some role of authority and teach the youth with whom they work. This was the second most frequent population in the works with a total of seven works (In, In5, In6, In14, In19, In21, and B/DT2) or 17% of the works. Only one Brazilian study approached this population (B/DT2).

School community

This category refers to studies that present actions aimed at the school community as a whole, not just specific actions with students or teachers. They involve practices and research that included actions with teachers, students, managers, employees, relatives, volunteers, etc. Studies of this category totaled 12% ($n = 5$) of the papers analyzed, four in the international scope (In1, In13, In21, and In23) and one in the national scope (B/A6).

The entire population

These studies included those that refer to intersectoral government laws and programs aimed at benefiting the entire population of a territory (country, state, or municipality). Four ($n = 4$) studies presented this approach, three international (In2, In3, and In4) and one national (B/DT1).

Families or communities: refer to studies that focus on the action of the students or the community (neighborhood, community centers, etc.) in which the students live. Four studies fell into this category, all at the international level (In1, In12, In13, and In17). It is important to note, however, that a review study (In4), when analyzing several actions developed in three different countries, indicates the existence of community programs developed in Brazil, aiming at the prevention of violence in general but also includes elements of prevention of gender violence.

Others

Three studies were identified in this category. One of them addressed the role of the public health care system staff in Brazil (B/A4), another one interviewed school managers (In22), and the third study failed to clearly indicate the study's target population (In29).

It is important to emphasize that several studies have worked with more than one target population, including teacher-student (In5, In19, In21, and B/DT2), family/community-student (In12 and In17), and the entire community-family-students (In 13).

TABLE 5 | Target population of actions or research subjects.

	Students	Teachers/coaches	School community	Home Community	Whole population	Other
National and international	$n = 29$, $f = 70.7\%$	$n = 7$, $f = 17.1\%$	$n = 5$, $f = 12.2\%$	$n = 4$, $f = 9.7\%$	$n = 4$, $f = 9.7\%$	$n = 2$, $f = 4.9\%$
International	$n = 21$, $i = 70\%$	$n = 6$, $i = 20\%$	$n = 4$, $i = 13.3\%$	$n = 4$, $i = 13.3\%$	$n = 3$, $i = 10\%$	$n = 1$, $i = 3.3\%$
National	$n = 8$, $b = 72.7\%$	$n = 1$, $b = 9\%$	$n = 1$, $b = 9\%$	$n = 0$, $b = 0\%$	$n = 1$, $b = 9\%$	$n = 1$, $b = 9\%$

n, number of articles identified in the category; f, frequency in the category adding international and national articles (total n = 41); i, frequency in the category in relation to the total of international (international total n = 30); b, frequency in the category in relation to the total number of Brazilians (Brazilian n = 11).

Type of Research

This section seeks to describe the research designs used in the articles, based on the descriptions by Mertens (2015) and Creswell (2012). It is important to emphasize that this categorization is made from the analysis of some elements described in the methods or procedures mentioned in the studies, and it is possible that other names could be assigned to the described procedures. It is also emphasized that some studies that were analyzed may present another terminology for the research designs and that some of the works failed to present discriminated Method sections, which were then inferred from their introduction or results. The use of seven different designs was identified: bibliographic research, correlational research, action research, survey, case study, experimental research, and ethnographic research. The number of articles using each method and the proposal to which they relate are described in **Table 6** below.

Surveys were the most frequent design used in 11 studies (In13, In14, In15, In16, In 18, In 19, In 21, In 22, In 28, B/A1, and B/A1), totaling 26% of the papers. This type of design is commonly used for the purpose of describing some characteristic of a particular sample or population, such as attitudes toward a theme, behaviors, opinions, etc. (Creswell, 2012). This type of research has a descriptive function and fails to seek to establish causal or correlational relationships.

The second most frequent type of research was the case study ($n = 8$, 19%), but it was only identified in the Brazilian studies (B/A3, B/A4, B/A6, B/DT1, B/DT2, B/DT3, B/DT4, and B/DT5) and not in international studies. This type of research is not characterized by the techniques and tools used but by the object of study, referring to a case, a particular instance of events, or phenomena (Mertens, 2015) and aims to "gather comprehensive, systematic and in-depth on each case of interest" (Patton, 2002, p. 447). As Fonseca (2009) indicates, the case must represent more than itself, providing information about a phenomenon. As Creswell (2012) suggests, the knowledge gained through case studies should not be viewed as universal or readily generalizable, given the particularities of its context.

Eight articles (In1, In2, In4, In8, In11, In12, In20, and In29) (19%) were identified as bibliographic searches. It can be defined by the data source and not necessarily by a method. They are studies that obtain the information through sets of bibliographical productions (documents, laws, scientific articles, books, etc). They may have different objectives, among them, revisions of scientific literature aim to identify the scientific knowledge available on a given topic. The present research, for example, characterizes this design. This type of research was absent in the national production, that is, all the studies that used this design were obtained in the international bases.

It was possible to observe that 14.3% of the studies ($n = 6$) used experimental designs (In7, In8, In13, In17, In26, and In27), which included single subject surveys, single-group, quasi-experimental models, etc. Correlational studies were classified in their own category, because they did not have manipulation of variables by the researchers. It is also possible to emphasize that this design was only identified in the international literature.

Correlational studies are defined by using statistical models that evaluate how statistically the variation in one characteristic of the phenomenon is associated with variation in another characteristic. There is no manipulation of variables but there are observed variations in them; therefore, it is not possible to establish causal relation between them. This design was identified in five studies (11.9%), four at the international level (In6, In24, In25, In3) and one at the national level (B/A5).

The action-research design was used in four surveys ($n = 4$, 9.7%), all international (In5, In9, In10, In23), characterized by performing a survey on specific practical issues, aiming at its change and improvement. In this type of research, there is a direct participation of the researcher, and it aims at the improvement of some practices.

The use of ethnographic research (In30 and B/DT5), characterized by a holistic approach to portray the daily experiences experienced by the subjects, was also identified, seeking to reveal how the person structures and describes their world (Mertens, 2015). In this way, it is strongly related to the subjects' routine, accompanying them in their natural environment.

As can be seen, there is a significant difference in the methods implemented in the research when comparing Brazilian and international literatures. In the latter, there was a greater variation in the types of research developed, while in the national production there was a clear predominance of the case studies.

Results of Interventions

From the descriptions of the actions in the studies, it was sought to identify if they indicated the results obtained with their implementation. The types of results described were then categorized into four main categories: change in people's actions; awareness of people; change in some type of record of occurrences of gender violence; and if there was no description of results, although there was some intervention described. It is important to emphasize that some of the studies failed to describe

TABLE 6 | Types of research.

Base	Survey	Case study	Bibliographic research	Experimental	Correlational	Action-research	Ethnographic research
National and international	*n* = 11, *f* = 26.8%	*n* = 8, *f* = 19.5%	*n* = 8, *f* = 19.5%	*n* = 6, *f* = 14.6%	*n* = 5, *f* = 12.2%	*n* = 4, *f* = 9.7%	*n* = 2, *f* = 4.9%
International	*n* = 10, *i* = 33.3%	*n* = 0, *i* = 0%	*n* = 8, *i* = 26.7%	*n* = 6, *i* = 20%	*n* = 4, *i* = 13.3%	*n* = 4, *i* = 13.3%	*n* = 1, *i* = 3.3%
National	*n* = 1, *b* = 9%	*n* = 8, *b* = 19.5%	*n* = 0, *b* = 0%	*n* = 0, *b* = 0%	*n* = 1, *b* = 9%	*n* = 0, *b* = 0%	*n* = 1, *b* = 9%

n, number of articles identified in the category; f, frequency in the category adding international and national articles (total n = 41); i, frequency in the category in relation to the total of international (international total n = 30); b, frequency in the category in relation to the total number of Brazilians (Brazilian n = 11).

TABLE 7 | Results of implemented actions.

Base	Change in people's actions		GBV awareness	GBV occurrences	Not described
	Crenças, valores, situações hipotéticas	Agir em situações reais			
National and international	*n* = 12, *f* = 29.3%	*n* = 4, *f* = 9.7%	*n* = 11, *f* = 26.8%	*n* = 9, *f* = 21.9%	*n* = 12, *f* = 29.3%
International	*n* = 11, *i* = 36.7%	*n* = 4, *i* = 13.3%	*n* = 7, *i* = 23.3%	*n* = 8, *i* = 26.7%	*n* = 7, *i* = 23.3%
National	*n* = 1, *b* = 9%	*n* = 0, *b* = 0%	*n* = 4, *b* = 36.4%	*n* = 1, *b* = 9%	*n* = 4, *b* = 36.4%

n, number of articles identified in the category; f, frequency in the category adding international and national articles (total n = 41); i, frequency in the category in relation to the total of international (international total n = 30); b, frequency in the category in relation to the total number of Brazilians (Brazilian n = 11).

GBV prevention actions (B/A1, B/A2, B/A5, In13, In19, In21, In24, In28, In29, and In30). The results obtained are described in **Table 7** below.

Most of the studies (n = 14, or 34%) described the results regarding some change in participants' actions. This category has been divided into two subcategories. In the first one, with a total of 12 searches (B/DT2, In1, In3, In4, In7, In8, In10, In10, In12, In14, In16, In25, and In26), the changes refer to beliefs, hypothetical situations, and values or answers to questions about how they assess GBV situations, how they would act if they witnessed violence, etc. Of these, only one was identified in the Brazilian literature (B/DT2). In the second one, with six works (B/A4, In1, In7, In12, In14, and In18), they refer to concrete actions of the participants (they report reducing commitment, reporting situations in which they witnessed and intervened, etc.).

The second most frequent type of result was the participants' awareness of GBV, which included being able to define or identify certain actions as GBV, to recognize the existence of GBV. It was observed in a total of eleven studies (B/A3, B/DT1, B/DT3, B/DT5, In1, In5, In9, In10, In18, In23, and In26). It should be noted that most of the Brazilian studies (n = 4, or 36% of them) present results in this category. If studies that fail to describe actions (n = 3) were excluded, and therefore there would be no results to be discussed, the total Brazilian production of awareness would be 57%.

The third most frequent category was the change in the occurrence of gender violence, which included reports of people or records of GBV situations and reports of victimization. It was observed in eight (n = 9, or 22%) studies (B/A6, In1, In4, In11, In15, In17, In20, In23, In27), of which only one was national (B/A6). Considering that the present study sought to identify preventive practices of gender violence, results in the occurrence of GBV are of great relevance for the evaluation of the described practices. Similarly, one study describes that no changes were observed (B/DT4), which is also important to be analyzed.

Studies that failed to describe the results obtained with actions totaled two studies (In2 and In6). It should be emphasized that they failed to describe the results obtained, although preventive actions are described.

In line with what was previously stated in the Method section, the results that were presented reflect some of the methodological limitations in the review. The difficulty in comparing the texts, considering the diversity between papers, can be pointed out as one of the present study's limitations. The papers show a great diversity in methods and actions, and, because of that, we opted to establish descriptive categories in order to propose a primary analysis of the theme.

DISCUSSION

From the analysis of the data, it is proposed to discuss the results obtained in two axes. In the first one, we sought to identify transforming elements in the analyzed research, that is, elements identified in the surveys that contribute to overcoming gender violence, to proposing preventive actions of gender violence, and to producing knowledge that favors them and exclusionary elements identified in them, that is, those pointed out in research

TABLE 8 | Exclusionary dimension.

Exclusionary dimension	Papers
Lack of policies to prevent and combat GBV; professional unpreparedness of teachers (mainly men); teachers exercising violence; naturalization of harassment and victimization of the victim, GBV and discriminatory practices; absence of family and community participation.	In1; In2; In4; In5; In6; In10; In14; In18; In22; In23; In28; B/A4; B/A2; B/A3
Schooling does not change men's beliefs about GBV.	In3
Naturalization of behaviors and speeches of gender inequality and bullying, especially of men, because they show little sensitivity to the subject; presence of gender stereotype beliefs; high GBV indices perpetuated by partners, regardless of sex.	In7; In8; In9; In20; In21; In 24; In26; In27 B/A5; B/A1; B/DT4
Little intervention of students in situations of low aggression, and can serve as a foundation for more aggressive behaviors.	In25
Absence of research and material about Brazil regarding cyber abuse.	In29
The implementation of the activities depends on the current government, which leads to oscillations regarding project acceptance, or discontinuation of projects on GBV.	B/DT1; B/DT5
It does not address the gender issue.	B/A6*
Absence of long-term programs of prevention, difficulty with the transferability of programs.	In12
Not very effective work in its analysis because it is limited by the absence of interviews with students, families, students of different ages, difficulty in understanding what made some students not participate in the evaluation; lack of foundation.	In13; In 15; In16; In30
The study focuses on the perspective of gender difference and sexuality addressing very little, if anything at all, about gender violence.	B/DT2; B/DT3

**The B/A6 paper was included in the review because it indicated in its abstract that gender would be one of its foci, but upon reading the full text, the theme of gender was not addressed.*

TABLE 9 | Transformational dimension.

Transformative dimension	Papers
Government policies and laws in line with international resolutions; community participation (parents and mothers) in school decisions; evidence-based research; against the GBV.	In2; In4; In11; In12; In13; In20; In23; In26; In28.
Strengthening of women's models and alternative male models and improvement of support networks that strengthen the complaint and the active position against GBV.	In2; In 17; In 26.
Improvement in schooling raises awareness of GBV of men and women. Student awareness of GBV improves coexistence.	In3; In 25; In 30.
Evidence-based research, and focus on the training and performance of teachers with good results in GBV prevention.	In5; In 6; In 22.
Working with youth on dating violence, which is based on reports from young people and data on the reality in which the program will be developed, demonstrate more effectiveness.	In1; In 09; In19; In 21; In28; B/A4.
Work with adolescents reduces violence among peers forming a support network, especially if they already see young people with non-sexist behaviors.	In10; In24; In 27; B/A2.
It outlines several actions that can be taken regarding the prevention of cyber dating abuse. The activity consists in raising awareness of the young people on the subject.	In29.
Legislation and government with great impact in the prevention and performance of GBV.	B/DT1; B/DT5
Awareness of students based on upcoming models such as teachers, coaches, students, and community people.	In7; In14; In17; In18.
Curriculum training at the university on GBV increases awareness of the issue, reduces violence and improves care in these institutions and in the prevention of the professionals trained by them.	In8; B/A3; B/DT2; B/DT3.
Research can be done with different age groups and different groups end up having effectiveness.	In15; In16.

as related to the maintenance and aggravation of gender violence or its consequences. In the second axis, we aim to discuss the differences and similarities identified between national and international productions, seeking to identify how to advance in the production of knowledge and conduct of preventive practices. These elements were obtained from the papers through questioning: what elements do the papers present to contribute to the prevention or maintenance of gender violence?

Considering the previous question, the analysis of the texts was conducted and the transformative and exclusionary elements were identified; after that, the themes identified were grouped in the following tables.

Exclusion and Transformation

Table 8 presents a summary of the exclusionary dimensions indicated by the articles and in which we seek to identify convergences between the elements pointed out in several studies.

The results pointed out transforming elements present in different analyzed researches. **Table 9** summarizes the transforming elements and the researches in which it was possible to identify them.

The results indicate several factors in the analyzed studies that contribute to the overcoming of gender violence in the case of transforming elements and to understand the elements that impede the transformation, i.e. the excluding elements. In the analysis, the great majority of the elements are present in both the **Tables 8**, **9**. Thus, we chose to carry out the discussion of both the elements together.

The papers presented relevant transformative or excluding elements related to government policies to prevent and combat GBV, teacher training, naturalization of or critique to practices of harassment, and family participation in schools.

Among these highlighted elements, some are crucial to working toward the prevention of GBV. The professionals who work in school must be well prepared for recognizing and acting in the prevention and combat of GBV. Current literature indicates that the risk of gender violence victimization is highly related to past experiences, mainly to have suffered violence in the first affective and sexual relationships

(Gómez, 2004; Flecha, 2012); for this reason, teachers' performance may be fundamental for the prevention of violence given the proximity to children and teenagers starting their first affective experiences.

The same formative aspect of education can be regarded when focusing on the young population, who, especially in adolescence, are strongly influenced by their peers and role models. In this sense, international literature analyzed in the present study indicated the success of actions that focus on the education of individuals who can become role models and influence the behavior of others to act in a non-violent and more egalitarian way (Katz et al., 2011. Thus, working with athletes, coaches, and tutors with more egalitarian actions makes a great contribution to overcoming gender violence. These studies point to models and interactions that reach out to the students and go in the same direction as signaled by Flecha et al. (2013) about the need to overcome the division between the language of ethics and the language of desire when proposing actions for preventing and overcoming gender violence.

Thus, from the model of new alternative masculinities, as highlighted earlier, it is possible to visualize models of masculinities that are egalitarian and that contribute to the fight against GBV. In that sense, it is possible to envisage models that are not violent and that can be valued in school interactions, between male or female, teachers, coaches, employees, students, etc., valuing egalitarian models. These actions were pointed out as transformative in the texts analyzed, that is, proposals that are being implemented and analyzed in the international studies.

In relation to the Brazilian production, the papers only address informative aspects when discussing the curricular training on gender, as is the case in studies B/DT2, B/DT3, and B/A3; however, these discussions only address the aspects related to sexuality and not gender violence, failing to present results in terms of behavior changes. These three papers were characterized as case studies; although one of them was focused on evaluating actions and results, the other two were aimed at evaluating available knowledge and describing some prevention action. Since these papers focused mainly on sexuality, such an element was considered as one of the exclusionary aspects, which bar the transformation, mainly for neither addressing gender violence nor discussing its prevention.

In relation to the valorization of egalitarian models of femininity and masculinity, it was highlighted in the studies, being considered a transformative dimension; several authors and research point to something that contributes to overcoming gender violence (Ríos, 2009; Katz et al., 2011; Flecha et al., 2013; Castro and Mara, 2014), especially in the research related to coaches' performance that highlights a change in the naturalization of violent attitudes of boys toward girls, leading them to more respectful interactions (Jaime et al., 2015).

Another key element in the debate on preventing and overcoming gender violence is the construction of a support network and a culture of non-tolerance toward GBV. In this sense, actions aimed at training various actors to act against violence have obtained positive results in this overcoming, as is the case in articles In2 and In4. In this regard, one of the Brazilian papers discusses the topic B/A2 and points out the importance of network formation for GBV prevention, in addition to emphasizing that this helps transform youth' relations.

It is important to highlight the positive results obtained in studies that implemented actions for training active intervention of spectators in GBV situations, manifesting themselves in opposition to violence and in favor of the victim, even in situations of low violence. The action must be in all cases and even those of low violence, since they can generate more situations with increasing levels of violence against the victim thus perpetuating violence as previously highlighted in relation to the importance of bystander (Vidu et al., 2017). In relation to this specific topic, there is no data in the national texts, only the work B/A2 reports something in this sense when talking about networks.

With regard to legislation, the national papers address the theme in papers B/DT1 and B/DT5, highlighting the importance of the existing laws, law 11340/2006—Maria da Penha and law 13.104/2015—femicide, and of the importance of the State to manage policies of action against gender violence. However, they also indicate the discontinuity of the work that occurs when another party takes over the executive position, directly influencing the way the laws are implemented.

In this way, the elements presented in **Tables 8**, **9** provide scientific evidence that can base school actions for the prevention of gender violence, specifically in the Brazilian context, based on the actions that are developed in the national and international contexts, because they are the result of research that presented, with its preventive work, positive results in relation to prevention work.

International and National Scientific Production

In this section, the data obtained from the analysis of the Brazilian and the international datasets are compared and discussed in order to identify gaps and perspectives for future research.

With regard to the objectives of the studies analyzed, it is possible to notice that, when dealing with preventive actions of gender violence, with a specific focus on school, the international scientific production has prioritized the evaluation of the effects of the proposed actions. Contrastingly, in Brazil, there are still few publications in the national scope in which the objective is the evaluation of preventive actions in the school context. In this sense, most of the production is focused on the description of the prevalence of GBV or on the description of actions without, however, aiming to evaluate its results. As pointed out in INCLUDED (2012), a study that aimed at identifying actions for inclusion and social cohesion, the educational space is of great relevance for overcoming inequalities. Thus, it indicates the need to produce scientific knowledge about school actions that prevent and reduce violence specifically in the Brazilian context.

If we link the analysis of the objectives with that of the results described in the articles (including both Brazilian and international ones), it can be seen that most of them refer to changes in people's actions regarding gender violence. This data

is consistent with the objectives proposed in the articles, since the analysis of the results of preventive actions is expected to lead to an observation of changes in the actions of the population.

In the Brazilian context, however, the results of the described actions referred more often to the "awareness" about the matter and not necessarily to a change in the actions of the individuals. Although awareness about the origins and characterization of gender violence may be necessary for its overcoming, it is important that, when evaluating intervention actions, its effects in terms of the actions of those who participate in it are observed. The predominance of "awareness" as the observed result of interventions instead of a change in people's actions is consistent with the greater frequency of reported objectives being "to describe actions and prevalence of violence" than to evaluate actions.

Also, with regard to the data related to the results of the actions (including Brazilian and international productions), we emphasize that most of them counted on the evaluation of beliefs, conceptions about GBV, or hypothetical situations. With regard to the data on change in concrete actions (not to harass, to intervene in real situations of GBV), it was less frequent. Another difficulty to be overcome is expressed by the fact that there are few studies in which the results were evaluated in terms of change in the incidence of GBV, which should be seen as the ultimate and primary objective of GBV prevention actions.

Another significant difference between national and international productions was the methods used. Surveys at the international level drew on diverse designs, including surveys, experiments, and correlational research, seeking to identify relationships between preventive practices and their effects. In the Brazilian production, there was a strong predominance of the case study design. This type of research allows in-depth and detailed knowledge of cases that may represent a phenomenon, provide indicative information for future research, or represent some exceptions. On the other hand, case studies are insufficient to provide broad generalizations of their results (Creswell, 2012; Mertens, 2015). In this sense, the need to conduct larger studies in the national context with objective evaluations regarding the results of preventive actions as well as the use of methods that more objectively evaluate changes and the relationships with the implemented actions may be indicated.

The analysis of the articles allowed to identify that the population for whom preventive actions are most frequently developed are students at different educational levels. In addition, conducting activities with other people involved in the prevention of gender violence was also identified, and in many cases, even when implementing actions with students, actions were also included with other actors, such as family members, teachers/coaches, and the school community.

With regard to the actions implemented, it is important to highlight how a small part of the Brazilian production described actions implemented in the school context (only present in 45% of the studies). This proportion is justified by the fact that studies that involved other areas, but that mentioned the school context in any way, were included in the analysis. This inclusion was due to the fact that, when searching exclusively for papers with preventive actions of gender violence in the school environment, few studies were found. Nevertheless, there was a significant number of papers that failed to describe intervention actions (36% of the Brazilian works). Those papers that implemented any action were mostly of an informative nature, being in agreement with the previously described analysis on the greater frequency of objectives related to the description of actions and evaluation of the prevalence (and not evaluation of the effects) and more frequent results related to the awareness about the violence than of change of people's actions.

Limitations

In this initial study, based on the analysis of the Brazilian and international productions on the theme of gender violence prevention in schools, the small amount of national papers in journals ($n = 6$) led us to incorporate the analysis of theses and dissertations ($n = 5$) to the study, which was not made with international theses and dissertations. This non-inclusion was due to the great volume of the international production ($n = 222$) that would demand a longer dedication of the research team, which will be conducted in the future. The impact of such differentiation was a restriction to some comparison aspects between was is being produced around the world and in Brazil. With regard to preventive actions in school, *per se*, no Brazilian papers were found.

Another limitation to the research occurred because of the absence or low occurrence, of impact assessment of the interventions implemented in schools. Even international studies that do conduct interventions in the school context rarely evaluate the impact on violence perpetration or victimization, even less on a follow-up stage. Therefore, even though transformative elements could be identified in many papers, it is difficult to evaluate if they do translate into practice.

CONCLUSIONS

GBV continues to be a problem of epidemic proportions, victimizing thousands of people every day around the world. It presents itself with several faces and can be of a psychological, material, sexual, or physical nature and is present in affective relationships, friendships, work, in the street, and at school. Overcoming GBV is a pressing issue, and the present study has sought to contribute in the extent that it aimed to provide scientific evidence that can base school actions for the prevention of GBV, specifically in the Brazilian context, from the actions that are described in the scientific literature both from the national and international contexts.

For achieving the proposed goals, bibliographical research was conducted in national and international scientific databases searching for papers that addressed actions of prevention of GBV conducted in the school context. Analysis of several elements of the articles was conducted in order to identify those that contribute to overcoming gender violence and those that maintain it. In addition, national and international literatures were also analyzed in order to identify differences and suggestions of continuities and improvements of the national scientific production.

The results indicate that, besides the fact that such production is scarce, Brazilian production is closely linked to actions to raise awareness about or to analyze of the prevalence of gender violence; few actions have been described in the national scientific production. Moreover, few of these articles seek to evaluate the impacts of these actions in terms of changing the behaviors of the population with whom they work. Finally, most of the Brazilian studies were carried out through case studies, which allow a thorough knowledge of the reality studied and the relationships established by the people in the analyzed context but hamper generalizations of their data and more comprehensive knowledge of the impacts of preventive actions of gender violence. Thus, it indicates the need to produce national knowledge that allows a more comprehensive and varied knowledge about the preventive actions of gender violence. In addition, data on the effects of these actions are analyzed, mainly in terms of changes in concrete actions of the target population and of occurrences of GBV in school and beyond.

In another sense, the international scientific production has sought to analyze the impacts of the various school actions described, mainly in terms of changes in beliefs and values expressed by the target population of the actions. It has also sought to identify, although in a smaller volume, changes in concrete behaviors of this population. To this end, a variety of methods have been implemented including experiments, action research, and ethnography. It is worth mentioning, as a recommendation for future productions, to analyze, in addition to the changes in the behavior of the target population of the actions, changes in the occurrence of gender violence.

Some of the elements identified as relevant to overcoming gender violence are as follows: the creation and implementation of specific laws, the preparation of teachers and professionals for the subject, the creation of support networks among students, the strengthening of egalitarian models of relationship, the strengthening of people as active spectators, the implementation of evidence-based scientific actions, interaction with different groups (students, teachers, families) in an integrated way, acting at various school levels, inserting training on gender violence in the university curricula, actions directed directly at the male population, investing in preventive actions and not just remediation, and implementing longer-term studies.

AUTHOR CONTRIBUTIONS

All authors contributed to the conception of the study. BP, DB, and EG contributed to the design of the study, conducted data collection, wrote the first draft of the manuscript, and wrote sections of the manuscript. DB organized the database. BP and EG conducted data analysis. BP, EG, DB, and RdM contributed to the discussion of the data. All authors contributed to manuscript revision, read and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2018.00089/full#supplementary-material

REFERENCES

Abramovay, M. G. C., Luciano, A. P. S., and Cerqueira, M. (2016). *Diagnóstico Participativo Das Violências Nas Escolas: Falam Os Jovens*. Rio de Janeiro: Flacso. Available online at: http://flacso.org.br/files/2016/03/Diagn%C3%B3stico-participativo-das-viol%C3%AAncias-nas-escolas_COMPLETO_rev01.pdf

Aguilar, R. C., Alonso, O. M., Melgar, P., and Molina, S. R. (2009). Violencia de Género En El Ámbito Universitario, Medidas Para Su Supoeración. *Revista Interuniversitaria de Pedagogía Social* 16, 85–94.

AVON Instituto and Data Popular (2014). *Violência Contra Mulher: O Jovem Está Ligado?* Available online at: http://agenciapatriciagalvao.org.br/wp-content/uploads/2014/12/pesquisaAVON-violencia-jovens_versao02-12-2014.pdf.

Barsted, L., and Pitanguy, J. (2011). *O Progresso Das Mulheres No Brasil 2003-2010. ONU Mulheres*. Rio de Janeiro: CEPIA; ONU Mulheres. Available online at: http://onumulheres.org.br/wp-content/themes/vibecom_onu/pdfs/progresso.pdf

Botton, L. D., Puigdellívol, I., and De Vicente, I. (2012). Evidencias científicas para la formación inicial del profesorado en prevención y detección precoz de La violencia de género. *Revista Interuniversitaria de Formación Del Profesorado* 73, 41–55.

Brasil (2006). Lei Maria da Penha: Lei no 11340, de 7 de agosto de. *que dispõe sobre mecanismos para coibir a violência doméstica e familiar contra a mulher*. Brasília: Câmara dos Deputados, Edições Câmara 2010, 34.

Bujosa, M. C., Beneira, R. M. A., and Grande, M. D. P. (2012). Luces y sombras En La formación sobre prevención y violencia de género valoración y percepción del profesorado, estudiantado y movimientos sociales. *Revista Interuniversitaria de Formación Del Profesorado* 73, 57–74.

Castro, M., and Mara, L. C. (2014). The social nature of attractiveness: how to shift attraction from the dominant traditional to alternative masculinities. *Int. Multidiscipl. J. Soc. Sci.* 3, 182–206. doi: 10.17583/rimcis.2014.1173

Creswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research, 4th Edn.* Boston, MA: Pearson.

Duque, E., and Teixido, J. (2016). Bullying y Género. Prevención desde la Organización Escolar. *Multidiscipl. J. Educ. Res.* 6, 176–204. doi: 10.17583/remie.2016.2108

ÉNOIS Instituto (2015). *Menina Pode Tudo.* Available online at: http://www.agenciapatriciagalvao.org.br/dossie/wp-content/uploads/2015/07/ENOIS_meninapodetudo2015.pdf

Flecha, A. (2012). Educación y Prevención de La Violencia de Género En Menores. *Multidiscipl. J. Gender Stud.* 1, 188–211. doi: 10.4471/generos.2012.09

Flecha, A., Melgar, P., Oliver, E., and Pulido, C. (2010). Socialización preventiva en las comunidades de aprendizaje. *Prev. Soc. Learn. Commun.* 67, 89–100.

Flecha, R., Puigvert, L., and Ríos, O. (2013). The new alternative masculinities and the overcoming of gender violence. *Int. Multidiscipl. J. Soc. Sci.* 2, 88–113. doi: 10.4471/rimcis.2013.14

Fonseca, C. (2009). Quando Cada Caso NÃO é um Caso: Pesquisa Etnográfica e Educação. *Revista Brasileira De Educação*, 10, 58–78.

Gómez, A., Elboj, C., and Capllonch, M. (2013). Beyond action research: the communicative methodology of research. 6, 183–97. doi: 10.1525/irqr.2013.6.2.183.183

Gómez, J. (2004). *El amor en la Sociedad del Riesgo. Una Tentativa Educativa.* Barcelona: El Roure.

Gómez, J., Latorre, A., Sánchez, M., and Flecha, R. (2006). *Metodologia Comunicativa Critica*. Barcelona: El Roure.

INCLUDED (2012). *Final Includ-ed Report Strategies for Inclusion and Social Cohesion in Europe From Education*. Available online at: http://creaub.info/included/wpcontent/uploads/2010/12/D25.2_Final-Report_final.pdf (Acessed Feb, 2017).

Jaime, M. C. D., McCauley, H. L., Tancredi, D. J., Nettiksimmons, J., Decker, M. R., Jay, G., et al. (2015). Athletic coaches as violence prevention advocates. *J. Interpers. Viol.* 30, 1090–1111. doi: 10.1177/0886260514539847

Katz, J. H., Heisterkamp, A., and Fleming, W. M. (2011). The social justice roots of the mentors in violence prevention model and its application in a high school setting. *Viol. Against Women* 17, 684–702. doi: 10.1177/1077801211409725

Mertens, D. (2015). *Research and Evaluation in Education and Psychology, 4th Edn*. Thousand Oaks, CA: Sage Publications Sage.

Nesello, F., Lopes, F. S., Santos, H. G., Andrade, S., Maffei, M. A. E., and González, A. D. (2014). Características da violência escolar no Brasil: revisão sistemática de estudos quantitativos. *Revista Brasileira de Saúde Materno Infantil* 14, 119–136. doi: 10.1590/S1519-38292014000200002

Oliver, E. (2014). Zero violence since early childhood: the dialogic recreation of knowledge. *Qual. Inquiry* 20, 902–908. doi: 10.1177/1077800414537215

Oliver, E., and Valls, R. (2004). *Violencia de Género : Investigaciones Sobre Quiénes, Por Qué y Cémo Superarla*. Barcelona: El Roure.

Olweus, D. (2013). School bullying: development and some important challenges. *Ann. Rev. Clin. Psychol.* 9, 751–780. doi: 10.1146/annurev-clinpsy-050212-185516

Padrós, M. (2012). Attractiveness male models in adolescence. *Masculinities Soc. Change* 1, 165–83. doi: 10.4471/MCS.2012.10

Patton, M. (2002). *Qualitative Research and Evaluation Methods. 3rd. Edn*. Thousand Oaks, CL: Sage.

Ríos, O. (2009). *Socialització De* Gènere: *La Construcció De La Masculinitat a L'Escola*. Barcelona: Universitat De Barcelona Departament.

Rosa, V. Puigvert, L., and Duque. E., (2008). Gender violence among teenagers: socialization and prevention. *Viol. Against Women* 14, 759–85. doi: 10.1177/1077801208320365

Tremblay, R. E., Gervais, J., and Petitclerc, A. (2008). *Early Learning Prevents Youth Violence*. Montreal, QC. Available online at: http://www.excellence-earlychildhood.ca/documents/tremblay_aggressionreport_ang.pdf

UNESCO-United Nations Scientific and Educational, and Cultural, O.rganization (2017). *School Violence and Bullying: Global Status Report*. Paris. Available online at: http://unesdoc.unesco.org/images/0024/002469/246970e.pdf

Unicef (2012). *The State of the World's Children 2012: Children in an Urban World*. Available online at: https://www.unicef.org/iran/SOWC_2012-Executive_Summary_EN_13Mar2012.pdf

Valls, R., Torrego, L., Colás, P., and Ruiz, L. (2009). Prevención de la violencia de género en las universidades: valoración de la comunidad universitaria sobre las medidas de atención y prevención. *Rev. Interuniv. Form. Prof.* 23, 41–57. Available online at: http://www.redalyc.org/pdf/274/27418821004.pdf

Vidu, A., Valls, R., Puigvert, L., Melgar, P., and Joanpere, M. (2017). Second order of sexual harassment -SOSH. *REMIE Multidiscipl. J. Educ. Res.* 7, 2014–2862. doi: 10.17583/remie.2017.2505

Waiselfisz, J. (2015). *Mapa Da Violência 2015 - Homicídio de Mulheres No Brasil. Vol. 1*. Brasília: Flacso. doi: 10.1017/CBO9781107415324.004

World Health Organization–W.H.O. (2013). *Global and Regional Estimates of Violence Against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-partner Sexual Violence*. Geneva. Available online at: http://apps.who.int/iris/bitstream/10665/85239/1/9789241564625_eng.pdf?ua=1

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer MP and handling Editor declared their shared affiliation.

frontiers in Education

ORIGINAL RESEARCH
published: 07 December 2018
doi: 10.3389/feduc.2018.00106

Cognitive Control at Age 3: Evaluating Executive Functions in an Equitable Montessori Preschool

Jessica Phillips-Silver[1]* *and María Teresa Daza*[2,3]

[1] Department of Neuroscience, Georgetown University Medical Center, Washington, DC, United States, [2] Department of Psychology, University of Almería, Almería, Spain, [3] Neuropsychological Evaluation and Rehabilitation Center (CERNEP), University of Almeria, Almeria, Spain

Studies in cognitive neuroscience have shown that education practices can affect the development of executive functions (EF) in young children, although there is very little evidence on young preschool children. The present study aims to provide support for this endeavor, and consists of a quasi-experimental design with one-group pre-test/post-test measures of cognitive control at age 3 in an urban public Montessori preschool. Three-year-olds ($N = 23$) in an authentic Montessori public preschool in Washington DC improved significantly on core EF measures (inhibitory control and cognitive flexibility) validated by the NIH Toolbox Early Childhood Cognition Battery, and the data revealed large effect sizes. Comparisons against NIH published norms revealed no selection bias. Performance on EF measures did not correlate with age but did correlate with amount of time between testing sessions, suggesting the possibility that experience, more than age, could have contributed to cognitive control growth. A controlled comparison between mixed-age and single-age classes revealed no differences in these EFs, raising the possibility that aspects of the environment other than the age composition are likely to contribute to growth. We propose that a potential contributor to EF growth is Montessori education, and more specifically, that this growth might be found in the design of interaction of the child with the environment. In particular, we discuss the design element called *control of error*, and consider why this element might be related to cognitive abilities such as inhibitory control. In current national discussions on the importance of equitable early childhood education, the synthesis of findings from neurocognitive studies has implications for children's academic and life success.

Keywords: executive function, preschool, montessori, NIH toolbox cognition battery, equity

OPEN ACCESS

Edited by:
Rocio Garcia-Carrion, Universitat de Lleida, Spain

Reviewed by:
Matthew Peter Somerville, University College London, United Kingdom
Laura Traverso, University of Genoa, Italy

***Correspondence:**
Jessica Phillips-Silver
jsp102@georgetown.edu

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *04 December 2017*
Accepted: *14 November 2018*
Published: *07 December 2018*

Citation:
Phillips-Silver J and Daza MT (2018) Cognitive Control at Age 3: Evaluating Executive Functions in an Equitable Montessori Preschool. Front. Educ. 3:106. doi: 10.3389/feduc.2018.00106

INTRODUCTION

In recent years, the field of cognitive neuroscience has seen a great interest in understanding the role of executive functions (EF) in early child development, the mechanisms by which they develop, and the ways in which EF abilities can transfer across a variety of cognitive, emotional and social domains. Various empirical studies provide support for the idea that certain approaches to child education are well-equipped to instigate EFs and bolster their continued development over time. As this field of investigation grows, fascinating questions remain, including, from what age these EF abilities might be measured with respect to school experience, and what specific features of the

educational approach are likely to foster strong development of EF. With these points of inquiry in mind, the aims of the current paper are: (1) to highlight several empirical studies which specifically address the role of focused educational approaches in supporting cognitive EF development—which we refer to here as cognitive control—in children, (2) to present a small, quasi-experimental study which lends support for this endeavor by demonstrating the feasibility of testing children as young as 3 years of age in the context of a public Montessori environment using the validated NIH Toolbox, and (3) to suggest a design feature particular to Montessori education that is consistent with the literature, and that we think is a promising avenue for future empirical investigation in children from a very young age.

Pioneering scientific work over recent years has demonstrated that the child that has cognitive control is a child that can learn and thrive in the school environment and in life (e.g., Blair and Diamond, 2008). For example, Diamond and colleagues have reported improvements in inhibitory control, working memory and cognitive flexibility in 5-year-old children in their second year of a school using the curriculum Tools of the Mind (Diamond et al., 2007). Tools of the Mind, which is based on the philosophy of Lev Vygotsky, is an educational approach that is designed around evidence-based teaching "tools" including intentional dramatic play, student-guided plans for play and learning, and instructional interactions among students and with their teachers (Bodrova and Leong, 2005). Diamond and colleagues argued, given the success of training EFs in 4- to 5-year-olds, that preschool is not too young to improve these abilities, and they stress the importance of the play-based curriculum, the repetitive practice of planning skills, and adaptive levels of challenge for students in this educational approach (Diamond et al., 2007).

From the perspective of another educational tradition, Lillard and colleagues reported enhanced EFs in children aged 5–12 years in a Montessori school, which developed out of the work of Maria Montessori (Lillard and Else-Quest, 2006). The Montessori approach has a focus on the principles of the "prepared environment"—in which the design of the young children's learning space allows independent work and discovery; the "prepared adult"—which refers to the classroom guide who is trained to optimally support the child's independent work and growth; and unique learning materials that are designed for the child to learn practical life skills, sensory development, literacy and math competence, and cultural appreciation (Montessori, 1988/1914). Of utmost importance to the Montessori approach is the central premise that with the proper support from environment, the adult and the appropriate materials, the child is capable of developing himself (Montessori, 1995/1949).

Both of the aforementioned studies revealed strong effects of public school curricula that were designed to foster EFs, and both measured performance of public school children from the age of 5 years. Two important questions for this field of research are: what are the core—and possibly common—elements of these educational approaches that show evidence of supporting EF growth, and from what age can we systematically measure improvements in EFs in the context of the full-time public school environment?

A common theme between these two educational approaches is the placement of the individual child at the center of the planning and decision-making process with respect to her own learning, and the role of the teacher as a guide to observe and support the child, rather than direct her, in her work. Barker and Munakata (2015a) discuss the importance of self-direction in developing EF, and consider the activation of goals as a potential key to the mastery of EFs such as inhibitory control (Barker and Munakata, 2015b). The findings from these studies suggest that the opportunity for a child to be self-driven, with an internalized goal, results in behaviors that reveal greater EF.

What about the Montessori approach, in particular, allows the opportunity for constant self-directed activity with internalized goals? One of the most unique features of the Montessori environment is the design of interaction of the child with environment, materials, and community—which has at its heart the goal of development of individual control and mastery. Within this design is a significant element, called *"control of error,"* which refers to the instant sensory feedback which the child receives about her actions and predictions, and it pervades multiple levels of the environment—from the design of the classroom environment itself, to the learning materials, and the relationship with the guide (teacher) and students (Montessori, 1962/1948, 1995/1949). The learning materials are self-correcting, meaning that the child requires no external feedback to know whether he has successfully used or completed a material. The materials are required to be concrete, sensory objects whose proper physical manipulation allows for the immediate, sensory recognition of error, and self-correction. There are requirements not only regarding the material itself but also regarding its use, in order to protect the interest and concentration of the child who chose to use it (for a description see Marshall, 2017). With these specially designed materials and rules of engagement, the child is allowed to pursue her own spontaneous work and receive the necessary feedback—the *control of error*—that allows for her own maximal cognitive-motor growth. This contributes to the refinement and integration of the senses—for example, via the eye (e.g., the pink tower for learning weight and proportion), the ear (i.e., the bells for learning musical intervals), the hand (e.g., the sandpaper letters for handwriting preparation) or the whole body (i.e., the ellipse for walking, skipping). Furthermore, the Montessori classroom environment is designed and prepared with a deliberate selection, arrangement and limited availability of these learning materials which require constant cognitive control to use. The limited availability of materials (only one of each kind) resembles real life resource distribution and necessitates communal cooperation, patience and sharing—skills which enhance self-control. This distribution is also taken into account in the makeup of the students' community by age: the traditional mixed-age groups (3–6 years in the primary classroom) allow for younger children to observe and model older children in their use of the materials. The act of mentoring can occur naturally through the appropriate use of a material that the younger child has not yet mastered. In this sense, the relationships and cooperative work among children of different ages allow for opportunities to observe self-correction and mastery independently of the adult.

The Montessori guide is prepared in his primary role which is to observe the child, and to allow her to pursue her own work and interaction with the environment and her community, with the goal of supporting that child's own cognitive-motor growth including physical exploration of the materials and activities in the environment. The guide is trained not to interfere with the child's natural and spontaneous work, nor her mastery of herself and her environment and materials; rather, the guide observes and provides support to the child specifically when necessary and valuable. The guide presents lessons on the materials but the child selects and carries out her own work goals on a given day or work cycle, learning from the very start that the work of her mind and body is her own, and is a reflection of her cognitive and motor control. This is not only a source of independence and freedom to learn, but a source of great pride for the child. Thus, the element of *control of error* pervades the relationship between the child and guide, and cannot be separated from the curricular method as it describes the fundamental structure and functioning of the classroom community, and the children's work within it.

Based on the strong theoretical background of Montessori education, its wealth of relevant evidence from neurocognitive research, and its increasing visibility in the public sector—and thus, potential to affect high-need or high-risk children—we propose a focus on testing EFs in school children from as young as 3 years of age. The preschool age is of great interest among researchers in cognitive, emotional, and motor development, and there is a great opportunity for demonstrating significant and reliable improvement in EFs at this age (e.g., Lillard et al., 2017). The development that occurs during the preschool age—specifically, before 5 years—is tremendous, including for example cognitive and motor changes that occur inextricably and in interaction (Diamond, 2000; Rueda et al., 2004; Haywood and Getchell, 2014). Changes in EF are known to rely particularly on the dorsolateral prefrontal cortex and its interaction with subcortical structures including cerebellum (Diamond, 2000; Rueda et al., 2004), and support the kind of sensorimotor control and integration that enables discrimination, planning, decision making and action (Kim and Shadlen, 1999; Rauschecker, 2011). With the joint maturation of motor-cognitive development come the abilities for independence in the child, and this can lay the foundation for developing cognitive control. Thus, there is a strong rationale for measuring EFs by age 3 (see also Bierman and Torres, 2016), and observing the development in core processes in a supportive educational environment.

The NIH Toolbox measures core EFs between the ages of 3 and 8 years via the Early Childhood Cognition Battery (ECCB) (Weintraub et al., 2013). The battery was designed to permit comparisons across a wide age range (the same core EF measures are utilized in the NIH Toolbox with individuals up to 85 years of age), and, importantly for very young or old populations, to provide replicable computer-based measures of EF that are not inhibited by differences in motor development or functioning (e.g., Victorson et al., 2014). From data collected in diverse populations of young children across the US in two languages (English and Spanish), two subtests were determined by the NIH authors to be the most robust and reliable indicators of EFs at this age: inhibitory control, as measured by the Flanker task, and cognitive flexibility, as measured by the Dimensional Change Card Sort task (Zelazo et al., 2013). Furthermore, inhibitory control (i.e., planning, error detection, novelty, and conflict processing) is considered to reflect effortful control of attention (Fan et al., 2002) and its associated executive attention network including target areas of the ventral tegmental dopamine system such as the anterior cingulate cortex and lateral prefrontal cortex (Bush et al., 2000; Botvinick et al., 2001; Benes, 2003; Matsumoto and Tanaka, 2004).

No study to our knowledge has implemented the NIH Toolbox in order to assess changes in executive functioning in the context of preschool experience. In the present study, we implemented core EF measures from the ECCB in an urban, lottery-based, public Montessori primary (preschool) setting (at the beginning and the end of the first school year). We aimed to demonstrate the feasibility of measuring changes in inhibitory control and cognitive flexibility from age 3 in this preschool context. We also aimed to observe whether improvements in executive functioning could be due in part to the mixed-age class structure of the Montessori school (with children ranging from 3 to 6 years of age in the primary classroom). In a unique opportunity presented as this school was expanding in size and had just begun a new classroom of only 3-year-olds (in keeping with authentic Montessori protocol), we were able to observe this by comparing performance between two mixed-age classrooms (3 to 6-year-olds) and a single age classroom (3-year-olds only). This growing school, with its small size, provided the opportunity to successfully implement the NIH Toolbox measures in 3-year-olds, describe EF improvements observed, and suggest from the current data a rationale for future investigation of cognitive control in preschool.

METHOD

Participants

Participants were 23 healthy children (10 females), with no known developmental or neurological deficits, who were 3 years of age (mean age in months = 39.56 SD = 3.91 at the start of the study). Participants varied in racial and ethnic descriptors (26% African American, 52% European American, 9% Hispanic, 13% mixed race). One child was excluded because of a failure to cooperate due to tiredness. All children were in their first year of preschool at Shining Stars Montessori Academy in Washington DC, a lottery-based public charter school, which is accredited by the American Montessori Society and one of the country's very few accredited public Montessori institutions. The sample included children from three different primary classrooms at the school, each of which had a classroom of ∼20–25 children, led by one guide and one assistant, both of whom were trained either by the Association Montessori Internationale or the American Montessori Society). Families were recruited by flyers presented at the front desk of the school. Parents gave written informed consent for their children's participation and children received a personalized junior scientist certificate.

Materials and Methods

The materials for the assessment of early childhood executive function included developmentally appropriate versions of the Flanker test and the Dimensional Change Card Sort test as developed for the NIH Toolbox ECCB (Weintraub et al., 2013). These measures were selected because they had been previously validated, were accessible and easily replicable, as well as available for testing populations in two languages (English and Spanish).

The Flanker test of inhibitory control and attention is derived from the Child Attention Network Test (Rueda et al., 2004), which measures the ability to inhibit visual attention to irrelevant information while performing a stimulus conflict task. On each of 40 trials, a central target (a yellow fish), pointing toward the right or left, is flanked by similar fish stimuli, pointing either in the same (congruent) or opposite (incongruent) direction. The child's task is to indicate the direction in which the central fish in the target array was pointing (for task figures and examples, see Rueda et al., 2004).

The Dimensional Change Card Sort test, designed to measure set shifting in children, requires matching stimuli according to the shifting dimensions of shape and color. The child DCCS test derives from the Wisconsin Card Sorting test, and has been shown to be an appropriate measure of task switching in preschool age children (e.g., Diamond, 2005). In this test, the first block presents trials in which only one dimension—i.e., color—is relevant, and then a second block in which the relevant dimension switches—i.e., to shape. Those who succeed in following the switch from the first to the second dimension also receive a mixed-dimension block, in which color is relevant on the majority of trials with occasional, unpredictable shifts to shape. The relevant criterion word, "color" or "shape," is delivered at the start of each trial, visually in the center of the screen, and simultaneously as an auditory spoken voice via the computer program. This task also consists of 40 trials.

These cognition domain measures were developed by NIH Toolbox, validated (using expert panels for content development and validation, cognitive interviews, small- and large-scale pilot testing) and developed for psychometric features (internal consistency and test-retest reliability, convergent and divergent validity) (Weintraub et al., 2013). Full details on the Flanker and DCCS tests are described by Weintraub et al. (2013), and in the *Cognition Technical Manuals* (http://www.healthmeasures.net/2-uncategorised/209-nih-toolbox-technical-manuals-for-ac). Scoring for both Flanker and DCCS measures in the NIH Toolbox ECCB were based on a combination of accuracy and reaction time, where each of these "vectors" ranged in value between 0 and 5, and the "computed score," combining each vector score, ranged from 0 to 10. If accuracy for any given individual was ≤80%, the final computed score was equal to the accuracy score; if accuracy was >80%, the reaction time score and accuracy score were combined. In this version of the tests, data from incongruent trials were specifically used as a measure of inhibitory control in the context of visual selective attention—which the authors determined could also be considered a measure of executive attention (but see Rueda et al., 2004 for alternative scoring methods; Zelazo et al., 2013). According to these authors, a change in participants' scores between Time 1 and Time 2 represents a real change in the level of performance for each individual since the prior assessment.

NIH Toolbox conducted a national standardization study in English and Spanish languages to provide normative data for each assessment. This was based on a large sample of 4,859 participants, from the age of 3–85, and was representative of the U.S. population based on gender, ethnicity, race, and socioeconomic status. For the purpose of the present study, we excluded from the normative data sample any individual children who were identified as attending a Montessori School. Specifics regarding NIH Toolbox norming sampling methods and norming analytic can be found in Beaumont et al. (2013).

Procedure

The NIH Toolbox ECCB was implemented in accordance with the procedures and guidelines of the National Institutes of Health and Northwestern University (for test battery and technical manuals see www.nihtoolbox.org).

Children were tested twice: once at the start of the school year (T1), and again near the end of the school year (T2). The time elapsed between T1 and T2 was 211 days on average (SD = 33). During testing children sat at a preschool desk in one of the classrooms outside of school hours. The tasks were presented as games on a computer screen with external speakers, and responses recorded using the computer keyboard and mouse. The entire session, including instructions and breaks, lasted ∼45 min. Children took breaks as needed during testing, and parents sat quietly in the same room, on a chair at the wall behind the child.

RESULTS

We measured the degree of change in the scores on both tasks from T1 to T2. In the flanker task, a Wilcoxon analysis revealed highly significant improvement in scores across all 3-year-olds ($N = 23$) from an average score of 1.91 (SD = 1.01) at T1 to 3.1 (SD = 1.44) at T2 ($Z = -3.44$, $p = 0.001$), and an effect size analysis yielded a large effect size ($r = 0.72$). In the DCCS task, a Wilcoxon revealed highly significant improvement from a mean of 1.27 (SD = 1.45) at T1 to 2.95 (SD = 1.73) at T2 ($Z = -3.9$, $p = 0.000$), and the effect size was robust ($r = 0.81$) (see **Figure 1**).

We next compared the results of the Montessori 3-year-olds at T1 ($N = 23$) with the NIH published norms of 3-year-old children who were attending schools unselected for curriculum or educational method (data provided by NIH). A Mann–Whitney test revealed no difference in either the Flanker task between the scores of Montessori children at T1 and Norms ($N = 40$; mean = 1.68, SD = 0.72), or the DCCS task between Montessori children at T1 and Norms ($N = 48$; mean = 1.39, SD = 1.5).

In order to test whether the degree of improvement among children depended upon their level of performance at first test, we divided all Montessori children ($N = 23$) into two groups, falling above or below a median score at T1. We found no significant difference in either the flanker score or the DCCS score at T2

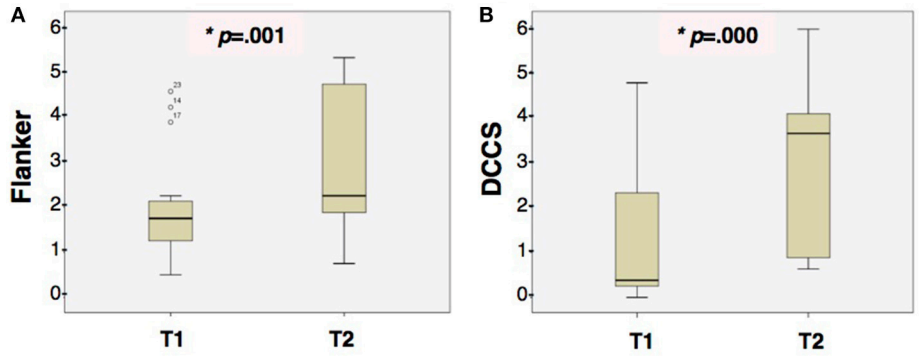

FIGURE 1 | Boxplots of the data of Montessori children ($N = 23$) across their first school year. Results show **(A)** the Flanker task at T1 and T2, and **(B)** the DCCS task at T1 and T2. Error bars represent the standard deviation of the mean.

based on whether the children's scores at T1 fell above or below the median.

An examination of the demographic characteristics of the children showed no significant Pearson correlation between the improvement in Flanker and DCCS scores and any of the following factors: age, sex (via Mann–Whitney test), or racial or ethnic descriptors of the children. Rather the time elapsed (in days) from T1 to T2 was the only factor correlating with improvement in scores in the Flanker task ($r = 0.44$, $p = 0.038$), and in the DCCS ($r = 0.55$, $p = 0.006$).

We next examined the features that differed between the Montessori classrooms. A Mann–Whitney test showed no significant difference between EF scores and the children's specific classroom—i.e., the guide, or teacher. Finally, contrary to our prediction, a Mann–Whitney test showed no significant difference between EF scores and the type of classroom by age—i.e., mixed age (3–6 s) vs. single age (3 s only).

DISCUSSION

We implemented, for the first time, tests of core executive functioning from the NIH Toolbox Early Childhood Cognition Battery—inhibitory control and cognitive flexibility—to 3-year-olds during their first year of preschool in an authentic urban, public Montessori primary environment. Results showed highly significant improvements in scores on the Flanker and the DCCS tasks in children who were 3 years of age throughout the academic year, with significant effect sizes.

When compared with the published norms for these same tasks, taken from preschool children of the same age who were attending schools unselected for curriculum, the Montessori children obtained scores that were equivalent to the norms at the start of the school year. This suggests that the children in the present study were not, due to some unseen selection bias, different from the general population as measured by the NIH Toolbox.

In contrast with the findings of Diamond and colleagues with the Tools of the Mind program (Diamond et al., 2007), we did not find a significantly higher degree of improvement in children with lowest EF scores at first testing (see also Weibe et al., 2011; Blair and Raver, 2014). Rather, we found equal improvement in subgroups of children with high and low initial EF scores. This contrast may be due to the difference in testing EFs at age 4 or 5 (Diamond et al., 2007) vs., in the present study, at age 3, given the large degree of development that occurs between those ages (Diamond, 2000). Alternatively, the difference could reflect some feature that varies between the Tools of the Mind and Montessori programs, a point that would require further investigation.

Improvement in EFs did not correlate with the present children's age, sex or racial or ethnic descriptors; this is in contrast with previous reports (Akshoomoff et al., 2014). Rather the time elapsed between T1 and T2 predicted the level of EF growth. Since improvement depended upon amount of time but not age, and since the effect sizes were large, we interpret that the improvements were beyond those attributable to maturation from age *per se*, and that the key factor promoting the improvement is the amount of experience in the Montessori environment.

It is important to note that there are numerous ways to measure EF components (see Bierman and Torres, 2016), including measures that are not computerized but are based in physical body movement (e.g., the head-toes-knees-shoulders task) which may indeed be more suitable for very young children (McClelland et al., 2014). Furthermore, there is not always agreement about what defines executive functioning and how it is to be measured—Weibe et al. (2011) argue that at age 3 specifically, EF is a unitary, domain-general process which is best captured by a single EF construct. This raises caution in the use and interpretation of various component measures of EF such as those comprising the NIH Toolbox ECCB.

The most significant limitation of the present study was the lack of a control group from a comparison preschool program, as has been done in previous work on this topic (e.g., Lillard and Else-Quest, 2006). In order to fully explain the effects of Montessori experience on development of cognitive control at the preschool age, future investigations with control groups from non-Montessori programs are needed. Our primary aim with the present study was to use the recently established normative data from the NIH to make predictions about performance

on developmentally appropriate cognitive control tasks in the preschool age range, and to measure the performance of 3-year-olds in a public Montessori school against those norms. A second important limitation is the small sample size, which must be taken into account when interpreting both correlational and effect size data. In order to fully attribute gains in EF to the Montessori school environment, and their relation to demographic and school choice factors, future studies on a larger scale must consider a control group with sufficient variability to allow for reliable correlational data and interpretation.

A fortuitous opportunity allowed for us to address our secondary aim in this study: a controlled comparison between mixed-age and single-age classes within the same Montessori environment, as a new classroom (of only 3-year-olds) was just established in the school at the start of the experiment. We reiterate that the small sample size means the data must be interpreted with caution. In contrast with our prediction, EF scores were not significantly different between the mixed-age and single-age classes. This could suggest, first, that the effects of the mixed-age classroom (which include younger children imitating the behavior of older classmates, and more mature children presenting lessons and assistance to less mature ones), may not be captured by measures of "cool executive functions"—i.e., cognitive executive functions, such as the flanker and card sorting tasks, but rather by measures of "hot executive functions" such as social and emotional functioning (Zelazo and Carlson, 2012). Second, and more importantly for the present discussion, the lack of significant difference in cognitive EFs between the mixed-age and single-age classrooms in this study suggest that the age range was not a contributor to the growth in this context. Instead, it more likely points to the possibility of the Montessori curriculum—which was constant across classrooms—as a source of improvement in inhibitory control and cognitive flexibility. The more experience children had in the Montessori environment, the greater was their improvement on EF scores, a finding which again would be consistent with the idea that the Montessori curricular method is accountable for developing cognitive control. This result is consistent with findings by Lillard (2012) regarding the fidelity of implementation of Montessori, in which a regression analysis showed that an improvement on one EF measure (head-shoulders-knees-toes task) in young children enrolled in half- or full-day private schools were predicted by the percentage of children in the classroom who were using Montessori, rather than non-Montessori, materials.

Various activities are known to contribute to the healthy development of EFs between the ages of 4 and 12 years, including music and mindfulness, sports and martial arts, and specifically designed school curricula (i.e., Montessori and Tools of the Mind). One of those can impact the majority of a child's waking hours during the week, is guided by public policy, and by necessity impacts cognitive and motor growth and overall well-being: the public school environment.

For the benefit of future research, we suggest that the design element "control of error" be examined as a potential causal factor in the success of Montessori educational environments. It is possible that various environments and activities implement some variation of this feature, in that the learning material or activity provides the opportunity, or even the requirement, for a child to perceive the feedback of her own thought or action and to adjust it in appropriate ways which can be interpreted and used to refine behavior without necessitating direction or interference from an adult. Control of error is central to the design of the early primary Montessori curricular method and can be considered paramount to later intellectual development (Diamond, 2012; Marshall, 2017). At the root of the element of control of error is, precisely, the development of self-mastery and cognitive control.

According to Montessori, self-mastery and cognitive control are the very core of the young child's desire and effort: by learning to regulate his own thoughts and actions—with the appropriate guidance and scaffolding—the child develops a pleasing sense of self-mastery and mastery of his environment (e.g., Montessori, 1995/1949). Recent research suggests that the most important predictor of academic and life success is executive functioning (Blair and Razza, 2007; Moffitt et al., 2011; Coldren, 2013; Zelazo et al., 2013; Mann et al., 2017). Schools implementing curricula designed to promote EF show this effect (Diamond, 2000, 2012; Lillard and Else-Quest, 2006; Diamond et al., 2007; Blair and Raver, 2014), and the fidelity of implementation of curriculum matters (Lillard, 2012). And while various practice-based activities, such as music and sports, are known to improve EFs (Diamond, 2012; Skoe and Kraus, 2012), some specially-designed training programs do not result in improvement on core EFs such as inhibitory control (Thorell et al., 2009; but see also Traverso et al., 2015), suggesting that more than a focused training program is required for growth. Bierman and Torres (2016), in a detailed comparative review, have argued that while short term interventions warrant investigation, they may not provide the broad approach required to produce long-lasting abilities in EF. Further research with proper control groups is needed to demonstrate how and to what extent the Montessori environment, and possibly the aspect of control of error, can affect the development of cognitive control. The findings of the present study, though limited, are consistent with the idea that a developmentally sensitive school curriculum can nurture the desired growth in EFs, and that this growth can be measured by the validated and replicable NIH Toolbox even from the tender age of 3 years. These results point to the need for further empirical study, as they may have important implications for the implementation of Montessori in the public sector, and its philosophy regarding the education of EFs beginning by age 3.

Researchers have cautioned that the practice of EFs may avert widening achievement gaps later (Diamond and Lee, 2011) and prevent school failure (Blair and Diamond, 2008). This is a call to action echoing Montessori's life work (Montessori, 1962/1948, 1995/1949; Lillard, 2005), and the availability of preschool programs including Montessori can allow for the practice of EFs to be pervasive to the child's daily experience by age 3. Concerns in the public education system regarding achievement gaps in EFs due to individual differences in learning, poverty or privilege, or other cognitive, social, and economic factors that are known to impact learning and life success (Mani et al., 2013; Blair and Raver, 2016) point to the development of EF in equitable school environments. The Montessori curriculum

is a subject of increasing research, and has been shown to be effective across various measures of educational performance and throughout childhood (Lillard, 2012). This approach reflects a curriculum—and a philosophy of the child's life and mind—which warrants further investment from science and society.

"Il bambino è padre dell'umanità e della civilizzazione, è il nostro maestro, anche nei riguardi della sua educazione."
["The child is the father of humanity and of civilization; he is our teacher, even with regard to his education."]
—Montessori, 1949

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of the Bioethics Committee for Human Research at the University of Almeria with informed consent from all subjects. All subjects gave written informed consent in accordance with the Declaration of Helsinki. The protocol was approved by the Bioethics Committee for Human Research.

AUTHOR CONTRIBUTIONS

JP-S and MD designed the experiment, collected and analyzed data, and wrote the manuscript.

ACKNOWLEDGMENTS

The authors wish to acknowledge the National Institutes of Health and Northwestern University for providing open access to and support for the NIH Toolbox, to promote research on the development of executive functioning across the lifespan. We thank Dr. Nathan Fox and Montessori Guide Autumn Wilson for helpful discussions. We are grateful to the participating families, and the founders, leadership and staff of the fully accredited Shining Stars Montessori Academy, who are a model of quality education and social justice.

REFERENCES

Akshoomoff, N., Newman, E., Thompson, W. K., McCabe, C., Bloss, C. S., Chang, L., et al. (2014). The NIH toolbox cognition battery: results from a large normative developmental sample (PING). *Neuropsychology* 28, 1–10. doi: 10.1037/neu0000001

Barker, J. E., and Munakata, Y. (2015a). Developing self-directed executive functioning: recent findings and future directions. *Mind Brain Educ.* 9, 92–99. doi: 10.1111/mbe.12071

Barker, J. E., and Munakata, Y. (2015b). Time isn't of the essence: activating goals rather than imposing delays improves inhibitory control in children. *Psychol. Sci.* 26, 1898–1908. doi: 10.1177/0956797615604625

Beaumont, J. L., Havlik, R., Cook, K. F., Hays, R. D., Wallner-Allen, K., Korper, S. P., et al. (2013). Norming plans for the NIH toolbox. *Neurology* 80(11 Suppl. 3), S87–S92. doi: 10.1212/WNL.0b013e3182872e70

Benes, F. M. (2003). Emerging principle of altered neural circuitry in schizophrenia. *Brain Res. Rev.* 31, 251–269. doi: 10.1016/S0165-0173(99)00041-7

Bierman, K. L., and Torres, M. (2016). *Executive Function in Preschool Age Children: Integrating Measurement, Neurodevelopment and Translational Research*. eds J. A. Griffin, L. S. Freund, and P. McCardle. Washington, DC: American Psychological Association.

Blair, C., and Diamond, A. (2008). Biological processes in prevention and intervention: the promotion of self-regulation as a means ofpreventing school failure. *Dev. Psychopathol.* 20, 899–911. doi: 10.1017/S0954579408000436

Blair, C., and Raver, C. C. (2014). Closing the achievement gap through modification of neurocognitive and neuroendocrine function: results from a cluster randomized controlled trial of an innovative approach to the education of children in kindergarten. *PLoS ONE* 9:e112393. doi: 10.1371/journal.pone.0112393

Blair, C., and Raver, C. C. (2016). Poverty, Stress, and Brain Development: new directions for prevention and intervention. *Acad. Pediatr.* 16(3 Suppl):S30–S36. doi: 10.1016/j.acap.2016.01.010

Blair, C., and Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Dev.* 78, 647–663. doi: 10.1111/j.1467-8624.2007.01019.x

Bodrova, E., and Leong, D. J. (2005). High quality preschool programs: what would Vygotsky say? *Early Educ. Dev.* 16, 435–444. doi: 10.1207/s15566935eed1604_4

Botvinick, M. M., Braver, T. S., Barch, D. M., Carter, C. S., and Cohen, J. C. (2001). Conflict monitoring and cognitive control. *Psychol. Rev.* 108, 624–652. doi: 10.1037/0033-295X.108.3.624

Bush, G., Luu, P., and Posner, M. I. (2000). Cognitive and emotional influences in anterior cingulate cortex. *Trends Cogn. Sci.* 4, 215–222. doi: 10.1016/S1364-6613(00)01483-2

Coldren, J. T. (2013). Cognitive control predicts academic achievement in kindergarten children. *Mind Brain Educ.* 7, 40–48. doi: 10.1111/mbe.12006

Diamond, A. (2000). Close interrelation of motor development and cognitive development and of the cerebellum and prefrontal cortex. *Child Dev.* 71, 44–56. doi: 10.1111/1467-8624.00117

Diamond, A. (2005). Preschool children's performance in task switching on the dimensional change card sort task: separating the dimensions aids the ability to switch. *Dev. Neuropsychol.* 28, 689–729. doi: 10.1207/s15326942dn2802_7

Diamond, A. (2012). Activities and programs that improve children's executive functions. *Curr. Dir. Psychol. Sci.* 21, 335–341. doi: 10.1177/0963721412453722

Diamond, A., Barnett, W. S., Thomas, J., and Munro, S. (2007). Preschool program improves cognitive control. *Science* 318, 1387–1388. doi: 10.1126/science.1151148

Diamond, A., and Lee, K. (2011). Interventions shown to aid executive function development in 4 to 12 years old. *Science* 333, 959–963. doi: 10.1126/science.1204529

Fan, J., McCandliss, B., Sommer, T., Raz, A., and Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *J. Cogn. Neurosci.* 14, 340–347. doi: 10.1162/089892902317361886

Haywood, K., and Getchell, N. (2014). *Life Span Motor Development.* Champaign, IL: Human Kinetics Press.

Kim, J. N., and Shadlen, M. N. (1999). Neural correlates of a decision in the dorsolateral prefrontal cortex of the macaque. *Nat. Neurosci.* 2, 176–185. doi: 10.1038/5739

Lillard, A., and Else-Quest, N. (2006). The early years: evaluating Montessori education. *Science* 313, 1893–1894. doi: 10.1126/science.1132362

Lillard, A., Heise, M. J., Richey, E., M., Tong, X., Hart, A., et al. (2017). Montessori preschool elevates and equalizes outcomes: a longitudinal study. *Front. Psychol.* 8:1783. doi: 10.3389/fpsyg.2017.01783

Lillard, A. S. (2005). *Montessori: The Science Behind the Genius*. New York, NY: Oxford University Press.

Lillard, A. S. (2012). Preschool children's development in classic Montessori, supplemented Montessori, and conventional programs. *J. Sch. Psychol.* 50, 379–401. doi: 10.1016/j.jsp.2012.01.001

Mani, A., Mullainathan, S., Shafir, E., and Zhao, J. (2013). Poverty Impedes Cognitive Function. *Science* 341, 976–980. doi: 10.1126/science.1238041

Mann, T. D., Hund, A. M., Hesson-McInnis, M. S., and Roman, Z. J. (2017). Pathways to school readiness: executive functioning predicts academic and

social–emotional aspects of school readiness. *Mind Brain Educ.* 11, 21–31. doi: 10.1111/mbe.12134

Marshall, C. (2017). Montessori Education: a review of the evidence base. *NPJ Sci. Learn.* 2:11. doi: 10.1038/s41539-017-0012-7

Matsumoto, K., and Tanaka, K. (2004). Neuroscience. Conflict and cognitive control. *Science* 303, 969–970. doi: 10.1126/science.1094733

McClelland, M. M., Cameron, C. E., Duncan, R., Bowles, R. P., Acock, A. C., Miao, A., et al. (2014). Predictors of early growth in academic achievement: the head-toes-knees-shoulders task. *Front. Psychol.* 5:599. doi: 10.3389/fpsyg.2014.00599

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., et al. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proc. Natl. Acad. Sci. U.S.A.* 108, 2693–2698. doi: 10.1073/pnas.1010076108

Montessori, M. (1949). *Lecture III*. San Remo: The San Remo Lectures.

Montessori, M. (1962/1948). *The Discovery of the Child*. Madras: Kalakshetra Publications.

Montessori, M. (1988/1914). *Dr. Montessori's Own Handbook*. New York, NY: Schocken; Knopf Doubleday.

Montessori, M. (1995/1949). *The Absorbent Mind*. New York, NY: Henry Holt.

Rauschecker, J. (2011). An expanded role for the dorsal auditory pathway in sensorimotor control and integration. *Hear. Res.* 271, 16–25. doi: 10.1016/j.heares.2010.09.001

Rueda, M. R., Fan, J., McCandliss, B. D., Halparin, J. D., Gruber, D. B., Lercari, L. P., et al. (2004). Development of attentional networks in childhood. *Neuropsychologia* 42, 1029–1040. doi: 10.1016/j.neuropsychologia.2003.12.012

Skoe, E., and Kraus, N. (2012). A little goes a long way: how the adult brain is shaped by musical training in childhood. *J. Neurosci.* 32, 11507–11510. doi: 10.1523/JNEUROSCI.1949-12.2012

Thorell, L. B., Lindqvist, S., Bergman-Nutley, S., Bohlin, G., and Klingberg, T. (2009). Training and transfer effects of executive functions in preschool children. *Dev. Sci.* 12, 106–113. doi: 10.1111/j.1467-7687.2008.00745.x

Traverso, L., Viterbori, P., and Usai, M. C. (2015). Improving executive function in childhood: evaluation of a training intervention for 5-year-old children. *Front. Psychol.* 6:525. doi: 10.3389/fpsyg.2015.00525

Victorson, D., Manley, J., Wallner-Allen, K., Fox, N., Purnell, C., Hendrie, H. C., et al. (2014). Using the NIH Toolbox in special populations: considerations for the assessment of pediatric, geriatric, culturally diverse, non-English speaking and disabled individuals. *Neurology* 80(11 Suppl. 3), S13–S19. doi: 10.1212/WNL.0b013e3182872e26

Weibe, S. A., Sheffield, T., Nelson, J. M., Clark, C. A. C., Chevalier, N., and Espy, K. A. (2011). The structure of executive function in 3-year-olds. *J. Exp. Child Psychol.* 108, 436–452. doi: 10.1016/j.jecp.2010.08.008

Weintraub, S., Dikmen, S. S., Heaton, R. K., Tulsky, D. S., Zelazo, P. D., Bauer, P. J., et al. (2013). Cognition assessment using the NIH Toolbox. *Neurology* 80(11 Suppl. 3), S54–S64. doi: 10.1212/WNL.0b013e3182872ded

Zelazo, P. D., Anderson, J. E., Richler, J., Wallner-Allen, K., Beaumont, J. L., and Weintraub, S. (2013). NIH toolbox Cognitive Battery (CB): measuring executive function and attention. *Monogr. Soc. Res. Child Dev.* 78, 16–33. doi: 10.1111/mono.12032

Zelazo, P. D., and Carlson, S. M. (2012). Hot and cool executive function in childhood and adolescence: development and plasticity. *Child Dev. Perspect.* 6, 354–360. doi: 10.1111/j.1750-8606.2012.00246.x

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Education

ORIGINAL RESEARCH
published: 19 December 2018
doi: 10.3389/feduc.2018.00114

School as Learning Communities: An Effective Alternative for Adult Education and Literacy in Brazil

Roseli Rodrigues Mello and Fabiana Marini Braga*

Department of Pedagogical Theories and Practices, Center of Research and Social and Educational Action, Federal University of São Carlos, São Carlos, Brazil

Women and men, young, and adult, who have reached youth or adult life without elementary schooling, are part of an important and vulnerable group in Latin America, as for instance Brazil. Integrating the studies that seek to contribute to a qualitative change in Brazilian Adult Education, as a means for overcoming inequalities and in support of most vulnerable groups within the population, this article regards the case of the first Adult Education School in Brazil to transform into learning community. The research was developed between 2014 and 2016 and refers to a qualitative case study using the communicative approach, guaranteed by the use of the Communicative Methodology. Data was collected using four techniques pertaining to the Communicative Methodology: communicative in-depth interview with the school's Adult Learning and Education coordination; communicative daily-life story with students and volunteers; communicative focus groups with students, volunteers, and teachers; and communicative observation in Successful Educational Actions. The results indicate transformative and excluding elements that emerged in the following categories: the school's characteristics studied, work and life conditions and access to schooling and continuity in school, and interaction within the learning community. Comparing the results that indicate positive aspects of the Adult Learning and Education school transformed into learning communities to results in other studies about other successful Adult Learning and Education schools in Brazil, it can be established that they coincide in some aspects and go beyond in others. Although coincidence between studies was observed, they were more intensely noticed in the learning community regarding the following aspects: (a) school management oriented toward learning, with contact mechanisms with students that began missing classes, (b) appreciation, from the school staff, of teaching and learning processes, specially reading and writing, (c) a welcoming environment, bonding between professionals and students, and high expectations toward students. As for the elements identified in the learning community which were not found in the other Brazilian studies, they were: (a) enrollment increase over time and decrease in student dropout rates throughout the year, and (b) overcoming dramatic situations experienced in the neighborhood and in the school that could initially lead to school dropout.

Keywords: adult and learning education, literacy, school as learning community, dialogic learning, Brazil

OPEN ACCESS

Edited by:
Monica Byrne-Jimenez, Indiana University Bloomington, United States

Reviewed by:
Ken Kempner, Southern Oregon University, United States
Corinne Brion, University of Dayton, United States

****Correspondence:***
Roseli Rodrigues Mello
roseli@ufscar.br

Specialty section:
This article was submitted to Leadership in Education, a section of the journal Frontiers in Education

Received: *04 September 2018*
Accepted: *06 December 2018*
Published: *19 December 2018*

Citation:
Mello RR and Braga FM (2018) School as Learning Communities: An Effective Alternative for Adult Education and Literacy in Brazil. Front. Educ. 3:114. doi: 10.3389/feduc.2018.00114

INTRODUCTION

Women and men, young and adult, who have reached youth or adult life with no elementary education, comprise an important vulnerable group in different places worldwide (Akello et al., 2017; Boyadjieva and Ilieva-Trichkova, 2017). In the case of Brazil, inequalities affect more the black population of the country, concerning several social rights (De Haan and Thorat, 2012; Andrews, 2014), such as in the labor market (Chadarevian, 2011), infant mortality (Wood et al., 2010), health care (Chadarevian, 2011), access to schooling (De Carvalho and Waltenberg, 2015), and violent death of young people (Brasil, 2017). Concerning the group of black women, they are the ones that receive the lowest salaries for the same jobs carried out by black men, white women and white men, whose wages have been increasing (Ipea-Instituto de Pesquisa Econômica Aplicada, 2015).

Although the country is a signatory to the Education for All commitments proposed in Dakar in 2000, and in the following 15 years it has made important efforts to increase the offer of Adult Education (hereafter AED), through programs, projects, funding and in-service teacher training (Brasil, 2014a), such efforts were neither continuous nor sufficient (Pierro and Haddad, 2015). As of 2016, with the financial crisis and the government's disinvestment in social policies and educational policies of AED, the living and working conditions of the young and adults with low schooling deteriorated, as well as vacancies in adequate places, times and mechanisms of education access and permanence (Gomes et al., 2017). In that year, the country registered a total of 11.8 million illiterate youths and adults, representing 7.2% of the country's population; however, only 6,28,393 enrollments in literacy and initial schooling were made (primary education) (Ibge – Instituto Brasileiro de Geografia e Estatística, 2017), which demonstrates the insufficiency of the educational policies established by municipal, state and national governments.

Even though AED as formal non-literate adult education in Brazil had started in a period when it still was a Portuguese colony, reaching throughout the country once it gained independency, it was only during the twentieth century, with the growing industrialization in Brazil, that formal non-literate adult education gained greater relevance. In the context of industrial expansion, in the late 1950s and early 1960s, Paulo Freire's adult literacy experience gained national and international visibility. In 1964, though, with the military coup d'etat, Paulo Freire was sent to exile, and began his journey around the globe in which he developed the theory that turned him into global reference. Meanwhile, in Brazil, his propositions suffered strict censorship. Adult education during the military dictatorship was strictly directed toward labor educational, leaving aside the humanizing contributions from Freire (Friedrich et al., 2010). With the political re-opening and democratic reuptake in the 1980s, Brazil was able to approve a new constitutional letter, the 1988 Constitution, making it possible to re-start discussing formal adult education. Di Pierro et al. (2017) state that in the 1990s legislation and public policies AED was kept aside regarding governmental funding. In the following decade, though, such funding disadvantage was corrected through the National Basic Education Fund (Fundeb).

Currently, even with a more proper student funding, Brazilian AED is configured as an appendix to each school level in basic education, as drawn in **Table 1**, extracted from UNESCO's report (Brasil, 2014a). It can be of a labor education character, or have a compensatory education character for those who have not had proper education in childhood or adolescence. The idea of lifelong education presented in international educational documents still has not come to be in Brazil. Few are the school oriented toward adequate AED, as highlighted by Di Pierro et al. (2017). Most AED vacancies is still offered on the evening, making use, in the third shift, of buildings utilized by children or teenagers during the morning and afternoon shifts.

Another element emphasized is that through government measures taken in previous years, the Brazilian educational legislation has stipulated that the student's minimum age for enrollment in an AED class is 15 years of age, which has led and encouraged young people with low learning or inadequate behavior in regular schools to migrate to the AED modality.

This measure has altered the configuration of the clientele that predominantly composes the AED classrooms: in 2016, 52.4% of enrollments, both at the most basic levels of schooling and at the secondary level of AED, were young people 15–24 years of age (Inep - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira, 2017).

Even with the sensible limitations faced by AED system in Brazil, finding quality condition and offer is a fundamental element for quality of life improvement of people and democracy in a country, as indicated in different by international organs and researchers from different areas. A recent Unesco - United Nations Educational Scientific Cultural Organization (2016) reaffirms the positive effects of AED on health and general well-being, on employment and the labor market, and on the social, civic and community life of people and countries. Following the worldwide trend, in Brazil, it is also observed that the more progress is made in schooling levels, the more positive outcomes are observed in employment and access to income (Salvato et al., 2010). In the health area, for example, in the case of women, lower

TABLE 1 | Structure of the Brazilian Educational System considering the Teaching Modalities.

Levels	Stage		Modalities
Higher education	Higher education	Postgraduate studies	E-learning AED Professional Education Indigenous School Education Special Education Field Education Quilombola Education
		Undergraduate studies	
Basic education	High school		
	Elementary School		
	Early Child Education	Preschool	
		Daycare	

Extracted from the Partial Report on Education for All (Brasil, 2014a, p. 7).

schooling is directly related to the rate of early pregnancy, as well as to infant mortality in their homes (Brasil, 2014b). Thus, although determinants such as racism and sexism are decisive factors in the structure of wage, income and mortality inequalities in the country (Ipea-Instituto de Pesquisa Econômica Aplicada, 2015), the increase in schooling reveals greater protection for citizens.

Integrating the studies that seek to contribute toward a qualitative change in Brazilian AED, as a means to overcome inequalities and to support the most vulnerable groups within the population, this article regards the case of the first AED school in Brazil to transform the learning community (hereinafter LCS). The transformation of schools into LCS has demonstrated to be an effective alternative toward high-quality education (efficacy), for all (equity), in an atmosphere of solidarity (social cohesion) (Flecha and Soler, 2013).

Having originated in Spain, the project of transforming schools into LCS was generated within the context of AED. In that country, since the 1980s, there is legislation granting specificity to AED, articulating it with the people's participation through neighborhood associations (Di Pierro, 2000; Flecha and Mello, 2012). In Brazil, despite the achievements, AED suffers from instability, as do the other educational modalities, since it receives quite disperse and peripheral attention of funding policies, infrastructure, and teacher education, and its implementation depends on the successive governments. In face of this situation, the aim of the present study was to analyze if the transformation of AED modality in Brazilian schools into LCS is an effective answer to many daily challenges faced by the teachers and students, presented as an immediate alternative for improving students' learning, interaction, and participation. The results presented in this paper are part of the research "Transformation of AED into Learning Community," funded by the National Council of Scientific and Technological Development (CNPq), Ministry of Science, Technology, Innovations, and Communications of Brazil and developed between the years 2014–2016.

TRANSFORMATION OF SCHOOLS INTO LEARNING COMMUNITY SCHOOLS (LCS)

LCS is a project of cultural and social transformation of the school, aimed at achieving maximum instrumental learning for all students, with respectful social interaction regarding diversity among everyone (Elboj et al., 2002). The project was conceived and developed by the Community of Research on Excellence for All (hereinafter CREA), an international community based at the University of Barcelona (hereinafter UB) in Spain, based on a series of studies that sought evidence on educational actions that guarantee school success, with equity and solidarity (Flecha and Soler, 2013; Ríos et al., 2013). The project resulted from the analysis of the current social context, which included elements such as the information society, globalism, the dialogic turn, loss of power of traditional authorities, reflexive modernity, and risk society (Aubert et al., 2016). In such a context, communication and implementing agreements between the subjects are central elements for transforming inequalities, with human agency as the engine of transformation. Dialogued joint consensus-based action between different subjects is what creates the conditions for overcoming barriers that the subjects encounter in the path they chose to trail.

Faced with this context, new educational and organizational needs are presented to the subjects and the institutions. Knowledge and skills that guarantee that the subjects have access, treatment and use of information, such as reading and writing, languages, and mathematics are fundamental, as well as access to knowledge on managing new communication and information technologies (Aubert et al., 2016). In addition, transforming information into knowledge in a reflexive and critical manner is essential for generating self-protection, for creating alternatives for the individuals and for their groups. The current context is characterized by the construction of one's own trajectories and identities. In it, it is necessary to appreciate the interactions based on the diversity as a source of knowledge, listening to different perspectives, both convergent and divergent, dialoguing, and discussing them. As for the institutions, promoting public discussions and establishing consensus is an urgent demand, since constraints and coercions are increasingly rejected by the subjects. In short, it is a challenge for the institutions and in particular for schools to create environments in order to exchange and construct knowledge and interaction, in discussions that are free from coercion. The concept of dialogic learning and the process of transforming schools into LCS were generated by CREA/UB in view of such challenges.

Dialogic Learning

Flecha (1997) called "Dialogic Learning" a global and valid concept for a wide range of educational contexts, from childhood to the last adult stage. This concept is related to how learning is conceived. It is composed of principles that are expressed in the theoretical formulations that allow describing what, in practice, is a unit. Among several CREA productions, the principles of dialogic learning can be found in Flecha (1997) and Aubert et al. (2016). They are: egalitarian dialogue, cultural intelligence, transformation, instrumental dimension, creation of meaning, solidarity, and equality of differences. In dialogic and transformative perspective of education, Dialogic Learning includes the extensive production of Paulo Freire, articulating it with theories that strengthens action in life committed to democracy and social justice. Some of such authors included in both CREA's publications mentioned are Habermas, Chomsky, Vygotsky, Bakthin, Bruner, Rogoff.

Taking Paulo Freire's (1987) dialogic action theory as starting point, egalitarian dialogue presupposes that the speeches and propositions of each participant in the dialogue are accepted because of the arguments presented and not of the positions occupied by the subjects who articulate them (age, profession, gender, social class, educational level, group of origin). This means that power lies in the argumentation, understood as the presentation of reasons with claims of validity (Habermas, 1987). Each one presents their arguments based on what they know and what they think, and, in the dialogue, new understandings and consensuses are built for the benefit of effectiveness, equality and social cohesion. Dialogue is seen as a widely recognized learning

tool in education. Aubert et al. (2016) refer to Bruner and Dewey as a way of exemplifying such recognition. They also indicate the contributions of Vygotsky, Freire, and Bakthin regarding the role of dialogue in learning.

In order to establish dialogic learning, communicative skills must be used in the family environment, in school, leisure time, and community, by means of critical and reflective participation in society. Thus, another concept arises: that of cultural intelligence. Based on the definitions of practical intelligence and academic intelligence, CREA developed the concept of cultural intelligence (Flecha, 1997). Cultural intelligence is people's ability to act in different contexts and transposing knowledge into new contexts, learning to move, to decide, to behave in a new environment. In the same group, each person can present, through dialogue, different ways of thinking and putting themselves in front of situations, constructing together greater understanding and alternatives (Aubert et al., 2016).

By sharing different points of view and ways of analyzing and solving situations, through a dialogue guided by the validity of the arguments, a process of change with two communicable directions is necessarily established: an internal transformation in each participant and external transformation, sought for the benefit of all. Both internal and external transformation demand the commitment of each person with what Freire (1987) called *true word*, that is, beyond reflection, true word demands from the subject that their action in the world must be consequent and coherent with what they are pronouncing. In Flecha (1997) and Aubert et al. (2016) it is clear how they articulate into such Freire's theoretical proposition Vygotski's (2008) concepts of interaction and zone of proximal development and Mead's (2010) concept of self. In that above-mentioned transformation process, Flecha (1997) and Aubert et al. (2016) highlight the access to instrumental knowledge is a necessity for life in the Information Society and the transformation of the surroundings. This is the instrumental dimension of dialogic learning.

In the instrumental dimension, the presence of the previous elements is evident: an equal dialogue is also proposed in the field of what is to be learned, since it is understood that everyone can present different knowledge in the process, given their cultural intelligence, in a dialogue that aims for and promotes personal and social transformation. Each person becomes the protagonist of their learning process, as well toward the school and its environment. Thus, the other three principles of dialogic learning can be seen in motion: creation of meaning, solidarity, and equality of differences.

In a society in which social change is a constant, there can be a climate of loss of meaning. The proposed participation in dialogic learning is an important tool in the creation of meaning by people for them to conduct their own lives. Faced with the numerous possibilities of choosing how to live, it is difficult to have a single project for all people or collectively, and it is equally difficult for the school to know which values to establish. Thus, the creation of meaning by the people and the group is fundamental in order to propose in the egalitarian dialogue, by means of dialogical learning. In this creation of meaning each person can examine the possibilities, critically reflect on them and make their choices.

Solidarity thus becomes an element of dialogic learning, from person-to-person interaction, as well as from people who are in solidarity with groups inserted in a situation of social exclusion. Flecha (1997) points to the difference between solidarity as participation in the search for transformation and construction of meaning, and solidarity tourism, in which people participate for their self-promotion.

Egalitarian dialogue, cultural intelligence, transformation, the instrumental dimension, the creation of meaning and solidarity are also associated—and integrated—in dialogic learning, by the principle of equality of differences, as shown in the following rationale. By proposing, through cultural intelligence, participation in egalitarian dialogue, thus contributing to the transformation of the school and its surroundings, benefitting the access to instrumental knowledge, creating new meanings for the life of each person and at the same time for all, in a process of constructive solidarity of alternatives, we also seek the equal right to choose a way of life and, therefore, to assume the differences. Through dialogic learning, each person builds new perceptions about life and the world and, reflecting on their culture and that of others, they can choose with greater freedom their way of living and interacting, as well as develop awareness that this process occurs with other people, thereby creating respect for different ways of life.

Creation and Validation of the Process to Transform Schools Into LCS

The process of transforming schools into LCS began in the 1990s (Morlà, 2015), based on the application of evidence-based practices at the Verneda de San Martí School of Adult Education (Sánchez-Arouca, 1999; Tellado et al., 2013), in Barcelona/Spain. Shortly thereafter, it was transferred to primary and secondary schools for children and young people. The series of research carried out for the design and diffusion of schools such as LCS culminated in the research titled INCLUD-ED—Strategies for inclusion and social cohesion in Europe from Education (Flecha, 2015), carried out by CREA, between 2006 and 2011, with the participation of different European countries (Gatt et al., 2011). From the INCLUD-ED research, the concept of Successful Educational Actions (hereafter SEA) was reached, which are those that guarantee school success and contribute to social cohesion in all the contexts in which they are implemented. Thus, the concept of SEA differs from the concept of best practices, whose success depends on the framework in which these practices are implemented (Flecha, 2015). During the INCLUD-ED research, SEAs that already comprised the design of transforming schools into LCS since its origin were validated, with the involvement of families in the life of the school and the learning activities inside and outside the classroom and others that were established (Flecha, 2015).

In LCS, the involvement of families and volunteers in the life of the school concerns their participation in education, training, and decision-making, along with the professionals and students. Participation occurs from the beginning of the transformation process of the school, during the succeeding phases and in the monitoring and evaluation of all the work after the school has

already become a LC school (Ríos et al., 2013; Braga and Mello, 2014).

The first phase of transformation is called sensitization. In it, school professionals, students' families and other educational agents in the local community are presented with the theoretical bases and the SEAs that will comprise the interactions and activities in the school. With the necessary information, the professionals of the school and the other educational agents of the community are in charge of the decision-making of rather transforming, or not, the school into LCS. If the positive decision is made, the next phase begins. It is the dream phase: the students and their family members, teachers and other educational professionals, and the other educational agents from the local community envision the school they want for everyone. After that, the priority selection phase follows: a mixed commission is then set up, composed of teachers, family members, students and members of the surrounding community, to select priorities from the dreams and analysis of the available and necessary resources. The same mixed commission organizes an action-planning assembly with everyone, for the launching of the learning-aimed SEA (Elboj et al., 2002; Mello et al., 2012).

With the school transformed into a LC school and the project already underway, the families will integrate the mixed commissions, always with the presence of different agents of the community, who will take care of executing the prioritized actions and the dreams of the transformation phase, planning, executing, and evaluating the actions, together with the members of other commissions (Flecha et al., 2009).

One or more times a week, family members and other members of the local community can volunteer in interactive groups in the classroom. Interactive groups are organized in all subjects, taking into account the maximum diversity among students in each group. Each group receives a volunteer to encourage interaction among students to solve problem situations and exercises proposed by the teacher based on the subjects they are studying in class. By rotating between four and five activities, lasting 15–30 min each, students in each group are encouraged to respect each other; to explain to each other the content of the activity, asking questions to each other and supporting each other in the learning activity. For approximately one and a half hours of work, students develop concentration and learning in a dialogical way. To carry out their work, the volunteers are guided by the teacher (Mello, 2012; Valls and Kyriakides, 2013).

In the classroom, family members and others in the surrounding community can also voluntarily follow up the realization of dialogic literary gathering, which imply shared reading of universal classical literature among students, based on egalitarian dialogue; each student reads in advance, at home or at school outside class, a passage previously agreed among them, and highlights at least one paragraph that has caught their attention. When reading their highlight to the class, each student argues their choice, relating it to thoughts, knowledge, experiences; from the highlighted extract, other participants sign-up to share their thoughts, knowledge, and experiences evoked in the reading and dialogue. The dialogic literary gathering can be conducted by the classroom teacher, by community volunteers or by a student; family members and community members can also participate in the dialogue simply to support students who are still in the initial stages of learning and to share their ideas (Pulido and Zepa, 2010).

The same type of support dynamics offered by family members and other volunteers in the interactive groups, or in dialogic literary gatherings in the classroom, can also be conducted in spaces of extended study time, as for instance the tutored library. Relatives and other agents of the surrounding community, outside the classes, stimulate study, and interactions among students, focusing on investing time in reading, listening to students reading and reading with them, and favoring relationships between students and favoring the students' knowledge (Flecha et al., 2008).

In LCS, formative spaces are also created for the families, like dialogic literary gatherings between mothers, computer classes, and assisting other needs of that community. By engaging in their own development, family members deepen their relationships with schooling and the learning process of other members of their family, strengthening their ties and motivations with the school (De Botton et al., 2014).

Families and other members of the surrounding community will also take part, with a professional from the school and students, in a mixed commission responsible for starting the dialogue and preparing guidelines for the interactions, for following up its effectiveness and for evaluating the pertinence of its continuity or the need for change in cases of overcoming and preventing conflicts in school. This is the SEA called dialogic model of conflict prevention. In addition to the disciplinary model and the conflicts mediator model, the dialogic model is a community model of conflict prevention, involving students, families, teachers, and other educational agents in the dialogue process. In a small mixed commission, a dialogue is held at each class until a base proposal is reached, which is held in a meeting of students, teachers, and family members, reaching a consensual directive of living together among all (Oliver, 2014).

Finally, for a school to be transformed and maintained as LCS, producing and articulating effectiveness, equity, and social cohesion, it is important that the professionals working in it meet the criteria using the study and dialogue between them regarding the best theories and the productions based on scientific evidence. Also, that they focus on promoting high quality education for all without breaking with the development of cultivating feelings of solidarity and friendship in each person. The successful educational action validated by the INCLUD-Ed research for this purpose was the dialogic pedagogical gathering. Among colleagues from one or more schools, who wish to achieve such a work, periodic meetings may be held where they can share the reading of scientific articles, or dialogic based books. Such meetings promote an opportunity to jointly consider the transfer of knowledge to pedagogical practices. It is necessary to overcome practices based on opinions and to invest in practices with scientific basis (Flecha and Puigvert, 2005; Garcia- Carrion et al., 2017).

Educational participation of the community, interactive groups, dialogic literary gathering, tutored library, educating the

family, dialogic model of overcoming, and preventing conflict and dialogic pedagogical gathering are the SEAs carried out in LCS. These SEAs were validated in the INCLUD-ED research, which showed that in different contexts (schools from 14 different countries participated) and with different vulnerable social groups, they have promoted the best results in terms of efficacy, equity and social cohesion (Flecha, 2015, 2017).

The Transformation of Schools Into LCS in Brazil

Brazil was the first foreign country, considering Spain as the cradle of transforming schools into Learning Communities, to disseminate, implement, monitor, and study the results of transferring the transformation of learning communities to a different national context from where the proposal was created. The transferring process began on the year 2001, when Mello (2002) started a post-doctoral stay in CREA/UB/Spain, in search of theories and practices they could help to better qualify Brazilian teacher education. Mello (2002) was a researcher at Federal University of São Carlos, in the state of São Paulo, and, at the same time, conducted in-service teacher education in public elementary schools in the city of São Carlos. Throughout the post-doctoral stay in CREA/UB, between 2001 and 2002, Mello studied the Spanish context and its educational legislation, as well as dialogic learning, school transformation into LCS and the communicative research methodology developed by the CREA/UB team (Flecha, 2017).

In 2001, at the beginning of the postdoctoral stay, in addition to the Verneda School of Adult Education in Sant-Martí, there were four elementary schools in Spain that were LCS. During the postdoctoral period, Mello (2002) made observations, analyzed documents and interviewed professionals, volunteers and students from the five schools. In this period, another three elementary schools joined the project in different regions of Spain, which were included in the field research that was being developed by her. At the end of 8 months of data collection, comparing the context and legislation of the two countries (Brazil and Spain), and analyzing the field research results, she concluded that there were sufficient elements that would justify the development of a pilot proposal in Brazil (Mello, 2002; Mello and Elboj, 2004).

From the observation of the success achieved by LCS in the Spanish context, its effectiveness had to be verified in the Brazilian context. Back in Brazil, in June 2002, Mello (2002) created the Nucleus of Research and Social and Educational Action (NIASE), associating it to the Federal University of São Carlos.

From the joint studies with the new members of the research group in 2003, NIASE team set out to transform schools into LCS. Over time, the team expanded, receiving new university professors, as well as undergraduate and graduate students. In addition to the university extension work, the LCS implementation channel in Brazil, NIASE team also began to research these topics in the Brazilian context, focusing mainly on the study of the effectiveness and transferability of LCS to the country (Constantino et al., 2011).

In 2003, after taking notice of the project, a municipal school of the city was the first to choose to undergo the transformation process. After the sensitization phase, managers, teachers and student's family members approved the transformation of the school into LCS. Then, everyone envisioned the school they wanted, and soon the project was set in motion. Mixed commissions were set up at the school to lead the transformation. The library was opened at lunchtime and after school as extended study time, being tutored by family and university students. A neighborhood resident, an Information Technology student and a university professor began voluntarily offering computer classes to the family members of the children, while the children were in the tutored library.

In the space and time of the tutored library, between afternoon classes and evening classes, a dialogic literary gathering began for the group of adults who studied there. They read classical literature, highlighting pieces they would like to share with their colleagues, relating these parts to their own lives. In the children's classrooms, once a week, on a set day, for an hour and a half, the teachers organized interactive groups, counting on the volunteers to conduct dialogues with the children in heterogeneous groups, focusing on accomplishing an assignment already studied. Concomitantly, the research group began to focus on studies to evaluate the effectiveness of transforming the Brazilian school into LCS. After 2 years, the school had expanded its respect and recognition to the surrounding community and families, and the quality of internal relationships had improved among all educational agents and students; it also improved everyone's instrumental learning (Braga, 2008). The results led two other schools in the municipality to transform into LCS (Mello, 2005; Mello and Larena, 2009).

With the three schools transformed and operating as LCS, in order to verify the joint data of the three schools and to compose indicators for the implementation of LCS in Brazil, NIASE proposed a large research project, financed by the São Paulo Research Foundation (FAPESP) and by the National Council for Scientific and Technological Development (CNPq). The objective was to analyze the effects of transforming the schools into LCS, both in the context of the students' school learning, as well as in the schools' socializing environment, considering their different contexts and demands (Mello, 2007).

For 2 years, the research focused on each educational activity developed in the schools (interactive groups, dialogic literary gathering, mixed commissions, education of families, and tutored library), as well as their results. With very different clienteles and demands, it was concluded that their implementation in the three different contexts was feasible and effective, producing quality learning for all students, with an improved environment of interaction among all educational agents and students (Braga and Mello, 2009; Mello, 2009; Mello et al., 2012). The transferability and the effectiveness of transforming the schools into LCSs in Brazil were verified.

In 2010, a fourth Brazilian school asked NIASE/UFSCar for LCS training. It was a school with more than a thousand students, distributed in three shifts: morning, afternoon and night. It was a regular elementary school that during the day held classes for children and adolescents and at night young and adult students

in the AED modality of initial schooling. After sensitizing the team of school professionals, an unusual decision was reached: the teachers responsible for the daytime classes of children and adolescents decided that they did not want to transform the school into LCS, while the teachers and managers of the evening AED unanimously decided to change the education modality.

With the argument that the AED was already handled by managers, teachers, and students of the daytime period as a separate school, apart from the rest, AED teachers convinced the team of NIASE/UFSCar researchers to conduct the school transformation only for the night period. It would be the first experience in Brazil of transforming AED into LCS. In a structural situation very different from Spain, AED of Brazil faces, as seen in the introduction of this paper, quite adverse conditions. From 2011 to 2013 the transformation was gradually taking place. From 2014 to 2016, the research presented here was carried out on the transformation of AED into LCS in Brazil.

THE STUDY

Objectives

As already mentioned in the introduction of the paper, the general objective presented here was to analyze if and how the transformation of AED modality in Brazilian schools into learning communities is an effective answer to many daily challenges faced by the faculty and students in those schools, presented as an immediate alternative for improving students' learning, interactions, and participation.

The specific objectives of the study were:

- Demonstrate the transformative aspects and the exclusionary aspects faced by professionals, volunteers, and students of AED in Brazil, regarding students' learning, interactions and participation when a modality is transformed into an LCS;
- Compare results referring to students' learning, interactions and participation reached by the AED school transformed into LCS to results presented by previous literature that has studied successful AED schools in Brazil.

Methods

In addition to the literature review on AED and SLC, we carried out a bibliographic research about successful practices developed in Brazilian AEDs, to use them as a comparison parameter with what we would find in field research. We searched for articles in the international Scopus database and in the Latin American Scielo database, with no beginning date indicated, but that had been published by 2016. In Scielo database, based on the descriptors "AED AND efficacy"; "Youth AND Adult Education AND efficacy"; "Youth AND Adult Education AND interactions," "AED AND interactions," we found 14 articles. After reading all the abstracts, only one (Silva et al., 2012) fit the inclusion parameters we had adopted: to approach an empirical study aimed at analyzing successful AED practices in Brazil, with regard to student learning and social interaction among everyone in school.

In the Scopus database, based on the descriptors "Adult Education AND Brazil" and "Adult Learning AND Education AND Brazil," we found 59 articles. After reading the abstracts, none fit the inclusion parameters adopted. Thus, the comparison between the results from field research that we developed and other experiences of successful AED practices in Brazil was restricted to the article by Silva et al. (2012).

As for the field research, it was developed in the years 2014, 2015, and 2016 and refers to a qualitative case study (Yin, 1994), given its singularity: it is the first AED segment that has become a learning community in Brazil. In addition, this case study may offer elements that help provide alternatives to overcoming the limitations of the AED school in structurally disfavored contexts. Specifically, it was a case study using the communicative approach, guaranteed by the use of Communicative Methodology (Gómez et al., 2006).

The Communicative Methodology is based on the contributions of Social Sciences about the dialogic turn in society, which refers to dialogue as the main means of understanding and transforming reality (Habermas, 1987; Giddens, 1991; Beck, 1992; Elster, 1998). Thus, in order to better capture reality, it is necessary, in addition to the researchers' perspective, to bring all the voices of people who experience a certain reality. In the Communicative Methodology, in an intersubjective dialogue, researchers and participants analyze the data collected in an egalitarian dialogue. There is the triangulation of data to overcome analytical biases or mistakes, in addition to comparing data from different data collection techniques, also through the intersubjective dialogue between researchers and participants at the end of the analyses.

Another characteristic of the Communicative Methodology is that it is directed toward social transformation, therefore it is not limited to describing and analyzing reality, but also analyzes how reality can be transformed within the analyzed context, overcoming obstacles to social equality (Gómez et al., 2011). Thus, it is a methodology especially in line with the development of research related to vulnerable groups, allowing the transformation of the exclusionary conditions during the research process itself (Flecha and Soler, 2013). The Communicative Methodology is operationalized through communicative techniques of data collection and analysis, involving researchers, and participants throughout the research process (Gómez et al., 2011).

Local, Participants, and Ethics Statement

The school that took part in the research is located in the city of São Carlos, inner state of São Paulo. The neighborhood was stablished in the mid-1990s, in a geographically isolated region. A businessman of the city, in order to induce urbanization of the area and consequently rise in prices of such area, which was his property, stimulated the migration of families originated in different states of the country. People who set their houses and built the neighborhood had low formal educational level, or no formal education whatsoever. The history of its residents is of low employment rates or low paying jobs, informal jobs and lack of basic sanitary and social rights.

The school serves as reference to the neighborhood. Before becoming LCS, the AED already show high cohesion and commitment between their professional team. The choice for

becoming a LC was made in order to overcome problems that already had been troubling the team: conflicts between young and adult students, hostility of young men toward transgender students, dropout rates along the year and low learning levels. for the research, the school was nicknamed "Walker" School, in order to keep the identity of its participants.

As previously mentioned, AED "Walker" School become a LCS in 2011, slowly implementing the SEAs. Data collection was implemented in the years 2014, 2015, and 2016.

The participants in the research were the pedagogical coordinator of the AED, the supporting teacher of AED, 10 teachers of different subjects, 20 students of different classrooms, and 13 volunteers who were residents in the surroundings of the school (8) or doctoral students in a local university (5). In 2014 and 2015, an approximate total of 100 students were observed during practical activities, but in the present article the focus is on the direct testimony of the informants as well as on situations in which they were present, in order to provide a more in-depth of the observations. In **Table 2** the encoding used to identify participants is displayed. In **Table 3**, the practical activities focused on the research is organized, and in **Table 4** both participants and practical activities in which the data collection was performed are gathered.

Providing more details about the participants on the research, it can be stated that among the 14–16 professionals that were employees in the school each year, including the coordinator and the coordination assistant, 8 were permanent (3 men and 5 women). The remaining professionals that participated in the research, 4 of them were newly hired in the school and had not yet gained stability in the job. Regarding the participating students, 14 were female and 6 were male, all of whom were in more advanced levels, which means they already knew how to read; 9 of them were older than 25 years and 11 were between 15 and 24 years old. Regarding the volunteers, only those who had a more constant participation in school activities took part in the research, i.e., those that continued participating from 1 year to the other, accounting for 10 women and 3 men of different ages. It is important to highlight that all of the participating teachers were white, while the vast majority of volunteers and students were brown or black and were residents in the school's neighborhood. Comparing the different composition of the different groups that participated in the research, we can affirm that it was representative of the entire school population, as well as of the proportions of blacks and whites, women and men, young and adults within the Brazilian AED scenario.

In accordance to the ethical aspects of the research, the project was approved by the National Commission of Ethics in Research (CONEP)—Brazil—and, aware of the objectives and purposes of the study, the participants signed a free and informed consent form. The written informed consent was obtained from all adult

TABLE 2 | Participants coding.

Subjects/ Participants	Code participants	Number of participants	Gender participants	Code gender	Color-race	Code color-race	Age years	Code age
Student	Stu	1–20						
Teacher	Tch	1–10	Men	M	White	W	15–25	Y
Coordinator	Coord	1	Woman	W	Brown	Br	26–59	A
Support coordination	Scoord	1	Transgender	T	Black	Bl	60 or more	S
Volunteer	Vol	1–13						

Example of participant: Stu2MBrS.

TABLE 3 | Data collection techniques coding.

Data collection techniques	Code data collection techniques	SEA focused	Code SEA Focused	Year of date collection	Code year of date collection
Communicative interview	CI	All		2014 2015 2016	14 15 16
Communicative daily-life story	CS	All			
Communicative Focal Group	FG	All			
Communicative Observation	OC	Mixed commissions Dialogic literary Gatherings Interactive groups Extended study time Dialogic education	MC DLG IG EST DE		

Example of data collected: CIMC16.

participants and from the parents/legal guardians of all non-adult participants.

Data Collection Techniques

In the referred case study, data was collected by means of four techniques pertaining to the Communicative Methodology: communicative in-depth interview with the school's AED coordination; communicative daily-life story with students and volunteers; communicative focus groups with students, volunteers, and teachers; and communicative observation in Successful Educational Actions (mixed commissions, dialogic literary gatherings, interactive groups, and learning time extension—tutored library and language and computer classes).

As previously mentioned, **Table 3** displays the data collection techniques used, the SEAs in which the observations were made and the years of the data collection. In 2014 and 2015, the data collection was carried out at the end of the school year, so that the participants could have a global view of the process. In 2016, the data were complemented with the interviews of two volunteers and the general coordinator and a support coordinator of the AED at the school.

All data collection was carried out in the school before the beginning of class (interviews, communicative daily-life story and focus groups), or in the period during the classes (case of communicative observations). For each data collection situation, the researchers communicated to the group how the collection technique and the open questions to be used in the dialogue would work. The issues focused on obstacles and aspects conducive to schooling and learning and recommendations to overcome the obstacles encountered. The activities were recorded in audio and video, later transcribed, and subsequently organized by the researchers.

Data Organization and Analysis Techniques

Due to its transformative structure, in the Communicative Methodology, the organization and data analysis are in two axes: the exclusionary dimension and the transformative dimension. In this research, the exclusionary dimension is composed by elements that prevent institutions and subjects from achieving the necessary instruments for exercising social equality; the transformative dimension is composed by elements that are conducive to such access. Data analysis was conducted around three categories in accordance to the research objectives. Within each category, subcategories emerged from the dataset. Data was organized into the categories and subcategories regarding their exclusionary or transformative character, recording the number of times they were mentioned by the participants. **Table 5** illustrates how the elements and the frequency in which they were mentioned were allocated in the research.

On the analysis of the data, at the same time of their collection, the researchers have already been expressing to the participants the analyzes based on the dialogical theories and incorporating in their annotations arguments and interpretative disagreements expressed by the participants. Subsequently, with all data collected, the researchers conducted the analyzes, producing more interpretations. Finally, in a meeting scheduled for that purpose, the researchers discussed their interpretations

TABLE 4 | Direct participants in the research and data collection techniques in which they took part.

Participants	2014	2015	2016
AED COORDINATION			
- Coord_Mwa	1 CI	1 CI	1 CI
- Scoord_Wwa	1 CI	1 CI	1 CI
TEACHERS			
- Tch1_Mwa—Literature and mother tongue (Portuguese)	1 CS, 1 CG, 4 OC	- 1 CS, 1 CG, 4 OC	
- Tch2_Wwa—Literature and mother tongue (Portuguese)	1 CS, 1 CG, 4 OC	- 1 CS, 1 CG, 4 OC	
- Tch3_Mwa—Sciences	1 CG, 3 OC	1 CS, 1 CG, 3 OC	
- Tch_4_Wwa—Geography	1 CG, 4 OC	1 CG, 4 OC	
- Tch5_Wbra—Mathematics	1 CG, 4 OC		
- Tch6_Wwa—Arts	1 CG, 2 OC	1 CG, 2 OC	
- Tch7_Wwy—English as a foreign language	1 CG, 3 OC	1 CG, 3 OC	
- Tch8_Wwa—Literature (readapted)	1 CG, 4 OC		
- Tch9_Wbra—History	1 CG, 1 OC	1 CG, OC	
- Tch10_Wbra—Mathematics		1 CG, 1 OC	
STUDENTS			
- Stu1_Wbra	1 CS, 1 CG, 2 OC	1 CS, 1 CG, 2 OC	
- Stu2_Wbra	1 CS, 1 CG, 2 OC	1 CS, 1 CG, 2 OC	
- Stu3_Wbra	1 CS,1 CG, 2 OC	1 CS, 1 CG, 2 OC	
- Stu4_Mbra	1 CS, 1 CG, 2 OC	1 CS, 1 CG, 2 OC	
- Stu5_Wbra	1 CS, 1 CG, 2 OC	1 CS, 1 CG, 2 OC	
- Stu6_Mbly	1 CS, 1 CG, 2 OC	1 CS, 1 CG, 2 OC	
- Stu7_Mws	1 CS, 1 CG, 2 OC	1 CG, 2 OC	
- Stu8_Mbly	1 CG, 2 OC	1 CG, 2 OC	
- Stu9_Mbra	1 CG, 2 OC	1 CG, 2 OC	
- Stu10_Mbly	1 CG, 2 OC	1 CG, 2 OC	
- Stu11_Wbry	1 CG, 2 OC	1 CG, 2 OC	
- Stu12_Wbry	1 CG, 2 OC	1 CG, 2 OC	
- Stu13_Wwy	1 CG, 2 OC	1 CG, 2 OC	
- Stu14_Wbla	1 CG, 2 OC	1 CG, 2 OC	
- Stu15_Wbly	1 CG, 2 OC	1 CG, 2 OC	
- Stu16_Wbly	1 CG, 2 OC	1 CG, 2 OC	
- Stu17_Wwa	1 CG, 2 OC	1 CG, 2 OC	
- Stu18_Wbra	1 CG, 2 OC	1 CG, 2 OC	
- Stu19_Wwy	1 CG, 2 OC	1 CG, 2 OC	
- Stu20_Wwy	1 CG, 2 OC	1 CG, 2 OC	
VOLUNTEERS			
Vol.1_Wbry	1 CG	1 CS, 1 CG, 2 OC	
Vol.2_Wbry	1 CG	1 CS, 1 CG, 2 OC	
Vol.3_Wbls	1 CG	1 CS, 1 CG, 2 OC	
Vol.4_Mwy	1 CG	1 CS, 1 CG, 2 OC	
Vol.5_Wbla	1 CG	1 CG, 2 OC	1 CS
Vol.6_Wbra	1 CG	1 CG, 2 OC	1 CS
Vol.7_Wbla	1 CG	1 CG, 2 OC	
Vol.8_Wwy	1 CG	1 CG, 2 OC	
Vol.9_Mbry	1 CG	1 CG, 2 OC	
Vol.10_Mbry	1 CG	1 CG, 2 OC	
Vol.11_Wbla	1 CG	1 CG, 2 OC	
Vol.12_Wwy	1 CG	1 CG, 2 OC	
Vol.13_Wwa	1 CG	1 CG, 2 OC	

TABLE 5 | Example of date organization in categories, subcategories, elements and mentions for transforming elements and exclusionary elements.

Category	Subcategories	Transformative dimension	Excluding dimension
Category	Subcategory 1	x elements– x mentions	x elements– x mentions
	Subcategory 2	x elements– x mentions	x elements– x mentions
	2 subcategories	x elements– x mentions	x elements– x mentions

with the group of participants that remained in the school at 2016, when the final interpretative dialogue about the dates was concluded and put into consensus; attended this final meeting: the coordinator, the coordination assistant, two Portuguese language teachers, five students and five volunteers.

RESULTS

The results are here presented in three categories: enrollment and continuity in the LCS, learning in the LCS and interactions within the LCS. In each of the categories, we present the organization of subcategories, of elements and of the frequency that they were mentioned into the exclusionary and the transformative dimensions. We sought to illustrate through comments from the participants or observational data what students, teachers, coordinators and volunteers indicate regarding the analyzed categories. The aim is to provide broad data and analyses that demonstrate the potentiality of the transformation of AED for the transformation of young and adult students' relationships and learning.

Enrollment and Continuity in LCS

Different from the national dropout trend throughout the year of AED classes, in the "Walker" School, in 2014, the increase in enrollment in the AED modality was remarkable throughout the year. The daily-life story and discussion groups with students revealed that the presence of volunteers in the school and the recognition by the students were decisive factors in that they were learning more than in the past, whether they were studying in another school or at this school before it transformed into LCS. The transformation into LCS brought new elements to the "Walker" School, concerning interactions and learning, determining the continuity of students in school as shown in **Table 6**.

In the case of students, the communication between neighbors and friends in the neighborhood about what was happening at school was a factor that encouraged and stimulated more people to look for the AED of the "Walker" School and which caused enrollments to increase throughout 2014. Then, what was experienced in the school's successful educational actions was reason to remain in the school, lowering the dropout rates. The testimony of one of the students, who looked for the school because he wanted to know what dialogic literary gathering was, is an example of this type of situation:

TABLE 6 | Transforming elements and exclusionary elements for enrollment and continuity in LCS.

Category	Subcategories	Transformative dimension	Excluding dimension
Enrollment and continuity in LCS	Interactions outside the classroom and school	2–38 mentions	1–1 mentions
	Successful educational activities	6–58 mentions	4–5 mentions
	2 subcategories	8–96 mentions	5–6 mentions

> "He [my neighbor] was talking about the dialogic literary gathering, I had no idea what it was, then my neighbor said, "next week there's going to be a dialogic literary gathering," I kept on thinking about that, "our dialogic literary gathering" then I said: "I'm going to see what it is." Then, that big room, [makes a gesture drawing a circle in the air, referring to the circle formed for the dialogue about the text shared in the DLG]... The group, each one reading a sentence... there are people who have a hard time reading, but we have to understand the other person's problem and show respect: "it's ok, you can do it," the teacher said. The group would say: "Take it easy that you can do it." There were so many different subjects I had never heard about, that I was listening and I thought it was very important! It's really cool... something I had never thought of, that I had never seen and didn't know what it was!" (Stu9_M.br.a._GC_2014)

In addition to staying in school, this man invited his wife to attend classes. She started coming with him.

About school continuity, another student commented on the interactive groups as the reason why she stayed in school:

> "For me, I wanted the interactive group every day in all subjects because we learn a lot more. The volunteers help, ask, help people teach themselves. Things I could not understand before, that didn't fit into my head, now I learned. The student explains, the volunteer asks and the teacher walks over to the desks. I always thought about dropping out... illness in the family, work, problems... But I thought about the [interactive] groups and I came. I did not miss many classes and now I'm going to graduate." (Stu3_W.br.a._GC_2014).

The mixed commissions, as successful educational activities involving the decision-making and evaluative participation of the community in the life of the school, were a privileged place to discuss the attraction of new students as a guarantee of their continuity in their studies.

The communicative encounters observed in 2014, for example, explicitly dealt with challenges to be overcome in the AED in general and in that particular community, making a dialogic recreation of successful educational actions through the dialogic contract of transforming the school (Padrós et al., 2011). One of the actions agreed upon and undertaken by the mixed commissions was proposed and developed by women, students and volunteers living in the neighborhood, raising the problem that many women in the neighborhood, mothers of

small children, do not have a place to leave their children while they go to class at night. In a dialogue held between all those present (students, volunteers, teachers, coordinators), they decided to mobilize volunteers who could develop activities with the children in the school cafeteria during their mothers' night classes. Thus, they got volunteers who, during the night period, began to support the children's school tasks, a capoeira master from the neighborhood who came to give classes to the children, and also students from the neighborhood high school who promoted a movie session followed by dialogues with the children. This allowed several women, who had dropped out of school, to return to school; others who were not yet students found out through the neighbors that there were such possibilities, and they enrolled for the first time.

Another action undertaken by the mixed commissions of 2014 was the creation, in 2015, of extended study time: 1 h before the beginning of classes, from 6 to 7 p.m., computer classes and groups to train reading and to study mathematics were offered in the tutored library (TL) and the English class group. These activities were open to students, their families and other people in the neighborhood (OC_14; OC_15).

The transformation of the conditions of entrance, continuity and participation in the school in the AED modality is evident from the school transformation into a LCS and the forms of participation that it promotes, coinciding with previous researches that verify such transformation (Diez et al., 2011; Braga and Mello, 2014; Garcia and Ríos, 2014).

But in addition to these actions, both in 2014 and 2015, the interviews from the testimonials, the Communicative daily-life stories and communicative focus groups revealed that two other elements were key to enrollment, continuity or return to school: the effective learning of contents and the atmosphere of solidarity in the school, both promoted by the SEAs developed in the LCS.

Regarding the elements indicated by the research participants as excluding elements, the references made were the following: when there are still conflicts between young people and adults in school, when teachers do not prepare the activities of the interactive groups within the allocated time frame, when some student disrespects a volunteer, or when a volunteer is not well-advised on how to perform the activity (GC_Tch_2014; GC_Stu_2014).

Learning in a LCS

Learning in the LCS of the AED of the "Walker" School, based on the students, teachers and volunteers, takes place in three different areas: one related to instrumental learning, concerning skills and knowledge related to teaching subjects such as reading, mathematics, English as foreign language, science, history, geography, and the arts; another concerning the skills and attitudes that strengthen the individual in the world, helping them to strengthen their families and the surrounding community, transforming situations, and, the last one, related to teacher training. Data are displayed in **Table 7**.

Regarding instrumental learning, learning how to read through moments of dialogic reading, as in the Dialogic Literary Gathering, the Tutored Library, the Interactive Groups, was frequently highlighted by students, teachers, and volunteers as educational actions that generate learning of instrumental aspects as well as of reading the world, coinciding with the results found in other studies (Flecha et al., 2008; Pulido and Zepa, 2010; Serrano and Mirceva, 2010; Mello et al., 2012). Expanding vocabulary, reading fluency, content comprehension, broadening the reading of the world were elements highlighted by all (GC_Tch_2014, GC_Tch_2014, GC_Stu_2014, GC_Stu_2015; GC_Vol_2014; GC_Vol_2015; Stu.3_W.br.a._ RC15; Stu.4_M.br.a._RC15; Vol.5_W.bl.a._RC16; Vol.6_W.br.a._RC16). The references to exclusionary elements concerned the lack of classical books for all students, and the little participation of some participants during the dialogic literary gatherings, not contributing to the themes discussed.

TABLE 7 | Transforming elements and exclusion elements related to learning in a LC school.

Category	Subcategories	Transformative dimension	Excluding dimension
Learning in LCS	Reading	4–31 mentions	2–3 mentions
	Mathematics	3–8 mentions	0
	English	2–3 mentions	1–1 mentions
	Other subjects	3–12 mentions	1–1 mentions
	Personal empowerment	2–23 mentions	0
	Strengthening the family and community	1–4 mentions	0
	Educating teachers	3–16 mentions	2–2 mentions
	7 subcategories	18–97 mentions	6–7 mentions

Mathematics learning had eight references to the three transformative elements brought in through the interactive groups: losing the fear of numbers, learning to think, and learning to move from "counting numbers in the mind" to learning to count using paper. (GC_Stu_2014, GC_Stu_2015), coinciding with research carried out in the Spanish context (Díez-Palomar et al., 2010).

Related to the interactive groups, the type of learning and interaction promoted by this successful educational action coincides with previous research carried out in Spain (Valls and Kyriakides, 2013) and in Brazil (Mello, 2012). In the case of the AED in the "Walker" School, the effect on students' learning and self-esteem is illustrated by the following statement:

> "I was a janitor here [at the "Walker" School], and I did not want to study because I had little time, but I ended up wanting to study because I saw that the [interactive] group helped a lot and I saw that folks really learned there. (...) when there is this group that comes to help us, it's better, because communication, dialogue with each other is very different, I was really encouraged, I learned, thank God, my grades improved." (Stu.5._W.br.a._GC14).

English as foreign language classes were highlighted as a benefit to understanding music and posters, as well as developing interest in other languages; but a participant indicated that another group should be created for those who had already completed the initial class, otherwise their learning would not advance (GC_Stu.5_W.br.a._2014). Among the other subjects, the interactive groups were again highlighted as a way to realizing a dream of teaching and learning sciences by conducting experiments, developing geography classes using computers, and learning history through dialogue and reflection (GC_Tch4.W.w.a._2014).

In the interactive groups, the exclusionary element mentioned concerns the inappropriate behavior of a young volunteer that could impair student learning, that included lack of attention in conducting activities and harassment of young girls (GC_Tch_2015).

In terms of the learning attitude regarding the world and personal attitudes, family and community empowerment, both students and volunteers from the surrounding community have often mentioned processes benefitted by their participation in successful educational activities. A 15-year-old girl, a former daytime student at the school said:

> "I think it's important to be part of the volunteer work, because it's cool, we are more interested in the lesson, you can talk to the students, there are also students who come here to talk to us, to say hello. The teachers help us, there are lessons that I can't even remember, the teachers then explain. There is a lot. My sister has already been a volunteer with me, we have already participated in almost everything, we participated in everything here in school, I really liked it, and God willing next year I'll be here again." (Vol.1_W.br.y._GC15)

The volunteers' learning, both in content and in their attitude toward the situations revealed in this research, coincide with research results carried out in Brazil with volunteers from children's schools, that is, that there are benefits and personal learning for the volunteers (Mello et al., 2012).

With regard to teacher training, training in successful educational activities was pointed out as a differential for improving the quality of knowledge and activities in school and in the profession. The format of dialogic pedagogical gathering and workshops of interactive groups and of teacher and volunteer groups deepen teacher knowledge. The turnover of teachers and the lack of interest of a new teacher who arrives at the school, about knowing the successful educational actions, are obstacles to the success of students' learning (GC_Tch4; GC_Tch8).

LCS Interaction

Learning and interacting in a LCS were two categories that appeared in the data in a very coherent manner, although with certain particularities. Learning is possible because solidarity is established among the LCS participants, improving interaction among all. Nevertheless, there were themes regarding interaction that were emphasized. The principle of equality of differences, which presupposes egalitarian dialogue among the different so that everyone can learn and consensus regarding the actions, was a strong axis perceived, considering: different religions, the presence of homosexual, and transgender students in school, different political views, interaction between young people and adults, machismo, and racism. **Table 8** shows the frequency of references to those elements that appeared in the Communicative daily-life stories, in the focal groups or in the interviews referring to these subcategories.

TABLE 8 | Transforming elements and excluding elements regarding interaction in LCS.

Category	Subcategories	Transformative dimension	Excluding dimension
Interaction in LCS	Religious	1–4 mentions	1–2 mentions
	Gender	2–5 mentions	2–4 mentions
	Social questions and political views	1–1 mention	0
	Generational	2–10 mentions	1–17 mentions
	Racial, ethnic	1–3 mentions	11 mention
	5 subcategories	7–23 mentions	5–24 mentions

As for religion, at school, there often had been clashes between people of different faiths. After being transformed into a LCS, where the moderations and activities are guided by the principles of dialogic learning, the reports of students indicate that interaction has improved; in the direction of a "new multicultural laity" (De Botton and Pulido-Rodríguez, 2013), each person explains their own view and others ask what they do not understand and then expose their point of view with respect; but there are still some in school who are intransigent and who close themselves to different religious views and choices that are different from the ones they hold. This was also pointed out about gender diversity, that is, issues regarding gays, lesbians and transgender students in the school.

The following transcript of a part of a communicative observation from the Dialogic Literary Gathering, with the book "The Metamorphosis," by Franz Kafka, illustrates what is stated here.

> The teacher begins the meeting by indicating where the discussions had stopped at the previous meeting: the comparison one participant made between the family relationship with Gregor, the character who becomes an insect, and that of a friend of hers with a homosexual grandson. The participant then narrates the following:
>
> "It was me. That's what I experienced. I went to my friend's house and in the circle we formed in the backyard of her house, her grandson appeared dressed as a woman and asked to be blessed: "Bless me grandmother." She humiliated the boy, saying that he was no longer her grandson, that a man dressed as a woman was a sin. I thought what she did was awful. He has the right to choose. The family has to understand!" (Stu1._W.br.a._OC_DLG _2015).

As the conversation continued, another lady asks to speak and says:

> "But it's in the bible, it's a sin for a man to want to be a woman. I would not accept it! It's a sin!" (Stu2._W.br.a._OC_DLG _2015).

Then a young man asks to be heard and argues:

> "I talked about this with a friend the other day. I'm not gay and I'm not encouraging anyone, but if I have a son or daughter who is gay or lesbian, I will not expel them from the house, I will support them!" (Stu6._M.bl.y._OC_DLG _2015).

> And addressing Stu.2, he asks, "If your son or daughter were gay, would you expel him or her from your house? I would like to understand this." (Stu6._M.bl.y._OC_DLG _2015). After thinking about it, Stu6. replies, "No, I would not" (Stu2._W.br.a._OC_DLG _2015).

> The teacher (Tch1_M.w.a_OC_DLG_2015) who was mediating the DLG asks if the students had the opportunity to search, to look for information about the doubt they had at the previous meeting about whether being gay is a choice, or sexual orientation. Faced with the negative reaction of the class, he says that he researched this and that he brought material organized by the LGBT movement of the city and asks if he can read the passage that refers to such a doubt. The group consents and listens to the reading. (OC_DLG _2015).

Thus, in an egalitarian dialogue, seeking the instrumental dimension of learning about the themes, the students are educated in the interaction between what is different. Successful educational actions, based on the principles of dialogic learning, create a space for respectful and profitable interaction, that is, one that promotes learning, reflection and transformation. In both the above topics and in the questions of generational, gender, cultural, political-partisan differences, dialogues are established. No one needs to agree with the other, but they must consider that the other can think and live different from how they live or think; the ethical limit of differences in dialogic learning is found in human rights (Valls and Munté, 2010).

In face of age-related, sexist, homophobic or racist prejudice that occurs in school, even after its transformation into LCS, the general coordinator explains that talks directly with the aggressor and limits his or her actions in this respect (GCoord._M.w.a_ CI_15). An example of intervention was observed by the research team when, in 2014, one of the students (Stu7_M.w.s_14) in the interactive groups refused to sit in the groups that included a young black female volunteer (Vol.5_W.bl.y), because for him, "a black and young woman would know nothing." Faced with the racist act, the general coordinator had a conversation with this student indicating that it was racism and that this was inadmissible (OC_2014). During this period, an intervention of a volunteer of the neighborhood (Vol.3_W.bl.a.) was carried out with this man (Stu7_M.w.s), in a mixed commission meeting: Stu_7.M.w.s claimed that adult men should beat youngsters who fooled around in class so they would should a better behavior; Vol.3_W.bl.s. intervened to indicate that conflicts should be handled through dialogue, not violence. And the discussion moved on for the next argument (OC_2014).

In the communicative interview held in early 2016, the general coordinator of the AED at the "Walker" School, when reviewing the previous year and thinking about the planning for the new year, indicated that the dialogic model of conflict prevention and resolution (Oliver, 2014) would have to be put into operation (GCoord._M..w.a._CI.16).

As a final result of the research, at the end of the process of dialogical analysis extracted from the data, it can be stated that teachers, students and volunteers approved and recommend the transformation of the AED into LCS, confirming the advances made possible by the successful educational actions in LCS.

AED teachers from the "Walker" School, students and volunteers that participated in the research agree that LCS and SEAs apply perfectly to the context of school and Brazil and recommend that other schools should be transformed. Volunteers and students are unanimous in this statement and also point out that elementary schools and high schools also need to be transformed to improve and guarantee a high-quality learning environment for all (GC_Tch_2014, GC_Tch_2015, GC_Stu_2014, GC_Stu_2015, GC_Vol._2014, GC_Vol._2015).

In the case of teachers, they add that in the process of expansion and transformation of schools as LCS in Brazil, educators, governments and researchers must:

> "- Ensure that teachers understand how the community participates in school life;
> - Explain in detail that it is not an imposed or fragmented project. Teachers have to really want to transform the school;
> - Explain that the participation of volunteering lies within another meaning from that advertised by the media in the country, that is, in learning communities, volunteering helps to generate a sense of community awareness and a learning possibility; it energizes, it does not teach; it does not replace the teacher or other professionals;
> - Promote volunteer training and that the teacher guide their participation appropriately;
> - Training workshops for AEE, for teachers, volunteers and students;
> - Create a database of activities for interactive groups and interaction forum involving the teachers of learning communities;
> - Direct support from the coordination in the classroom to show how to implement SEAs." (GC_Tch_2014).

In short, as it can be seen, the transformation of the AED segment into LCS is confirmed as a proposal that generates learning, motivation and a positive environment in school, articulating different expectations of adult life. The transfer of practices based on scientific evidence, while meeting the objective of effectiveness, fairness and solidarity in the humanities, is not only desirable, but also possible.

DISCUSSION

As it had already being found in previous research conducted by NIASE/UFSCar in Brazilian schools for children and adolescents that were transformed into LCS, the effectiveness of LCS for AED in the Brazilian context was supported. In the AED, recreating the LCS transformation and development processes

was done through meeting the previous knowledge about the SEAs, identified and endorsed by the international scientific community, to the knowledge and needs expressed by the groups involved, looking into how to develop the activities within that specific context in order to improve the living conditions of the community involved. Among different agents (students, community, teachers, managers, researchers), the different voices speak for themselves and, in an egalitarian dialogue, establish the best ways to achieve the desired ends, that is, teleological action is mediated by communicative action, as discussed by Habermas (1987) in his Theory of Communicative Action. The dream phase allows an abundance of goals aimed at maximum learning by everyone and the improvement of interactional diversity; the selection phase of priorities and planning ensures to establish the agreements regarding the steps and way forward; the mixed commissions carry out the monitoring, evaluation and redirection, if necessary, of the action plan directed toward the dreams. Such a process of permanent dialogue between the voices of the community, the phases of transforming the school into LCS and the Successful Educational Actions are referred to as the dialogic contract of transformation (Padrós et al., 2011).

Both the increase in enrollments and the decrease in dropout rates recorded during the years studied in the AED of the "Walker" School were possible because the school performed SEAs and was a LCS. To that end, the participation of the community and students was fundamental in the evaluation, educational and decision-making processes, as designed in the SEAs and in the process of transformation and maintenance of a LCS.

In the mixed commissions, the students, together with volunteers and teachers, were able to evaluate the problems they faced at this time and, in consensus, generate actions to confront them. In the dialogic literary gathering groups, in the interactive groups and in the extended study time, students found support from teachers and volunteers and constituted solidarity and respectful interaction among everyone.

The transformation principle, that integrates the dialogic learning concept, must also be highlighted. As an element of external transformation, i. e., the transformation of the surrounding and the interactions, the transformation in the quality of the interactions between family and within school is present in the testimonies of the different participants. Respect to diverging thinking, solidarity toward others, improvement of service and of activities in school are good examples of it. Having volunteers offering activities to female students' children, provided these women the opportunity to resume studying. Mixed commissions were privileged situations to observe external transformation. Through egalitarian dialogue and pursuit for the validity of arguments, it was possible to observe what Freire (2001) describes as *transforming challenges into possibilities*.

It was also possible to observe internal transformation, i.e., the one that occurs within each person, changing what they used to think and feel, turning themselves more aware of the inequalities and differences, and behaving more coherently toward the construction of a world that overcomes inequalities and violence. The dialogues witnessed in the dialogic literary gatherings referred to deep self-reflection related to themes such as gender violence, racism and religious tolerance. However, it was in the interactions, in Dialogic Literary Gatherings as well as in other SEAs, that it was possible to observe the development of respectful posture and listening attitude, of courage to read out loud in front of others, of solidarity and care toward people.

One aspect that is of high importance to consider in this topic is that not everyone who was observed and listened to have changed their racist, violent and excluding beliefs, as was the case of Stu_7M.w.s. In his communicative daily-life story, it was possible to observe that his former life in the condition of homelessness had been of great suffering and exclusion, and seemed to drive him to wish doing to others the same cruelty of which he himself had been a victim in his youth. The time he had been in the school seemed insufficient to mobilize in him other possibilities of feelings, thoughts and action. Nonetheless, the boundaries stablished by the professionals, the students and the volunteers for his speech of racism, homophobia and against the younger students. We should not wait for everyone to have changed before we can socially stablish the limits for shared living, mainly since, as pointed out by Vygotski (1995), intrapersonal development depends on the interpersonal interactions. Therefore, changing the interactive context is the chance to change thought and feeling.

Given what has been so far exposed, we can state that the transfer of LCS to the AED modality in Brazil is possible and produces the necessary results. The presence of the voice of all educational agents in deliberately designed, studied, and proven processes highlights the dialogic contract of transformation (Padrós et al., 2011) as an instrument that associates science and dreams; global and local; universal and particular, elements that are present in the current context.

CONCLUSION

The study presents elements for the comprehension and analysis of how the transformation of AED modality into LCS, and the development of SEAs within them, can provide effective support for the improvement on students' learning and interaction between all, guaranteeing participation and continuity of young and adult learners in school. Efficacy and social cohesion clearly emerged in the data as factors promoted by LCS and SEAs. Regarding equity, considered to be a learning improvement by all students, considering specifically individuals from historically excluded groups, it was also successful, for guaranteeing learning for youth and adults. However, regarding blacks and women, two of the groups most affected by inequality in Brazil, it is necessary to conduct future research in order to compare the performance of all the classes to verify if equity is achieved.

We consider that the findings are, on the one hand, highly dependent on the specific context of "Walker" School, considering the atmosphere stablished between the team of professionals in AED, but on the other hand, there are signs that the dynamics provided by the SEAs was what permitted the improvement in participation, learning and interaction between

all in the school. As mentioned before, the professional team ate the school was already united prior to the transformation into LCS, what certainly favored such transformation and the implementing of SEAs. As a consequence of implementing those actions, it was possible to observe an increase in enrollment, a decrease in dropouts and conflicts and a successful management of difficult situations experienced in the school. Such findings coincide with those encountered in children LCS in Brazil (Mello et al., 2012).

Comparing the results that indicate positive aspects of the AED transformed into LCS to results in other studies about other successful AED schools in Brazil (Silva et al., 2012) it is possible to affirm that they coincide in some aspects and that they go beyond others.

Though coincidence between studies was observed, they could be more intensely noticed in the learning community regarding the following aspects: (a) school management oriented toward learning, with contact mechanisms with students that began missing classes, (b) appreciation, from the school staff, of teaching and learning processes, specially reading and writing, (c) a welcoming environment, bonding between professionals and students, and high expectation toward students.

As for the elements identified in the LCS which were not found in the other Brazilian studies, there were: (a) increase in enrollment over time and decrease in student dropout rates over the school year, and (b) overcoming dramatic situations experienced in the neighborhood and in the school that, at first, could lead to school dropout.

If we compare the data to those presented by Di Pierro et al. (2017) regarding AED-exclusive schools in the state of São Paulo, we can find even more reasons to argue in favor of the transformation of AED into LCS. The AED-exclusive schools analyzed by Di Pierro et al. (2017) present several advantages related to the available structure, such as more hours for the teachers to stay in the school, activities offered all throughout the day and evening and more adult-appropriate organization of environments and materials. Nonetheless, such schools still face a restricted participation of students in decision-making processes. The authors point out that "there is practically no participation of students in the centers' management" and that, although each of the four AED centers is in a different stage of development, it is possible to affirm that "the pedagogical practices are typical of what Freire called banking model of education" (Di Pierro et al., 2017, p. 133)

The design of the transformation process of a school into LC and of the SEAs, attested in the large-scale research titled INCLUD-ED, seems to provide instruments and courses of action for professionals in the AED that go beyond discourse, intension and experimentation, based on the dialogic education or popular education adopted in Brazil. In that sense, we suggest that the project of LCS could be proposed to an AED-exclusive center and study the transformation that follows.

Identified limiting factors for the research were the fact that it was restricted to only one AED Brazilian school and that it was not possible to analyze in detail if, and how, internal equity is being guaranteed. It was also not possible to analyze the sustainability elements of the project. We recommend for future studies to analyze such aspects, involving schools in different regions of the country and focusing and making use of specific instruments to analyze learning and paths trailed by different groups, with special attention to black people and women.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of MINISTÉRIO DA SAÚDE—Conselho Nacional de Saúde—Comissão Nacional de Ética em Pesquisa—CONEP guidelines, MINISTÉRIO DA SAÚDE—Conselho Nacional de Saúde—Comissão Nacional de Ética em Pesquisa—CONEP. The protocol was approved by the MINISTÉRIO DA SAÚDE—Conselho Nacional de Saúde—Comissão Nacional de Ética em Pesquisa—CONEP. All subjects gave written informed consent in accordance with the Declaration of Helsinki.

AUTHOR CONTRIBUTIONS

RM and FB both contributed significantly to the design of the study, the data collection and analysis. RM wrote most of the manuscript but FB critically revised important parts of the manuscript.

FUNDING

Our thanks to CNPq - This research was funded by CNPq - Brazilian Ministry of Science, Technology, Innovations and Communications with financial resources for research (CNPq: 409794/2013-9) and with scholarship for RM (Bolsa Produtividade em Pesquisa - CNPq - 311372/2014-7).

ACKNOWLEDGMENTS

Our thanks to the data collection team and to the teachers, students, and school volunteers. Our thanks to Beverly Victoria Young for the professional translation of the text from Portuguese to English. Our thanks to Bruno Cortegoso Prezenszky, member of the research team, for both translation of addendums made for the final version of the text and for the final language review of the full text.

REFERENCES

Akello, J. A., Lutwama-Rukundo, E., and Musiimenta, P. (2017). Functional adult literacy: an alternative gateway to grassroots women's improved income generation in Lango Subregion, Northern Uganda. *Adult Educ. Q.* 67, 79–96. doi: 10.1177/0741713616685143

Andrews, G. R. (2014). Racial inequality in Brazil and the United States, 1990-2010. *J. Soc. Hist.* 47, 829–854. doi: 10.1093/jsh/shu026

Aubert, A., Flecha, A., García, C., Flecha, R., and Racionero, S. (2016). *Aprendizagem Dialógica na Sociedade da Informação*. São Carlos: EdUFSCar.

Beck, U. (1992). *Risk Society: Towards a New Modernity*. London: SAGE.

Boyadjieva, P., and Ilieva-Trichkova, P. (2017). Between Inclusion and Fairness. Social justice perspective to participation in adult education. *Adult Educ. Q.* 67, 97–117. doi: 10.1177/0741713616685398

Braga, F. M. (2008). *Comunidades de Aprendizagem: Uma Única Experiência em dois Países (Brasil e Espanha) em Favor da Participação da Comunidade na Escola e da Melhoria da Qualidade do Ensino*. [Tese de Doutorado], Universidade Federal de São Carlos.

Braga, F. M., and Mello, R. R. (2009). Comunidades de aprendizagem: buscando relações mais dialógicas e aprendizagens mais efetivas entre todos/as. *Teoria Prátic. Educ.* 12, 289–301.

Braga, F. M., and Mello, R. R. (2014). Comunidades de Aprendizagem e a participação educativa de familiares e da comunidade: elemento-chave para uma educação de êxito para todos. *Educacao Unisinos* 18, 165–175. doi: 10.4013/edu.2014.182.07

Brasil (2014a). *Ministério da Educação e Cultura. Relatório Educação para todos no Brasil 2000-2015*. Versão Preliminar. Brasília: Ministério da Educação e Cultura. Available online at: http://portal.mec.gov.br/index.php?option=com_docman&view=download&alias=15774-ept-relatorio-06062014&Itemid=30192

Brasil (2014b). *Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise de Situação em Saúde. Saúde Brasil 2013: Uma Análise da Situação de Saúde e das Doenças Transmissíveis Relacionadas à Pobreza / Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Análise de Situação em Saúde*. Brasília: Ministério da Saúde, 384.

Brasil (2017). *Presidência da República. Secretaria de Governo. Índice de vulnerabilidade juvenil à violência 2017: Desigualdade Racial, Municípios com mais de 100 mil Habitantes / Secretaria de Governo da Presidência da República, Secretaria Nacional de Juventude e Fórum Brasileiro de Segurança Pública*. São Paulo: Fórum Brasileiro de Segurança Pública, 87.

Chadarevian, P. C. (2011). Para medir as desigualdades raciais no mercado de trabalho. *Rev. Econ. Política* 31, 283–304. doi: 10.1590/S0101-31572011000200007

Constantino, F. L., Marigo, A., and Moreira, R. (2011). Aprendizagem dialógica: base para educação e a transformação social no Brasil. *Multidisc. J. Edu. Res.* 1, 53–78. doi: 10.4452/remie.2011.03

De Botton, L., Girbes, S., Ruiz, L., and Tellado,I. (2014). Moroccan mothers' involvement in dialogic literary gatherings in a Catalan urban primary school: increasing educative interactions and improving learning. *Improv. Schools* 17, 241–249. doi: 10.1177/1365480214556420

De Botton, L., and Pulido-Rodríguez, M. A. (2013). Une nouvelle laïcité multiculturelle. *Int. Multidisc. J. Soc. Sci.* 2, 236–256. doi: 10.4471/rimcis.2013.23

De Carvalho, M. M., and Waltenberg, F. D. (2015). Desigualdade de oportunidades no acesso ao ensino superior no Brasil: uma comparação entre 2003 e 2013. *Econ. Aplicada* 19, 369–396. doi: 10.1590/1413-8050/ea124777

De Haan, A., and Thorat, S. (2012). Addressing group inequalities: social policies in emerging economies great transformation. *Eur. J. Dev. Res.* 24, 105–124. doi: 10.1057/ejdr.2011.42

Di Pierro, M. C. (2000). Evolução recente da educação de pessoas adultas na Espanha. *Rev. Educ. Soc. Campinas* 31, 233–252. doi: 10.1590/S0101-73302000000300012

Di Pierro, M. C., Kuhn, A., Cruz, B., Tsuchya, B., and Batistão, M. (2017). *Um Estudo Centros Públicos de Jovens e Adultos no Estado de São Paulo*. São Paulo: FEUSP- FAPESP, 148.

Diez, J., Gatt, S., and Racionero, S. (2011). Placing immigrant and minority family and community members at the School's centre: the role of community participation. *Eur. J. Edu.* 46, 184–196. doi: 10.1111/j.1465-3435.2011.01474.x

Díez-Palomar, J., Rosell, L., Wehrle, P., and Brown, J. (2010). Matemàtiques i grups interactius: ensenyament i aprenentatge des del punt de vista de les interaccions. *Temps Educ.* 38, 153–165.

Elboj, C., Puigdellívol, I., Soler, M., and Valls, R. (2002). *Comunidades de Aprendizaje – Transformar la Educación, 1st Edn*. Barcelona: Graó.

Elster, J. (1998). *Deliberative Democracy*. Cambridge: Cambridge University Press.

Flecha, R. (1997). *Compartiendo Palabras, 1st Edn*. Barcelona: Paidós.

Flecha, R. (2015). *Successful Educational Action for Inclusion and Social Cohesion in Europe*. Springer Publishing Company. Available online at: http://link.springer.com/chapter/10.1007/978-3-319-11176-6_4

Flecha, R. (2017). *Social Impact of Community-Based Educational Programs in Europe*. Oxford Research Encyclopedia of Education; Education and Society. Available online at: http://education.oxfordre.com/view/10.1093/acrefore/9780190264093.001.0001/acrefore-9780190264093-e-184

Flecha, R., Gómez, A., and Latorre, A. (2009). Participacion en escuelas de exito: una investigacion comunicativa del proyecto Includ-edParticipation in successful schools: a communicative research study from the Includ-ed Project. *Cultura Educ.* 21, 183–196. doi: 10.1174/113564009788345899

Flecha, R., and Mello, R. R. (2012). A formação de educadoras e educadores para um modelo social de educação de pessoas jovens e adultas: perspectiva dialógica. *Revista FAEEBA* 20, 1–16.

Flecha, R., and Puigvert, L. (2005). Formación del profesorado en las comunidades de aprendizaje Revista Colombiana de Educación. *Universidad Pedagógica Nacional Bogotá* 48, 12–36.

Flecha, R., and Soler, M. (2013). Turning difficulties into possibilities: engaging Roma families and students in school through dialogic learning. *Cam. J. Educ.* 43, 451–465. doi:10.1080/0305764X.2013.819068

Flecha, R., Soler, M., and Valls, R. (2008). Lectura dialógica: interacciones que mejoran y aceleran la lectura. *Revi. Iberoamericana Educ.* 46, 71–87.

Freire, P. (1987). *Pedagogia do Oprimido. 17ª Edição.* Rio de Janeiro: Paz e Terra, 184.

Freire, P. (2001). *À Sombra desta Mangueira*. São Paulo: Editora Olho D'Água, 120.

Friedrich, M., Benite, A., Benite, C., and Pereira, V. (2010). Trajetória da escolarização de jovens e adultos no Brasil: de plataformas de governo a propostas pedagógicas esvaziadas. *Ensaio* 18, 389–410. doi: 10.1590/S0104-40362010000200011

Garcia- Carrion, R., Gomez, A., Molina, S., and Ionescu, V. (2017). Teacher Education in Schools as Learning Communities: transforming high-poverty schools through dialogic learning. *Austr. J. Teach. Educ.* 42, 44–56. doi: 10.14221/ajte.2017v42n4.4

Garcia, L., and Ríos, O. (2014). Participation and family education in school: successful educational actions. *Stud. Educ. Adults* 46, 177–191. doi: 10.1080/02660830.2014.11661665

Gatt, S., Ojala, M., and Soler, M. (2011). Promoting social inclusion counting with everyone: learning Communities and INCLUD-ED. *Int. Stud. Sociol. Educ.* 21, 33–47. doi: 10.1080/09620214.2011.543851

Giddens, A. (1991). *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Cambridge: Polity.

Gomes, C. A., Coelho, S. R., and Lima, L. C. (2017). Ser ou não ser estudante da educação de adultos no Brasil. *Rev. Int. Educ. Adultos* 39, 10–28. Available online at: http://www.redalyc.org/jatsRepo/4575/457555939002/457555939002.pdf

Gómez, A., Puigvert, L., and Flecha, R. (2011). Critical communicative methodology: Informing real social transformation through research. *Qual. Inquiry* 17, 235–245. doi: 10.1177/1077800410397802

Gómez, J., Latorre, A., Sánchez, M., and Flecha, R. (2006). *Metodologia Comunicativa Crítica, 1st. Edn.* Barcelona: El Roure.

Habermas, J. (1987). *The Theory of Communicative Action. V. 2. Lifeworld and System: A Critique of Functionalist Reason*. Boston, MA: Beacon Press.

Ibge – Instituto Brasileiro de Geografia e Estatística (2017). *PNAD Contínua 2016: 51% da População com 25 Anos ou Mais do Brasil Possuíam Apenas o Ensino Fundamental Completo*. Agência de Notícias IBGE. Available online at: https://agenciadenoticias.ibge.gov.br/agencia-noticias/2013-agencia-de-noticias/releases/18992-pnad-continua-2016-51-da-populacao-com-25-anos-ou-mais-do-brasil-possuiam-apenas-o-ensino-fundamental-completo.html

Inep - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira (2017). *Sinopse Estatística da Educação Básica 2017. Ministério da Educação*. INEP: Diretoria de Estatísticas Educacionais. Brasília. Available online at: http://inep.gov.br/sinopses-estatisticas-da-educacao-basica

Ipea-Instituto de Pesquisa Econômica Aplicada (2015). *Retrato das desigualdades de gênero e raça. 4ª ed. – Brasília, 39 p.: il. Com a participação de: ONU Mulheres, Secretaria de Políticas para as Mulheres (SPM), Secretaria de Políticas de Promoção da Igualdade Racial (Seppir)*.

Mead, G. (2010). *Espíritu, Persona y Sociedad: Desde el Punto de Vista del Conductismo Social. 1ª Edn, 10ª*. Impresión. 403.

Mello, R. R. (2002). *Comunidades de Aprendizagem: Contribuições Para a Construção de Alternativas Para Uma Relação Mais Dialógica Entre a Escola*

e Grupos de Periferia Urbana. Barcelona: Centro de Investigação Social e Educativa (CREA), Universidade de Barcelona, (Relatório de Pós-Doutorado, FAPESP).

Mello, R. R. (2005). Comunidades de Aprendizaje: para democratizar las relaciones entre escuela y la comunidad. *Educ. Hoy* 1, 9–36.

Mello, R. R. (2007). *Comunidades de Aprendizagem: Aposta na Qualidade da Aprendizagem, na Igualdade de Diferenças e na Democratização da Gestão da Escola. Projeto e Relatório de Pesquisa*. São Paulo: FAPESP and CNPq. Available online at: http://www.bv.fapesp.br/pt/auxilios/31200/comunidades-de-aprendizagem-aposta-na-qualidade-de-aprendizagem-na-igualdade-de-diferencas-e-na-de/

Mello, R. R. (2009). Dialogo y escuela en Brasil: comunidades de aprendizaje Dialogue and school in Brazil: learning communities. *Cultura Educ*. 21, 171–181. doi: 10.1174/113564009788345871

Mello, R. R. (2012). From constructivism to dialogism in the classroom. Theory and learning environments. *Int. J. Educ. Psychol.* 1, 127–152. doi: 10.4471/ijep.2012.08

Mello, R. R., Braga, F. M., and Gabassa, V. (2012). *Comunidades de Aprendizagem: Outra Escola é Possível*. São Carlos: EDUFSCar.

Mello, R. R., and Elboj, C. (2004). Comunidades de Aprendizaje: alternativa para relaciones entre escuela y grupos de periferia urbana en Brasil. *Encuentros Psicol. Soc. Málaga Espanha* 2, 64–67.

Mello, R. R., and Larena, R. (2009). Pedagogía comunicativo-crítica en los centros educativos. *Teoría Educ.* 10, 119–140.

Morlà, T. (2015). Comunidades de Aprendizaje, un Sueño que hace más de 35 años que Transforma Realidades. *Soc. Educ. History* 4, 137-162. doi: 10.17583/hse.2015.1496

Oliver, E. (2014). Zero violence since early childhood the dialogic recreation of knowledge, *Qual. Inquiry* 20, 902–908. doi: 10.1177/1077800414537215

Padrós, M., García, R., De Mello, R., and Molina, S. (2011). Contrasting scientific knowledge with knowledge from the lifeworld: the dialogic inclusion contract. *Qual. Inquiry* 17, 304–312. doi: 10.1177/1077800410397809

Pierro, M. C. D., and Haddad, S. (2015). Transformações nas políticas de Educação de Jovens e Adultos no Brasil no início do terceiro milênio: uma análise das agendas nacional e internacional. *Cadernos CEDES* 35, 197–217. doi: 10.1590/CC0101-32622015723758

Pulido, C., and Zepa, B. (2010). La interpretación interactiva de los textos a través de las tertulias literarias dialógicas. *Signos* 43, 295–309. doi: 10.4067/S0718-09342010000400003

Ríos, O., Herrero, C., and Rodríguez, H. (2013). From access to education. The revolucionary Transformation of Schools as Learning Communities. *Int. Rev. Qual. Res.* 6, 239–253. doi: 10.1525/irqr.2013.6.2.239

Salvato, M. A., Ferreira, P. C. G., and Duarte, A. J. M. (2010). O impacto da escolaridade sobre a distribuição de renda. *Estudos Econômicos (São Paulo)*. 40, 753–791. doi: 10.1590/S0101-41612010000400001

Sánchez-Arouca, M. (1999). Voices inside schools - la verneda-sant martí: a school where people dare to dream. *Harv. Educ. Rev.* 69, 320–335. doi: 10.17763/haer.69.3.gx588q10614q3831

Serrano, M., and Mirceva, J. (2010). Dialogic imagination in literacy development. *J. Psychodidact.* 15, 191–205. doi: 10.1387/RevPsicodidact.820

Silva, J. L., Bonamino, A. M. C., and Ribeiro, V. M. (2012). Escolas eficazes na educação de jovens e adultos: estudo de casos na rede municipal do Rio de Janeiro. *Educ. Rev.* 28, 367–392. doi: 10.1590/S0102-46982012000200017

Tellado, I., Serrano, M. A., and Portell, D. (2013). The achieved dreams of a neighborhood. *Int. Rev. Qual. Res.* 6, 289–306. doi: 10.1525/irqr.2013.6.2.289

Unesco - United Nations Educational Scientific and Cultural Organization (2016). *3 Global Report on Adult Learning and Education (III Grale)*. Hamburg: UNESCO Institute for Lifelong Learning Feldbrunnenstraße 58 20148. Available online at: https://unesdoc.unesco.org/ark:/48223/pf0000245917

Valls, R., and Kyriakides,. L. (2013). The power of interactive groups: how diversity of adults volunteering in classroom groups can promote inclusion and success for children of vulnerable minority ethnic populations. *Cam. J. Educ.* 43, 17–33. doi: 10.1080/0305764X.2012.749213

Valls, R., and Munté, A. (2010). Las claves del aprendizaje dialógico en las Comunidades de Aprendizaje. *Rev. Int. Form. Profesorado* 64, 11–15.

Vygotski, L. (1995). *Pensamiento y Lenguaje*. Barcelona: Paidós.

Vygotski, L. (2008). *El Desarrollo de los Procesos Psicológicos Superiores, 2nd Edn*. Barcelona: Crítica, Biblioteca de Bolsillo.

Wood, C. H., De Carvalho, J. A. M., and Horta, C. J. G. (2010). The color of child mortality in brazil, 1950-2000: social progress and persistent racial inequality. *Lat. Am. Res. Rev.* 45, 114–139.

Yin, R. K. (1994). *Case Study Research: Design and Methods, 2nd Edn*. Newbury Park, CA: Sage Publications.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Education

METHODS
published: 19 February 2019
doi: 10.3389/feduc.2019.00009

Reaching Social Impact Through Communicative Methodology. Researching With Rather Than on Vulnerable Populations: The Roma Case

Aitor Gómez[1], María Padrós[2], Oriol Ríos[3], Liviu-Catalin Mara[4] and Tepora Pukepuke[5]*

[1] Department of Pedagogy, Faculty of Psychology and Educational Sciences, Universitat Rovira i Virgili, Tarragona, Spain, [2] Department of Didactics and Educational Organization, Faculty of Education, University of Barcelona, Barcelona, Spain, [3] Department of Pedagogy, Faculty of Psychology and Educational Sciences, Universitat Rovira i Virgili, Tarragona, Spain, [4] Business Management Department, Business and Economy Faculty, Universitat Rovira i Virgili, Tarragona, Spain, [5] Te Ōhanga Mataora, School of Undergraduate Studies, Te Whare Wānanga o Awanuiārangi, Whakatane, New Zealand

Communicative methodology has been acknowledged as having an impact at all levels: social, political, and scientific. The social impact is achieved with communicative methodology by involving the people or communities we intend to study from the beginning to the end of the research. There are positive benefits to those involved, which increases the impact. Therefore, communicative methodology enhances the potential of stakeholders (including those traditionally excluded) for social transformation through the use of egalitarian dialogue. Additionally, those stakeholders co-lead the research and promote change in their own social environments because of their inclusion in all stages of the research process. The theoretical basis of communicative methodology led to the assumption of postulates that enable social transformation. Researchers, taking into account the theoretical principles and postulates, interpret reality through dialogic knowledge while researching with vulnerable populations. This article illustrates how it is possible to attain social impact using communicative methodology in diverse contexts and points out how the communicative organization of research and the communicative analysis of data can be decisive in attaining social impact. Such change contributes to the social and educational transformation of reality and to improving the lives of vulnerable populations.

Keywords: communicative methodology, social impact, social transformation, vulnerable populations, diversity

OPEN ACCESS

Edited by:
Roseli Rodrigues De Mello, Federal University of São Carlos, Brazil

Reviewed by:
Gresilda Anne Tilley-Lubbs, Virginia Tech, United States
Daniel Johnson, Universidad de Chile, Chile

****Correspondence:***
Aitor Gómez
aitor.gomez@urv.cat

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *26 May 2018*
Accepted: *29 January 2019*
Published: *19 February 2019*

Citation:
Gómez A, Padrós M, Ríos O, Mara L-C and Pukepuke T (2019) Reaching Social Impact Through Communicative Methodology. Researching With Rather Than on Vulnerable Populations: The Roma Case. Front. Educ. 4:9. doi: 10.3389/feduc.2019.00009

INTRODUCTION

In the past few years, we have witnessed growing demands from governments and society for sciences to demonstrate the benefits they provide to society as a whole. Scientists are increasingly encouraged to share the impact of their research on people's everyday lives. In the case of research concerning vulnerable populations, to attain project funding, researchers should show how such research has generated results, and benefits Important to such accountability is the highlighting

of achievements that would not have occurred had the funds been appropriated by existing organizations or current policies targeted at these populations.

This article illustrates how social impact is embedded in communicative methodology when researching with vulnerable populations. This approach has been analyzed in depth through the SALEACOM project[1], which set up a worldwide network of researchers concerned with addressing educational and social exclusion in schools with children and youth that are sistemically underprivileged. In addition to various topics, such as successful actions, teacher training, and access to higher education, research methodologies have been a transversal topic throughout the project. In particular, we analyzed how methodologies oriented toward social transformation contribute to overcoming social inequalities. There is a special emphasis on communicative methodology because of relevant experiences within the previous 5, 6, and 7th Framework Programmes of the European Commission.

Therefore, the objective of this article is to dwell on how communicative methodology contributes to achieving social impact, paying special attention to the effects of communicative methodology when it is used for research with vulnerable populations. First, we will review the criticism on research that has produced a rather negative impact on vulnerable populations whose reality is being studied. Second, we will present the theoretical postulates of communicative methodology that are applied when conducting research with vulnerable populations. Third, we describe the procedures of communicative methodology, namely, the communicative organization of research, the communicative data collection and communicative analysis of the data, which are in place when working with vulnerable populations. Finally, we conclude with examples of social impact that have been achieved with these populations as a result of the research.

RESEARCH ON VULNERABLE POPULATIONS

Although several decades of research on vulnerable populations have passed, there is scarce evidence as to whether this research has led to a positive transformation of or social impact on the community or the daily lives of the people who were subjects of the research. In fact, part of the research has even promoted or reproduced racist stereotypes about these vulnerable populations.

There are several examples of academics that have raised their voices against the bias of this exclusionary research. For instance, this type of reality has been recorded for a long time now in studies related to Roma people. Roma are the largest minority in Europe and have a history of severe human rights violations, racism, and social exclusion. The Roma scholar Hancock (1988, 14) criticized those researchers who try to undermine Roma realities and thus reproduce the social exclusion of the Roma people.

> Those who know my work know that I have thoroughly fought against the attitude of the non-Roma researchers that study our people and that want to close us up in a "time capsule" for us to be "real Roma," illiterate, nomads, and primitive, like Himmler wanted. These persons think that we are unable to unite, to have a political conscience, and to choose our leaders.

As noted by Hancock, part of the explanation for this bias is due to the exclusion of the non-traditional participants from the research. By excluding the non-traditional participants, the researchers deliberately ignore and silence the primary information source of the Roma reality that they plan to understand and improve. Thus, the exclusion of these voices from the research inevitably reproduces the social exclusion of the vulnerable populations because such conclusions mirror the research methods that were carried out.

Other Roma scholars such as Courthiade and Duka (1995) criticize the approaches that want to deny the existence of Roma identity and to scrutinize the Roma people from the mainstream expectations of conduct. As the authors explain, many people have tried to identify Roma as a problematic group and potentially criminal. These explanations, as the authors pointed out, were official during the Third Reich, and they can even be seen currently in scientific articles. We can find these so-called scientific articles not only in social and humanities research but also in medical research. In the medical research area, racism has been widely recognized by research (Huang and Coker, 2010). Moreover, Roma researchers have also detected racist practices against the Roma population in the area of health, such as forced sterilization for Roma women in Eastern countries (Santos et al., 2016).

Racism in social research is related to both ethnocentric and relativist approaches. On the one hand, ethnocentrism generates modern racism (Flecha, 1999), and involves beliefs such as the existence of inferior and superior cultures or the idea that the characteristics of these cultures prevent their respective members from enjoying equal rights and opportunities. Father and son authors Cavalli-Sforza provide a clear example of modern racism when Roma people are depicted as thieves, lazy, and not compatible with going to school with others.

> Is it fair to tolerate, support, and protect a culture of thieves and lazy people? What else could they do? It is very difficult to accustom the Gypsies without having them suffer. The Gypsy is raised within the nomad culture, in which his group has always been adapted and non-compatible with going to school, among others. He/she encourages theft because stealing and escape is an easy task (Cavalli-Sforza and Cavalli-Sforza, 1994, p. 266)[2].

On the other hand, relativist approaches are the basis of postmodern racism (Flecha, 1999), which basically consists of considering inequality situations as the product of cultural attributes and defending these "cultural differences" as an

[1]*SALEACOM: Overcoming Inequalities in Schools and Learning Communities: Innovative Education for a New Century* is a HORIZON 2020 Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) project, which lasted for 36 months, from 2015 to 2017, funded by the European Commission.

[2]Own translation from the Spanish edition of the book.

alternative to ethnocentrism. Among other examples, Okely (1999, p. 78) argues that illiteracy means freedom for the Roma people: "the Gypsies" non-literacy, far from being an inevitable cultural handicap, is in many key areas a force for freedom'.

These kinds of contributions have also been denounced by the Roma scholar community: "actually, some researchers try to justify our illiteracy, saying, sometimes unnecessarily, that the illiteracy is part of our cultural identity" (Rose, 1983, p. 23). Many Roma researchers are demanding approaches and methodologies to overcome this exclusionary research, highlighting that Roma people want to participate only in research that treats them on an equal basis (Amador, 2016).

Research undertaken "on" vulnerable groups rather than including the voices of those who are being studied in the entire research process is more likely to assume ethnocentric or relativist perspectives (Lauritzen and Nodeland, 2018). In both cases, they prevent the creation of scientific knowledge of the culturally diverse groups that co-exist in contemporary societies, with negative consequences on the population instead of serving the best interests of these vulnerable populations.

This gloomy landscape calls for a change. It is a matter of uttermost importance to build trust and put science at the service of those sectors of society that most need it. In this context, communicative methodology has already demonstrated the use of a permanent egalitarian dialogue between researchers and people who participate in the research. In that sense, García-Espinel et al. (2017) used communicative methodology to demonstrate how this is possible, through an egalitarian and intersubjective dialogue between the Roma people and the mainstream health system, improving their health conditions by overcoming common episodes of discrimination in the health system. More examples similar to this can be found in different research projects within the 5, 6, and 7th Framework Programmes of the European Commission, with relevant socio-political impacts for overcoming the exclusion and discrimination of vulnerable groups.

CONCEPTUAL FRAMEWORK OF COMMUNICATIVE METHODOLOGY

Communicative methodology is framed in a society that demands more dialogue, is more reflexive, and is increasingly critical regarding social inequality. The methodology gathers contributions from several theories, such as communicative action, constructivism, dialogic action, dialogic learning, dramaturgy, ethnomethodology, phenomenology, symbolic interactionism, and transcultural studies. These methodological influences are materialized in communicative methodology through seven postulates.

Postulates of Communicative Methodology

Communicative methodology is inclusive, egalitarian, and aimed at social transformation, which is carried out by the individuals themselves. Thus, this methodology acknowledges that all individuals have inherent capacities for communication and social interaction and that they can understand the world, generate knowledge, and change social structures. Moreover, they can communicate in a rational way, their common sense is influenced by the context in which they live, and thus, they can transform it. Finally, communicative methodology considers that participants and researchers are on the same epistemological level because they all possess knowledge. Therefore, in communicative methodology, there are no interpretative hierarchies, allowing both researchers and participants to participate on an equal basis in the generation of new dialogic knowledge. In this way, the use of communicative methodology in research with vulnerable populations implies the participation of all individuals on an equal basis with the researchers, the co-creation of dialogic knowledge, and the possibility of real social impact for all. Gómez et al. (2006, p. 41–47) describe the following postulates of communicative methodology:

Universality of Language and Action

While exclusionary research assumes deficit theories that deny the agency of participants, in fact, there is the capacity to interpret critically the reality with the possibility of change. The communicative approach is based on the work of authors such as Habermas (1984, 1987), Austin (1962), and Vygotsky (1962, 1978) and assumes that all individuals have inherent capacities to communicate and interact with each other. There are no superior and inferior cultures; rather, there are different cultures with universal values and universal capacities. Contributions such as the work of Cole and Scribner (1974) also demonstrate that disadvantaged people develop cognitive and communicative capacities.

Individuals as Transformative Social Agents

This premise builds on authors such as Garfinkel (1967) to assert that individuals are not cultural dopes and have the capacity to understand the world, generate knowledge and change structures. In the same vein, Freire (1970; 1976) work emphasizes that all the people are capable of critically understanding their reality and, consequently, can change the world. He also discusses the relevance of both denunciation and annunciation as part of the utopian purpose of creating a better world. Freire's theory of dialogical action is a basic point in communicative methodology to address the means to transform reality.

Communicative Rationality

Building on the work of Habermas (1984, 1987), communicative rationality considers language as a vehicle for dialogue and understanding on an equal basis, far from the instrumental rationality in which participants use language to achieve specific aims. Researchers have their own interests, and the research process is based on these interests, but this does not mean that the dialogue with participants is based on an instrumental rationality. Far from this, under a communicative approach, researchers use communicative rationality throughout the whole research process.

Common Sense

Context shapes individuals' common sense, as studied by Schütz (1967). Therefore, this postulate places emphasis on the context where the interactions are taking place and where knowledge is

generated. Communicative methodology respects and values this context and favors the collection of data in the different cultural contexts where participants live (which can range from public spaces to associations and churches).

Abolition of the Interpretative Hierarchy

This postulate is a result of the previous ones, and it implies that individuals are capable of the scientific interpretation of their respective realities. Researchers do not hold the truth; the reality is interpreted through the best arguments among all participants, regardless of whether they have an academic background. This postulate is also directly related to the concept of the demonopolization of expert knowledge (Beck, 1994) in which researchers break with the traditional exclusionary hierarchy between social actors and researchers. Experts are those who bring knowledge closer to participants while rejecting the opportunity to stay in a position of power.

Equal Epistemological Level

Consistently, both researchers and the people with whom they conduct research participate in the process of the co-creation of new knowledge on an equal basis. This process involves breaking from the traditional difference between researchers as "subjects of study" and participants as "objects of study." The individuals bring their daily life knowledge and experience to the forefront but not as "data" to be instrumentally used nor as the only source of knowledge. Researchers have the responsibility to combine scientific knowledge with participant knowledge so that a real dialogue can take place.

Dialogic Knowledge

Rooted in contributions from Vygotsky (1962), Freire (1970, 1976), Beck et al. (1994), Flecha (2000) and Habermas (1984, 1987), this postulate consists of generating new knowledge using the principles of dialogic learning from an intersubjective perspective. The researchers must pursue a maximum degree of achievement to attain egalitarian dialogue, solidarity or consensus, which are typical values for this type of learning. The dialogue is based on validity claims, never on power claims, searching for a common understanding of the reality of consensus between all participants. This dialogic knowledge incorporates the objectivist and subjectivist approaches to interpret reality and acts in a dual way, recognizing, at the same level, the system (structures) and the daily life of the participants (life world). Such knowledge highlights the capacity of participants to reflect and be reflexive (Beck et al., 1994) as well as preparing the environment to facilitate interactions (Vygotsky, 1962). The establishment of this dialogue implies contributing during the research process because reality and the construction of knowledge are not neutral (Freire, 1970).

RESEARCH WITH VULNERABLE POPULATIONS. PROCEDURES FOR COMMUNICATIVE METHODOLOGY

The above-mentioned postulates and theoretical basis are embedded in a set of procedures that have already been implemented in previous research projects involving underprivileged populations such as the Roma, migrants, and people in poverty. Here, we will explain in detail some of the main features of its implementation, mainly through *WORKALO: The creation of new occupational patterns for cultural minorities: the gipsy case* (funded by FP5) and *INCLUD-ED: Strategies for inclusion and social cohesion in Europe from education* (FP6). The underlying idea is the involvement of vulnerable populations in a continuous egalitarian dialogue and the specific ways in which this idea is operationalized to be recreated in all research. We also note some of the things we learned from the challenges we encountered.

Communicative Organization of the Research

The communicative organization of the research is a basic feature to guarantee the inclusion of diverse social actors throughout the entire research process—from the research design to the interpretation and dissemination of the results—and the pursuit of social transformation. Particularly, the communicative organization of research can be materialized in the following strategies or activities: a multicultural research team, advisory committee, working groups, or plenary meetings.

Multicultural and Diverse Research Teams

It is widely acknowledged that the research teams in educational research tend to be very far from representing the great diversity of our societies and schools. In doing research specifically focused on the inequalities and situations of disadvantaged and underprivileged populations, this team composition is especially regrettable. Therefore, a crucial strategy for improving the way in which research approaches educational and social exclusion is to recruit and engage with indigenous researchers (Mertens et al., 2013) or those belonging to vulnerable groups. The INCLUD-ED project identified and analyzed educational actions that contribute to overcoming inequalities and promoting social cohesion (Flecha, 2015). During its 5 years, researchers from different backgrounds were part of the research team. Among them, there were Roma and Moroccan junior researchers, as well as a former pupil of one of the schools participating as a case study in INCLUD-ED (situated in a deprived area) who had a research fellow related to this project. Their insights were extremely helpful for the preparation, development, and analysis of the fieldwork as well as for the entire process. Crucially, this helped identify the strengths and capabilities of underprivileged pupils and their families.

Advisory Committee

The advisory committees are composed of vulnerable population representatives that bring their knowledge to the research. Their roles include a critical review of the reports and findings of the

research, guide the research process, assure the fulfillment of the communicative postulates, and disseminate these findings within their communities to improve the life of the respective vulnerable populations (Gómez et al., 2006).

The selection of the members of an advisory committee becomes a key issue to avoid an over-emphasis on "formality" or privileging the voice of people who, despite their belongingness to a certain group (e.g., being Roma, a woman or a migrant), do not truly represent the situation of vulnerability. For instance, lobby groups are related to end-users. In INCLUD-ED, the selection of members was based on three criteria: (a) they represented a given vulnerable group and considered themselves to be at risk of social exclusion within that vulnerable group, (b) they did not hold a higher education degree, and (c) they had experience overcoming inequalities through community participation or social and political involvement.

This selection process provides the opportunity to engage with, for instance, an illiterate Roma grandmother in the WORKALO project. In that case, the woman made an important contribution to the state of the art of the project. She criticized the assumption of mainstream theoretical explanations that the shift to an information society affected everyone in Europe in the same way by pointing out that the Roma people did not have the security of lifelong employment as others working in industrial society do (Vargas and Gómez, 2003). Thus, for many people, the transition to an information society meant a change in their working conditions, but this was not the case for the Roma people. The egalitarian dialogue and abolition of interpretative hierarchy were the conditions for achieving this knowledge co-creation.

Working Groups

The working groups are created to bring efficiency to the research process. The idea behind these small and flexible groups is that they can work on specific tasks depending on the needs of the project, which can then be discussed afterwards in the plenary meetings and with the advisory committee (Gómez et al., 2006). On many occasions, these groups are composed of volunteers who are experts on a certain issue or in a certain discipline. Such scientific knowledge of volunteers or their direct experience can be employed to form free oriented task groups collaborating with the project. For instance, in the FP6 project INCLUD-ED, a specific team focused on the methodology was created. Along with the project, this group had the responsibility of preparing the data collection techniques and designing the data analysis procedures.

Plenary Meetings

The plenary meetings provide a forum for the research team to work together on the development of the project and then forward the results to the advisory committee (Gómez et al., 2006). At the end of the project, there will normally be a final event presenting the results to the public and stakeholders. At this time, representatives of the vulnerable populations who have been involved in the project are invited to present their social impact experiences wrought by the project. It is desirable in the communicative organization of research to establish a structure and develop plenary meetings and dissemination dynamics. However, the constraints of time or budget can limit these intentions. Nonetheless, the development of communicative technologies can contribute to overcoming most of the issues related to the time and money needed in the research process. Ideally, the research team who wants to perform research with vulnerable groups should aim at including all of these elements of the communicative organization of research, starting with those who are most important to their respective research.

Communicative Data Collection Techniques

To collect the data, communicative methodology has led to the development of specific techniques adapted to its theoretical postulates. In this methodology, qualitative and quantitative techniques can be used separately; when the techniques are combined, the research design becomes mixed. Notwithstanding, the communicative qualitative orientation contributes in a more robust way to the co-creation of the knowledge aimed at attaining social transformation. These communicative, qualitative data techniques are communicative daily life story (CDLS), communicative focus group, and communicative observation (Gómez et al., 2006).

Communicative Daily Life Story (CDLS)

The specificity of the CDLS consists of gathering thoughts, reflections, and forms of action through which individuals face exclusionary situations in their daily life. CDLS is a very useful tool to give a voice to the most vulnerable populations and to give them an active role in the creation of valuable knowledge (García-Yeste, 2014; Ramis et al., 2014). In INCLUD-ED, the CDLS of Roma and migrant students provided relevant knowledge regarding the discriminatory treatment they received in the school and the positive referents from their own group at the school. In conclusion, the connection was made between high expectations and their educational improvement.

Communicative Focus Group

Communicative focus groups are formed by natural groups aimed at reaching a collective interpretation of reality through egalitarian dialogue and validity claims. The researcher has the role of promoting interaction and communication in the group to guarantee the mentioned collective interpretation (Aubert et al., 2011). In INCLUD-ED, the research team conducted six longitudinal case studies in schools. Four rounds of fieldwork were performed for each case. The focus groups were conducted with professionals in the schools (teachers, consultants, social educators, etc.) to exchange personal subjective information (opinions, knowledge, etc.).

Communicative Observation

The element that distinguishes communicative observation is that the dialogue with the people being researched is continuous throughout the whole process. For instance, when researchers attended an evangelical mass with the Roma, they informed the community of the purpose of the observation, and afterwards, they discussed their impressions about the ritual.

Communicative Analysis of Data

The communicative analysis of data has the main purpose of overcoming the exclusionary research by offering a transformative orientation and thus contributing to the social impact of research. For this reason, the communicative analysis of data is developed based on exclusionary and transformative dimensions (Gómez et al., 2006).

The exclusionary dimension refers to those elements that reproduce or enhance the social exclusion or discrimination of the vulnerable populations, while the transformative dimension refers to those elements that help overcome or tackle the social exclusion and discrimination against vulnerable populations. All data are interpreted taking into account both dimensions, and in that way, the transformative capacity of social agents is always maintained. The communicative analysis is arguably the blueprint of communicative methodology, distinguishing it from other methodologies.

The identification of these two dimensions is carried out at the analysis phase of the data. In this phase of the research process, the researchers first identify the categories and sub-categories of research based on the literature review and the scripts they used. Second, the researchers establish a grid of analysis where they assign a code to specific elements that are identified either as exclusionary or transformative for each category and sub-category. Finally, the analysis of the data is performed, and the sentences or paragraphs are highlighted using the agreed upon codes; thus, the information is easily extracted and grouped for the interpretation.

Again, a key feature is the inclusion of many voices in the data analysis. In the process of the interpretation of the results, members of the vulnerable populations are also invited to participate. Such participation may occur in different ways, for instance, with a "second round" of fieldwork that allows us to discuss the findings and interpretations or by strategies such as the advisory panel or working groups that we have previously explained.

REACHING SOCIAL IMPACT

Aroa, Alfredo, Jorge, and Saray are some of the more than 20 Roma that have entered the university in the last years in Catalonia. They will study fields such as education and political science. Their educational achievements will offer a better future for their children than what they can offer working in *mercadillos* (street markets). They all live in deprived neighborhoods and did not have any acquaintances that went to the university when they were children. Some of them did not complete primary or secondary education. Now, they have created CampusRom, the first Roma university network in Catalonia. In addition to achieving their own dreams, they also demonstrate to non-Roma researchers that their ethnic identity is not linked to marginalized situations or to school disaffection. Undoubtedly, their achievements will raise the numbers of Roma entering the university and raise the expectations of many Roma families and non-Roma professionals about their children's success in education, future in the labor market and social positions.

These enrolments are due to the Integrated Plan for the Roma People in Catalonia, which, among other actions, provides support for preparing Roma students to pass the university entrance exam. The Plan has been implemented in an unusual collaboration between public administration and Roma associations and seriously takes into consideration the WORKALO findings. Instead of describing the inequalities and lack of Roma people with job opportunities, WORKALO stresses the skills and abilities they have developed and their competence within an information society.

At the same time, the Integrated Plan for the Roma People would not be possible without the motion approved by the Spanish Parliament in 2005, recognizing the rights of the Roma (Sordé et al., 2013), and the official recognition from the European Parliament of the Roma as a distinct ethic minority on 28 April 2005 (European Parliament, 2005). This recognition, which can be viewed as the start of the European Parliament's explicit commitment to improving the situation of Europe's largest ethnic minority (Munté et al., 2011; Aiello et al., 2013), was suggested by a political representative of the European Parliament, drawing on WORKALO's findings and resulting recommendations.

Achieving this impact is essentially related to the communicative approach of the WORKALO project. From the participation of an elderly grandmother in the theoretical discussion in the advisory committee to the elaboration of policy recommendations, all phases were developed with accurate respect and dialogue with those most concerned by the findings likely to be achieved. The researchers of the WORKALO team, grass-roots Roma people, and representatives of Roma associations presented the results together in a conference at the European Parliament in 2004 that reached key policy-makers.

Thus, Roma participation in a study led to the European Union's commitment to defend the full recognition of the identity, culture, and language of the Roma people as a European minority (Aiello et al., 2013). In turn, this commitment also contributed to promoting national and regional strategies to tackle the great inequalities their people face and other policies taking into account the research findings.

The INCLUD-ED project shared the same communicative orientation of looking for solutions beyond barriers. The main objective of this research project reflected this communicative orientation in distinguishing two dimensions to be identified and analyzed—educational actions that contribute to overcoming inequalities and promoting social cohesion in Europe and actions that generate social exclusion. The Successful Educational Actions (SEAs) identified "are characterized by reorganizing the available resources in the school and the community to support all pupils" academic achievement, instead of segregating some of them according to ability or by lowering down their educational opportunities' (Flecha and Soler, 2013, p. 451).

In fact, SEAs are characterized as being universal and transferable to other contexts. Together with the learning communities, a project that started in 1978 in Barcelona, which "consists of the transformation of schools and their socio-cultural environment in order to achieve academic success for all students" (Gatt et al., 2011, p. 37), SEAs bolstered the social

impact of INCLUD-ED. As part of this impact, there is reduction in absenteeism and early school leaving (Flecha and Soler, 2013) and improvement in academic achievement (Elboj and Niemelä, 2010; Díez et al., 2011; Valls and Kyriakides, 2013; Flecha, 2015) in schools where they applied SEAs. INCLUD-ED was the only Social Sciences and Humanities research project recognized as one of the ten success stories at the FP6 by the European Commission due to its high social impact.

This impact could only be achieved with communicative methodology applied in INCLUD-ED. The project's success was due to an orientation toward solutions and successful actions rather than toward difficulties and barriers, as well as the involvement of participants who had previously never been able to have their voice heard.

Concerning the worldwide debate regarding what social impact is, on the one hand, and what impact are specifically the results of social sciences, on the other hand, the two examples provided here are very illustrative of what can be achieved with dialogic approaches in research (Flecha et al., 2015). Social impact is not "reaching society" in dissemination activities or being mentioned in social media, nor is it the transference of knowledge *per se*. The social impact of research is when "published and disseminated results, which have been transferred into a policy or an NGO-led initiative, produce improvements in relation to the stated goals of society" (Reale et al., 2017, p. 3).

The results of the WORKALO and INCLUD-ED projects have been published in highly ranked journals in different disciplines. They have achieved political impact as public administrations, individual schools, NGOs, and other stakeholders have been interested in their results. The findings of INCLUD-ED have informed policy-makers at different levels: internationally (for example, Secretaries of Education in Argentina, Colombia, and Mexico), in the EU (3 recommendations and 2 resolutions) (Flecha and Soler, 2014), and in Spain (recommendation, legislation and agreements with the public administration). However, the ultimate goal in both cases was to make a difference in the populations that face unacceptable inequalities.

CONCLUDING REMARKS

This article claimed to illustrate that relying on the direct and active participation of the people whose reality is being studied throughout the entire research process increases the social impact of such research. In communicative methodology, this participation is performed on the basis of clear theoretical concepts and postulates that promote egalitarian dialogue, dialogic knowledge and co-leadership, and social transformation for the participants in the research. Furthermore, communicative methodology has specific strategies for the implementation of its postulates, strategies in the communicative organization of research, communicative data collection techniques, and communicative analysis of the data.

We have seen in the two examples involving vulnerable populations that when the procedures of communicative methodology are in place, the political impact and social impact of the research are enhanced for the vulnerable populations, and society, in general, gains from the dissemination of the new knowledge that has been co-created between the researchers and the end-users. Finally, the road has been paved for future research with vulnerable populations, and the fact that people in many parts of the world are enjoying the benefits of the research carried out through communicative methodology is yet more evidence of the transferability of this methodology to different places and different socio-economic contexts.

Communicative methodology is increasingly being acknowledged as a very useful methodological approach to serve a society that needs dreams and science to reach social transformation, working with rather than on vulnerable populations (Gómez and Flecha, 2004). This methodology is aligned with the efforts to increase rigor in ethical issues and the idea of the co-creation of knowledge. As committed researchers, we must continue to improve this approach, as much of the current social inequalities are still far from being overcome.

AUTHOR CONTRIBUTIONS

AG, MP, OR, L-CM, and TP have participated in the elaboration of the article at the same level, developing the same tasks.

FUNDING

This article received funding from the European Commission, under the H2020-EU.1.3.3 scheme. Project grant: 645668.

REFERENCES

Aiello, E., Mondejar, E., and Pulido, M. A. (2013). Communicative methodology of research and recognition of the roma people. *Int. Rev. Qual. Res.* 6, 254–265. doi: 10.1525/irqr.2013.6.2.254

Amador, J. (2016). La "Roma Response" al modelo reproduccionista. la educación, nuestra escalera para la transformación social. *Int. J. Sociol. Educ.* 5, 142–163. doi: 10.17583/rise.2016.2091

Aubert, A., Melgar, P., and Valls, R. (2011). Communicative daily life stories and focus groups: proposals for overcoming gender violence among teenagers. *Qual. Inq.* 17, 295–303. doi: 10.1177/1077800410397808

Austin, J. L. (1962). *How to Do Things With Words*. New York, NY: Oxford University Press.

Beck, U. (1994). "The Reinvention of Politics: Towards a Theory of Reflexive Modernization", in *Reflexive Modernisation: Politics, Tradition and Aesthetics in the Modern Social Order*, eds. U. Beck, A. Giddens, and S. Lash (Cambridge, MA: Polity Press), 1–55.

Beck, U., Giddens, A., and Lash, S. (1994). *Reflexive Modernization*. Politics, Tradition and Aesthetics in the Modern Social Order. Cambridge, MA: Polity Press.

Cavalli-Sforza, L., and Cavalli-Sforza, F. (1994). *¿Quiénes somos?* Historia de la diversidad humana. Barcelona: Editorial Crítica.

Cole, M., and Scribner, S. (1974). *Culture and Thought: A Psychological Introduction*. New York, NY: Wiley.

Courthiade, M., and Duka, J. (1995). *A Social and Historical Profile of the Rroms in Albania*. Strasbourg: ECRI.

Díez, D., Gatt, S., and Racionero, S. (2011). Placing Immigrant and Minority Family and Community Members at the School's Centre: the role of community participation. *Eur. J. Educ.* 46, 184–196. doi: 10.1111/j.1465-3435.2011.01474.x

Elboj, C., and Niemelä, R. (2010). Sub-communities of mutual learners in the classroom: the case of interactive groups. *Rev. Psicodidáctica* 15, 177–189. doi: 10.1387/RevPsicodidact.810

European Parliament (2005). *Resolution on the Situation of Roma in Europe and Marking the International Roma Day*, PE 357.314v01-00, P6_TA-PROV (2005) 0151, 20 *april* 2005

Flecha, R. (1999). Modern and postmodern racism in Europe: dialogic approach and anti-racist pedagogies. *Harv. Educ. Rev.* 69, 150–172. doi: 10.17763/haer.69.2.3346055q431g2u03

Flecha, R. (2000). *Sharing Words*. Lanham, MD: Rowman & Littlefield.

Flecha, R. (2015). *Successful Educational Actions for Inclusion and Social Cohesion in Europe*. Dordrecht: Springer. doi: 10.1007/978-3-319-11176-6

Flecha, R., and Soler, M. (2013). Turning difficulties into possibilities: engaging Roma families and students in school through dialogic learning. *Camb. J. Educ.* 43, 451–465. doi: 10.1080/0305764X.2013.819068

Flecha, R., and Soler, M. (2014). Communicative methodology. Successful actions in dialogic democracy. *Curr. Sociol.* 62, 232–242. doi: 10.1177/0011392113515141

Flecha, R., Soler-Gallart, M., and Sordé, T. (2015). Social impact: Europe must fund social sciences. *Nature* 528:193. doi: 10.1038/528193d

Freire, P. (1970). *Pedagogy of the Opressed*. New York, NY: Herder and Herder.

Freire, P. (1976). *Education: the Practice of Freedom*. London: Writers and Readers Ltd.

García-Espinel, T., Aso, L., Redondo-Sama, G., and Flecha, A. (2017). Roma never die alone. *Qual. Health Res.* 27, 2189–2200. doi: 10.1177/1049732317729138

García-Yeste, C. (2014). Overcoming stereotypes through the other women's communicative daily life stories. *Qual. Inq.* 20, 923–927. doi: 10.1177/1077800414537218

Garfinkel, H. (1967). *Studies in Ethnomethodology*. New York, NY: Prentice Hall.

Gatt, S., Ojala, M., and Soler, M. (2011). Promoting social inclusion counting with everyone: learning Communities and INCLUD-ED. *Int. Stud. Sociol. Educ.* 21, 33–47. doi: 10.1080/09620214.2011.543851

Gómez, J., and Flecha, R. (2004). "Participatory Paradigms: Researching 'with' rather than 'on'," in *Researching Widening Access: Issues and Approaches in an International Context*, eds. B. Crossan, J. Gallacher, and M. Osborne (London: Routledge), 129–140.

Gómez, J., Latorre, A., Sánchez, M., and Flecha, R. (2006). *Metodología Comunicativa Crítica*. Barcelona: El Roure.

Habermas, J. (1984). *The Theory of Communicative Action. V. 1. Reason and the Rationalization of Society*. Boston: Beacon Press.

Habermas, J. (1987). *The Theory of Communicative Action. V.2. Lifeworld and System: A Critique of Functionalist Reason*. Boston: Beacon Press.

Hancock, I. (1988). *The Pariah Syndrome: An Account of Gypsy Slavery and Persecution*. Ann Arbor: Karoma Publishers.

Huang, H., and Coker, A. (2010). Examining issues affecting african american participation in research studies. *J. Black Stud.* 40, 619–636. doi: 10.1177/0021934708317749

Lauritzen, S. M., and Nodeland, T. S. (2018). "What is the problem represented to be?" two decades of research on Roma and education in Europe. *Educ. Res. Rev.* 24, 148–169. doi: 10.1016/j.edurev.2018.04.002

Mertens, D., Cram, F., and Chilisa, B. (Eds). (2013). *Indigeneous Pathways into Social Research*. Voices of a New Generation. Walnut Creek, CA: Left Coast Press.

Munté, A., Serradell, O., and Sordé, T. (2011). From Research to policy: roma participation through communicative organization. *Qual. Inq.* 17, 256–266. doi: 10.1177/1077800410397804

Okely, J. (1999). Non-Territorial culture as the rationale for the assimilation of gypsy children. *Childhood* 4, 63–80. doi: 10.1177/09075682970040 01004

Ramis, M., Martín, N., and Íñiguez, T. (2014). How the dialogue in communicative daily life stories transforms women's analyses of why they suffered gender violence. *Qual. Inq.* 20, 876–882. doi: 10.1177/10778004145 37210

Reale, E., Avramov, D., Canhial, K., Donovan, C., Flecha, R., Holm, P., et al. (2017). A review of literature on evaluating the scientific, social and political impact of social sciences and humanities research. *Res. Eval.* 27, 298–308. doi: 10.1093/reseval/ rvx025

Rose, R. (1983). Sinti and Roma in Germany. *Roma* 7, 21–24.

Santos, T., Macías, F., Amador, J., and Cortés, D. (2016). Samudaripen, el Genocidio Gitano: ¿Volveremos a Repetir la Historia? *Sci. J. Intercult. Stud.* 2, 2–29. doi: 10.17583/recei.2016.1897

Schütz, A. (1967). *The Phenomenology of the Social World*. Evanston, IL: Northwestern University Press.

Sordé, T., Flecha, R., and Alexiu, T. M. (2013). *El Pueblo Gitano: una Identidad Global sin Territorio*. Scripta Nova 427:XVII.

Valls, R., and Kyriakides, L. (2013). The power of Interactive Groups: how diversity of adults volunteering in classroom groups can promote inclusion and success for children of vulnerable minority ethnic populations. *Camb. J. Educ.* 43, 17–33. doi: 10.1080/0305764X.2012. 749213

Vargas, J., and Gómez, J. (2003). Why Romà do not like mainstream schools: Voices of a people without territory. *Harv. Educ. Rev.* 73, 559–590. doi: 10.17763/haer.73.4.k6807432592612j3

Vygotsky, L. S. (1962). *Though and Language*. Cambridge MA: MIT Press. doi: 10.1037/11193-000

Vygotsky, L. S. (1978). *Mind in Society: the Development of Higher Psychological Processes*. Cambridge MA: Harvard University Press.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor declared a past co-authorship with several of the authors (AG, MP).

frontiers in Psychology

SYSTEMATIC REVIEW
published: 24 April 2019
doi: 10.3389/fpsyg.2019.00918

Children and Adolescents Mental Health: A Systematic Review of Interaction-Based Interventions in Schools and Communities

Rocío García-Carrión[1], *Beatriz Villarejo-Carballido*[2]* *and Lourdes Villardón-Gallego*[2]

[1] Faculty of Education, Psychology and Social Work, Universitat de Lleida, Lleida, Spain, [2] Faculty of Psychology and Education, University of Deusto, Bilbao, Spain

Background: There is growing evidence and awareness regarding the magnitude of mental health issues across the globe, starting half of those before the age of 14 and have lifelong effects on individuals and society. Despite the multidimensional nature of this global challenge, which necessarily require comprehensive approaches, many interventions persist in seeking solutions that only tackle the individual level. The aim of this paper is to provide a systematic review of evidence for positive effects in children and adolescents' mental health resulting from interventions conducted in schools and communities in which interaction among different agents is an integral component.

Methods: An extensive search in electronic databases (Web of Knowledge, SCOPUS, ERIC, and PsycINFO) was conducted to identify interventions in which interactions between peers, teachers, families or other community members or professionals played a role. Their effects on children and adolescents' mental health were also reviewed. We carried out a systematic review of papers published from 2007 to 2017. Eleven studies out of 384 met the inclusion criteria. Seven of the articles reviewed focus on interventions conducted in schools and promote supportive interactions involving students, teachers, families and mental health professionals. Four of the articles develop interventions that engage community members in dialogic interactions with children and adolescents.

Results: Interventions in schools and communities implement strategies that foster supportive interactions among diverse actors including teachers, parents, community members, and other professionals. The effects of the mental health interventions reported on children and adolescents' problems include a decrease in disruptive behaviors and affective symptoms such as depression and anxiety, together with an increase in social skills, as well as an improvement in personal well-being.

Conclusions: There is evidence of a positive effect on the mental health of children and adolescents, both in decreasing symptoms of mental disorder and in promoting emotional well-being. Whereas, interactions among different actors seem to be a relevant aspect across the interventions, more research is needed to conclude its effect on the outcomes of the studies reviewed.

Keywords: interaction-based interventions, mental health, schools, communities, children, adolescence, systematic review

OPEN ACCESS

Edited by:
Isabel Menezes, Universidade do Porto, Portugal

Reviewed by:
Sharinaz Hassan, Curtin University, Australia
Giovanna Bubbico, Department of Neuroscience, Imaging and Clinical Sciences, University of "G. d'Annunzio" Chieti-Pescara, Italy

***Correspondence:**
Beatriz Villarejo-Carballido
beatriz.villarejo@deusto.es

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Psychology

Received: *24 April 2018*
Accepted: *05 April 2019*
Published: *24 April 2019*

Citation:
García-Carrión R, Villarejo-Carballido B and Villardón-Gallego L (2019) Children and Adolescents Mental Health: A Systematic Review of Interaction-Based Interventions in Schools and Communities. Front. Psychol. 10:918. doi: 10.3389/fpsyg.2019.00918

INTRODUCTION

Childhood and adolescence are critical periods to promote mental health as more than half of mental health problems start at these stages, and many of these persist throughout adult life (Kessler et al., 2005). Currently, this has become a priority as worldwide data shows an increase in the prevalence of mental health issues in childhood and adolescence (de la Barra M, 2009) and the percentage of those afflicted reaching nearly 20% (WHO, 2016). The situation is further exacerbated by the fact that many of these children and adolescents are not receiving the specialized care they require (Mills et al., 2006; Weist and Murray, 2008; Green et al., 2013).

Consequently, important efforts to bring together the best evidence about mental health have been done and raised the challenge of agreeing about fundamental issues in the field such as the definition of mental health and other related concepts (Mehta et al., 2015). According to WHO, mental health is understood not as a mere absence of illness, but rather, in a broader sense, as a state of well-being in which individuals develop their abilities, face the stress of daily life, perform productive and fruitful work, and contribute to the betterment of their community (WHO, 2004). This definition served as the basis for WHO Mental Health Action Plan, 2013–2020, which incorporates the concepts of mental health promotion, mental illness prevention and treatment, and rehabilitation. Particularly, developmental aspects of children and young people, including, for instance, the ability to manage thoughts, emotions, as well as to build social relationships, and the aptitude to learn, are emphasized in the plan as critical facets to be tackled in mental health interventions.

Mental health interventions conducted in schools and in the communities start from the premise that the problems experienced by adolescents are determined by the interaction of individual, environmental and family factors (Manjula, 2015). Accordingly, schools and communities offer an optimal context to intervene as children and adolescents grow and develop through social interaction. Schools and communities can make the most of its environment to foster child and youth development and to promote good mental health (Weist and Murray, 2008). Many of the mental health programs implemented in schools promote the development of social skills, socio-emotional competences, and learning outcomes while at the same time reducing disruptive behavior (Dowdy et al., 2010; Moreira et al., 2010; Durlak et al., 2011; Suldo et al., 2014). The school environment and climate can therefore play a critical role in encouraging the promotion of protective factors for mental health, such as social-emotional competences and skills (Osher et al., 2012).

Hence, social and cognitive development is enacted through social interactions in a particular cultural and social context (Vygotsky, 1978; Bronfenbrenner, 1979). Drawing on the contributions of Vygotsky's theory of cognitive development, human interaction that takes place in the social and cultural context enhances learning and is fundamental for psychological function. These cultural processes in which people learn and developed occur through interactions with others, including symmetrical (peer) as well as expert–novice (e.g., teacher–student) relations (Rogoff, 1990; Cole, 1996). Importantly, specific instruments have been produced to capture productive forms of dialogue across educational contexts (Hennessy et al., 2016)

Most of the research have been devoted to understanding the central role played by the quality of dialogue and interaction between students, in small group classrooms, or in whole class setting teacher-student interaction (see review by Howe and Abedin, 2013). Furthermore, research conducted in community-based schools has also reported the benefit of involving families and community members in learning interactions with elementary students, especially for those belonging to vulnerable populations (Flecha and Soler, 2013; Valls and Kyriakides, 2013). Accordingly, community plays a central role as human develop through their interactions in the sociocultural activities of their communities (Rogoff, 2003). Similar improvements have been reported among students with disabilities as a result of engaging in caring and supportive interactions among peers and with other adults when solving academic tasks in interactive groups (García-Carrión et al., 2018). The relevance of productive forms of dialogue and supportive interactions among peers, teachers and other community members, have also reported positive effects in 4th grade students prosocial behavior (Villardón-Gallego et al., 2018).These studies evidence the potential of educational interventions that draw on the potential of fostering interactions among different agents and promote productive dialogues as a tools for academic and social improvement.

However, when searching for mental health improvement through dialogic interactions, the research is scarce. The pioneering study carried out by Seikkula and Arnkil (2006) showed the psychological and social benefits of the therapy based on open and anticipation dialogues with adults and adolescents that also involved the family along with the professionals. Rather than focusing in the individual, facilitating supportive interactions among peers, professionals and family members might be an asset underpinning mental health interventions with children and adolescents. This study showed the critical role of collective interactions, which were very different from a dialogue between two individuals (Seikkula and Arnkil, 2006). They identified multi-system treatments (MST) characterized by engaging in close interaction professionals with adolescents, family, and other networks. Replication of these US studies in Norway found evidence of effectiveness, particularly, in the adolescents' social skills (Ogden and Halliday-Boykins, 2004). However, according to Seikkula and Arnkil (2006, p. 181): "what ultimately caused the observed outcome was not revealed. After all, methods do not help or cure anyone as such. Psychological methods -and other interaction-based means- exist as they user activity."

Whereas, determining the effect of the interaction itself in the outcomes obtained might be problematic, the authors of these paper aim to examine interaction-based mental health interventions, defined as those in which collective interactions, that involve professionals, family and community members with children and adolescents, are an integral component of the intervention. This systematic review focuses on those interventions conducted in schools and communities and its outcomes on children and adolescents' mental health. According to the WHO definition of mental health provided above, primary

studies selected for this review will include positive outcomes in a broader sense, comprising not only the reduction of symptoms of mental disorder but also the promotion of emotional well-being.

METHODS

The study carries out a systematic review (Gough et al., 2013), a methodology developed by the EPPI Centre of the UCL Institute of Education. We have also taken into account the recommendations by PRISMA (Moher et al., 2009) and checklist by Joanna Briggs Institute (JBI) (Lockwood et al., 2015), in order to offer transparency, validity, replicable, and updateable in this study.

Search Strategy

This systematic review has been focused and defined by the question: Do interaction-based mental health interventions in schools and communities have positive effects among children and adolescents? This question has been defined in terms of PICOS: In children and adolescents (Population) are interaction-based interventions (Intervention) effective in decreasing disruptive behaviors and affective symptoms such as depression and anxiety (in children and adolescents with mental health problems), and in increasing social skills, and improving well-being and academic engagement (in children and adolescents in general)? (Outcomes).

For the review, empirical articles published in international scientific journals in the areas of psychology, education, and mental health and focused on interventions among children and youth between 2007 and 2017 were searched and screened. To that effect, the following databases were analyzed: Web of Knowledge, SCOPUS, ERIC, and PsycINFO.

The articles were searched using the following keywords: "school-based," "community-based," "dialogue," "mental health," "well-being," "emotional development," "interventions," "program," "interaction," and "prevention." The exploration was completed with searches that employed synonyms or derivatives of the keywords. The keywords were also combined to refine the search. The publications containing the search criteria in the title, in the keywords and in the abstract were include.

Inclusion and Exclusion Criteria

In order to identify and select the studies most relevant to our research, inclusion and exclusion criteria were established.

The inclusion criteria were the following:

- Special population group: children and adolescents.
- Target age: 6 to 18 years of age, inclusive.
- Mental health interventions in which collective interactions, including professionals, families, and community members with children and adolescents, are an integral component.
- Studies reporting outcomes of the intervention in decreasing symptoms and/or promoting well-being.

The exclusion criteria were the following:

- Interventions focus on early childhood, youth, or adults.
- Target age is not specified, or the target population is below 5 or above 18 years.
- Mental health interventions focusing on one-to-one interactions (i.e., professional-child/professional-adolescent).
- The intervention is not described or assessed, as in trials, theoretical research or literature reviews.

Selection Process

The first part of the search yielded a total of 384 articles from indexed journals: 183 in published in the WOS database, 12 in Scopus, 33 in ERIC and 156 in PsycINFO. All these articles were entered into the Mendeley software for its screening and review. Basic information such as the title, year, authoring, and abstracts was obtained and introduced in a spreadsheet for a first screening.

From the 384 articles gathered in the initial search, the titles and their authors were subsequently revised in order to eliminate duplicates. This review was carried out by the members of the group independently in order to eliminate duplicate documents, specifically 83 were duplicates and were therefore discarded, resulting in a new total of 301 articles.

Abstracts of the 301 articles were reviewed according to the inclusion and exclusion criteria. As a result, 17 articles initially met the inclusion criteria and were eligible for the review (see **Figure 1**). The articles were downloaded for an in-depth review.

The three researchers examined the articles independently and extracted the most relevant information that was included in a spreadsheet. The information referred to: (a) study characteristics (author, country, selection criteria, design, data acquisition period), (b) population (target population, age and sample size), (c) settings, and (d) type of study. Once the articles were examined in depth against inclusion and exclusion criteria, discrepancies were discussed to reach a consensus in the final selection of the studies. This first review and discussion of the studies of the 11 articles lead to the elimination of a further six articles that did not adequately fit the inclusion criteria. Thus, a total of 11 articles were finally selected for analysis (**Figure 1**).

Quality Assessment

The quality of the selected studies was assessed using a checklist following the methodological guidance for systematic reviews developed by the Joanna Briggs Institute (JBI) (Lockwood et al., 2015). The selected studies were checked against nine questions. The results of the evaluation are presented in the **Table 1**.

Data Analysis

For the analysis of the studies, the three researchers developed an analytical grid to systematize the most relevant information for the purpose of the review: study characteristics, interactions fostered during the intervention, positive effects and information for assessment of the risk of bias. Each researcher analyzed the studies independently aiming at identifying on the one hand, how the interventions promote interactions between different agents, and on the other hand, the effects of the interventions on the target population. Firstly, data was categorized following an inductive method. Secondly, researchers compared their analysis to reach a consensus to report main findings from the review.

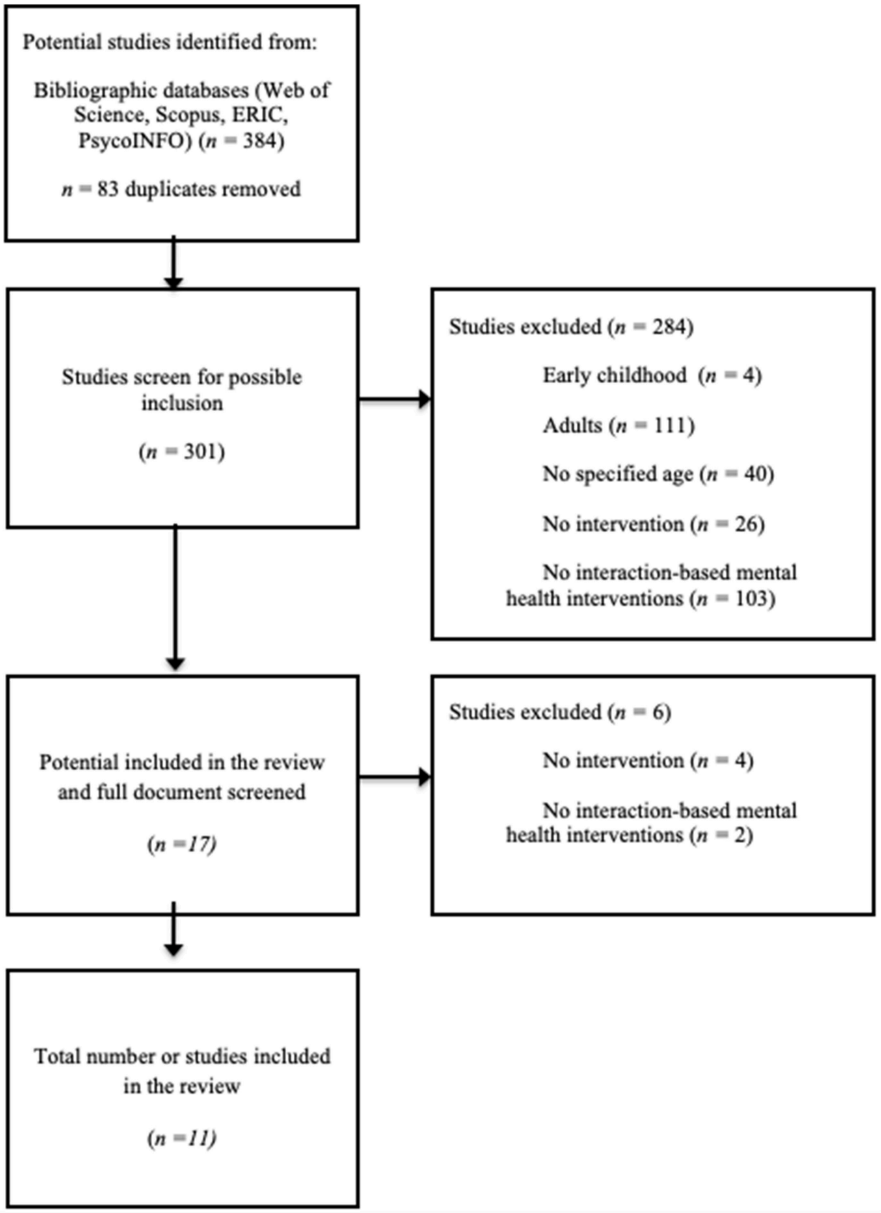

FIGURE 1 | Flow diagram to show the process of study selection.

RESULTS

The analysis of 11 mental health interventions targeting children and adolescents reported the benefits for both -students with mental health problems as well as healthy participants- resulting from their participation in the programs analyzed. Nine of the studies show the effects of preventive interventions aim to reduce future problems and to promote mental health among children and adolescents without mental health problems. Only two studies target children who had already contacted the school-based mental health service (Fazel, 2015) and adolescents who presented depressive symptoms (Connell and Dishion, 2008). Overall, the articles reviewed show a series of studies conducted mainly in the US context, seven out of ten, whereas the rest of the studies were carried out in the United Kingdom and Kenya. Seven of the interventions were conducted in schools and four of them were based in the community.

All the studies have shown to promote positive mental health in increasing well-being and preventing other related problems, as well as in reducing affective symptoms among those participants who were already affected. A detailed analysis of the strategies implemented across the mental health programs revealed an emphasis on fostering interactions among the children and adolescents engaging them in dialogues

TABLE 1 | Quality of studies.

Source	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Atkins et al., 2015	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Bloemraad and Terriquez, 2016	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Bradshaw et al., 2009	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Cappella et al., 2012	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Connell and Dishion, 2008	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Fazel, 2015	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Houlston et al., 2011	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Kia-Keating et al., 2017	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
McWhirter and McWhirter, 2010	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Ohl et al., 2013	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Puffer et al., 2016	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Q1. Is there congruity between the stated philosophical perspective and the research methodology?
Q2. Is there congruity between the research methodology and the research question or objectives?
Q3. Is there congruity between the research methodology and the methods used to collect data?
Q4. Is there congruity between the research methodology and the representation and analysis of data?
Q5. Is there congruity between the research methodology and the interpretation of results?
Q6. Is the influence of the researcher on their search, and vice-versa, addressed?
Q7. Are participant, and their voices, adequately represented?
Q8. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?
Q9. Do the conclusions drawn in the research report flow from the analysis or interpretation, of the data?

that involved different agents -teachers, families, community members, mental health professionals. An overview of the articles selected is provided in **Table 2**.

Supportive Interactions in Mental Health Interventions

Interactions among students, teachers, family, and community members and other professionals play an important role in the interventions analyzed. The mental health programs developed in schools and communities include specific strategies that have an emphasis on enacting peer support, partnerships and dialogic spaces for the children and adolescents to engage in supportive interactions with other relevant peers or adults.

Collaborative Interactions Among Children, Teachers and Parents in the School Context

Interactions between teachers and students underpin the strategies of the mental health interventions in different specific ways, which include tutoring, interviews, consultation meetings, peer-assisted learning strategies, interactive games, cooperative non-competitive building games, among others. (Bradshaw et al., 2009; Houlston et al., 2011; Cappella et al., 2012; Ohl et al., 2013; Atkins et al., 2015; Fazel, 2015). Overall, five of the studies implement strategies aim at developing children social skills through interaction and collaboration.

Similarly, interventions focus on "group interactions" as a preventive strategy that seek to reduce future mental health problems and to promote well-being (McWhirter and McWhirter, 2010). Specifically, two group-oriented prevention programs—Project Family Rejuvenation Education and Empowerment and Group-Oriented Psychological Education Prevention- are characterized by small-group discussions among students and with their mothers; in both settings participants engage in dialogue in a nonthreatening climate while encouraging cultivation of feedback and support between them (McWhirter and McWhirter, 2010).

Moreover, three studies promoted collaborative interactions between parents, teachers, and mental health professionals (Bradshaw et al., 2009; McWhirter and McWhirter, 2010; Atkins et al., 2015). Interactive features of these mental health programs include building positive peer groups and partnerships, solving problems peacefully, and fostering parent-student interactions, among others. This aligns with the need for an integration of the school ecology into program planning and the implementation of effective programs, as observed in the Link to Learning (L2L) service model instituted in classrooms and homes to support children with disruptive behavior disorders living in urban low-income communities (Atkins et al., 2015). In the same vein, collaboration between parents and teachers in classrooms is at the heart of the Family-School Partnership Program (Bradshaw et al., 2009). Discussion-based interactions include parents reading aloud to their children, with a particular emphasis in the promotion of reasoning among the students. Interaction is guided-by open-ended questions after the reading or using other materials, such as videotapes. Parents reacted to and discussed the situations and problem-solved alternative approaches. Discussions were also held on problem situations arising at home.

Fostering Communicative Skills and Home–School Interaction

Communication skills and family communication practice are a central component of READY—a family-based intervention program to prevent HIV infection and mental health problems (Puffer et al., 2016). The interaction and the communication skills training involved families, caregivers, children, and the community, as the intervention was carried out in religious congregations. By improving family communication as a protective factor against mental health disorders, READY draws on a promising approach to strengthen protective family processes that may prevent future negative outcomes for adolescents (Puffer et al., 2016). In conjunction with these activities, and while the program was being implemented, interaction was also fostered, using a voicemail system to cultivate parents' involvement and to provide consultation on an as-needed basis, and asking parents to fill in and return comment sheets indicating whether they had completed the weekly home activities and whether they had encountered any problems.

For their part, Atkins et al. (2010) carried out an intervention that targeted home-school communication and home routines that support learning, homework support, and daily readings. They promoted interaction between parents and teachers by

TABLE 2 | Summary of included studies.

First Author - Year	Settings	Country	Assessment instruments	Type of study	Target population	Sample size *
Atkins et al., 2015	School	United States	Observations, reports and assessment of academic performance	Intervention/Quasi-experimental/ Longitudinal	Children and families	416 (280)
Bloemraad and Terriquez, 2016	Community	United States	Questionnaire, interview, and documentary data	Descriptive/Cross-sectional	Immigrant youth/communities of color	1210 (440)
Bradshaw et al., 2009	School	United States	Academic performance and interview	Intervention/Quasi-experimental/Longitudinal	Children	678
Cappella et al., 2012	School	United States	Questionnaires and interviews	Intervention/Quasi-experimental	Consultant, teacher and children	890 (828)
Connell and Dishion, 2008	School	United States	Questionnaires	Intervention/Longitudinal	At-risk adolescents	998
Fazel, 2015	School	United Kingdom	Interview	Survey/Cross-sectional	Refugee children	40
Houlston et al., 2011	Secondary School	United Kingdom	Questionnaires	Survey/Cross-sectional	Adolescents	334
Kia-Keating et al., 2017	Community	United States	Community forums	Intervention	Latino youth, family, and community	194 (21)
McWhirter and McWhirter, 2010	Community	United States	Group sessions	Comparative intervention	Family and children	
Ohl et al., 2013	School	United Kingdom	Questionnaires	Intervention/Quasi-experimental	Children	385
Puffer et al., 2016	Community	Kenya	Questionnaires	Intervention/Longitudinal	Adolescents	440 (237)

**Sample size: total sample of the study; brackets indicate total number of children and youth.*

means of two techniques: Daily Report Cards and Good News Notes. Daily Reports Cards, on the one hand, consist of cards in which teachers and parents join efforts to identify, monitor, and reinforce behaviors that interfere with learning. Teachers and parents agree on a rating system to track behaviors, a reward schedule, and a plan for monitoring intervals that will enhance both direct feedback to students and home-school communication. Good News Notes, on the other hand, are certificates that teachers send to families detailing desirable behaviors exhibited by children, as a means to provide positive weekly feedback to parents. The Notes identify students' strengths, scaffold behavior improvement by reinforcing small achievements, and balance infraction reports with positive feedback.

Overall, these studies report a multilevel approach, tackling schools, families, communities, and mental health providers and services. The three articles include programs that evidence the crucial role of family and parental engagement in promoting mental health among adolescents (Connell and Dishion, 2008; Puffer et al., 2016) and children (Atkins et al., 2015). According to Connell and Dishion (2008), providing family-centered services in the school environment facilitated family engagement in the program.

Engaging in Dialogue With Community Members

Engaging in dialogue with the very community members who might be at risk of suffering mental health problems is essential for the success of the intervention. Some strategies for their involvement include the creation of a local Community Advisory Committee (Puffer et al., 2016) or a Community Advisory Board (Kia-Keating et al., 2017). The latter engage participants in reciprocal dialogues on solutions for issues ranging from violence exposure and health disparities to the difficulties encountered by youth people seeking to thrive, as exemplified by the HEROES Project (Kia-Keating et al., 2017).

There have been other community-based organizations studied in California, aimed at promoting "cultures of health" by engaging people in building social networks, by fostering solidarity and collective efficacy, or by promoting a shared commitment to the collective well-being (Puffer et al., 2016). Overall, these programs promote dialogic spaces in which the voices of the minorities, who have often been excluded, are instead given prominence and listened to, in order to look for solutions that will address the inequalities affecting their communities.

Effects

The effects of the interventions carried out in schools and communities with an emphasis on fostering supportive interactions as discussed above have benefited children and adolescents as reported in the following dimensions:

Internalizing symptomatology: Three studies include interventions that have had positive effects on the treatment and prevention of affective disorders such as depression and anxiety. Thus, Connell and Dishion (2008) ascertained, throughout 3 years, their potential to reduce and prevent the increase of depressive symptoms in at-risk early adolescents. Likewise, Ohl et al. (2013) confirmed the effectiveness of relationships for decreasing emotional symptoms. McWhirter and McWhirter (2010) garnered the results of the GOPEP intervention program (McWhirter et al.,

1997), based on group sessions and on conjoint sessions, which entailed substantial collaboration between researchers and participants, and confirmed the effectiveness of the SOAR program (Student Optimistic Attitudes and Resilience Program) in reducing anxiety and depression. The FREE program, for its part, was effective in decreasing self-isolation among children and their mothers, survivors of domestic violence.

Externalizing symptomatology: Four articles present improvements in aspects related to aggression and behavioral issues. Ohl et al. (2013) confirmed that the Pyramid project helped improve peer problems; however, they did not find positive effects on behavioral problems. McWhirter and McWhirter (2010) gathered evidence confirming the effectiveness of the FREE project in decreasing family conflict, and of the SCARE (Student-Created Aggression Replacement Education) program, one of the GOPEP intervention programs, in decreasing and managing aggression, anger, and violent behaviors. However, Cappella et al. (2012) did not find significative differences in behavioral regulation as an effect of their BRIDGE intervention, although children identified as having behavioral problems benefitted more than their peers in the area of social relations. On the other hand, Bradshaw et al. (2009) confirmed the long-term positive effects in reducing behavioral and mental-health problems resulting of the CC intervention.

Personal well-being: Six of the studies reported positive effects on strengthening psychological-related aspects to well-being, including self-concept, self-esteem, self-efficacy, and empowerment, among others. Cappella et al. (2012) confirmed the existence of a positive effect of intervention on children's academic self-concept. Atkins et al. (2015) found a significantly greater improvement on social skills among children who had been involved in the intervention, whereas Ohl et al. (2013) ascertained its positive effect on prosocial behavior. Houlston et al. (2011) confirmed that peer support improves self-esteem in victims of bullying, as well as their perception of the support provided by friends and other students. Participants stated that peer support had a positive impact on students' relationships, improving and building peer networks with trained peer supporters and other students. More specifically, in bullying situations, students considered peer support to be helpful for a number of reasons, including being able to talk about it, having peers to interact with, or helping bullied students to tell others of their plight.

Bloemraad and Terriquez (2016) gathered the opinions of people taking part in activities organized by CBOs (Community-Based Organizations). Results provide evidence of the impact that involvement in CBOs has on participants, namely when preparing to enroll and succeed in college, as well as on their self-reported civic capacity developing skills, which encompass skills as diverse as communicating with others, understanding the impact that government decisions have on the community, speaking in public, or planning events. Besides, the involvement in CBOs improves personal empowerment and self-efficacy, as participants learn to stand up for their beliefs, become more aware of health issues impacting their communities, and learn about their own culture or ethnic group. As for health and education outcomes, participants became more informed about college and career options, took better care of their personal health, and improved their school grades.

McWhirter and McWhirter (2010) showed that the FREE project resulted in an increase in children's and women's emotional well-being, peer engagement and self-esteem in children, as well as women's self-efficacy.

Context: Five of the interventions reported improvements on the classroom climate and teacher-student and peer interactions. The study carried out by Cappella et al. (2012), based on BRIDGE intervention, demonstrates how classroom interactions generate a positive climate where emotional support and teacher sensitivity are prominent. These interactions also promote a positive classroom climate, characterized by optimal behavior management, productivity, and instructional learning formats. Furthermore, they have been verified to help develop instructional support, more positive teacher expectations regarding children's behavior, and a more responsive teacher-student relationship. The study by McWhirter and McWhirter (2010), based on group interventions, highlights that interacting with other people helps build positive peer/adult relationships. These conclusions are shared by Puffer et al. (2016), whose study focused on family communication, and who conclude that intra-family communication improves well-being. In a similar vein, Bloemraad and Terriquez (2016) find that the interactions fostered by the intervention improve well-being in the community.

DISCUSSION

The present systematic review of studies has fulfilled the objective of identifying evidence for positive effects of interaction-based interventions in schools and communities in children's and adolescents' mental health. We have shown that mental health interventions, in which supportive interactions are fostered among different actors, have a positive effect in decreasing affective symptoms and in increasing personal wellbeing among children and adolescents.

We detected in these programs an emphasis on engaging children and adolescents in supportive interactions with other relevant adults, such as teachers, family, community members, and other professionals. Overall it showcases the benefits children and adolescents without mental health problems can reap, particularly in preventive interventions as nine of the studies focused on. Only two studies target adolescents and children with mental health problems (Connell and Dishion, 2008; Fazel, 2015). The literature analyzed sheds light on the importance of preventive interventions where different agents work together toward the common goal of promoting children's and adolescents' mental health (Atkins et al., 2015; Kia-Keating et al., 2017).

Positive effects on mental health are achieved through interventions that are culturally appropriate and culturally

grounded (Bloemraad and Terriquez, 2016; Puffer et al., 2016; Kia-Keating et al., 2017). This is particularly important in those interventions which require the active engagement of families and community members. The role of family and community members emerges as particularly relevant and providing them with communicative skills and fostering home-school communication are assets for the mental health interventions. Schools thus become an ideal space to facilitate family and community involvement, and they consequently present a great potential for enhancing positive parent-teacher, teacher-student and student-student interactions. This is consistent with other research that has focused on the benefits of school-based mental health interventions to help them develop cognitively, socially, and emotionally (Fazel et al., 2014).

There is enough supporting evidence on the potential of these interventions for schools to create a positive climate based on instructional and emotional support, solidarity and friendship that improves the well-being of children and communities (McWhirter and McWhirter, 2010; Bloemraad and Terriquez, 2016; Puffer et al., 2016). Available evidence on the effectiveness of these studies attests to the attainment of positive gains in students' academic achievement, which will also lead to other long-term positive effects that will help prevent behavioral and mental-health problems (Bradshaw et al., 2009). This positive effect is particularly strong in high poverty contexts (Atkins et al., 2015). Particularly relevant is the reduction of anxiety and depression, especially in light of the marked increase of the latter, currently ailing 4,4% of the world population (WHO, 2017).

Overall, we argue that interaction-based approaches in mental health interventions, that involve diverse actors in productive forms of dialogue and supportive interactions, are consistent with the benefits reported by the sociocultural approaches to learning and development (Vygotsky, 1978). However, in this systematic review we have not been able to determine the effect of the interaction on the effectiveness of the intervention. This is consistent with the literature, as effective mental health interventions, which include collective interactions among different agents as a central element of the intervention, did not revealed how those interactions were linked to the positive outcomes obtained (Seikkula and Arnkil, 2006). Similarly, the primary studies reviewed do not established a direct link of the interaction component of the intervention with the positive mental health outcomes. This question still remains.

Limitation and Future Directions

In this systematic review we have reviewed a set of interventions for both adolescents and children, without explicitly distinguishing within the two study groups. This raises a limitation as children and adolescents can potentially show different needs in terms of mental and behavioral support. Consequently, there could be potential differences in the outcomes that have not been considered in this review. In the same vein, this study only reviewed research in English and most research was conducted in the United States, which could also limit the generalizability of the results.

On the other hand, the concept of interaction we explored it is a broad concept that presents some limitations in providing a consistent definition within the interventions. Furthermore, the primary studies reported the effects of the intervention as a whole. Therefore, their methodological designs do not allow to identify the specific effect on mental health of the interaction itself. Still there is a gap to determine the effect of the interactions on the mental health outcomes. Further research is needed to explore the particular role and potential of social interaction to promote children and adolescents' mental health.

CONCLUSIONS

This systematic review of 11 studies has focused on mental health interventions in which interaction plays an important role. Supportive interactions carried out in the framework of mental health interventions involve various contexts, agents and systems, including teachers, parents, mental-health professionals, and members of the community.

There is evidence of a positive effect on the mental health of children and adolescents, both in decreasing internalizing and externalizing symptoms, and in promoting personal well-being. Factors that foster mental health as social support or engagement also increase with interventions programs that include interaction as a main feature.

However, more research is needed into the specific impact of interaction on the mental health of children and adolescents, as well as analyzing the type of interactions that have the most beneficial effect.

AUTHOR CONTRIBUTIONS

RG-C wrote the proposal of this systematic review with the input and contributions of the research team BV-C and LV-G. RG-C and LV-G planned the search in databases and defined exclusion and inclusion criteria for the selection of the articles. BV-C carried out the search, screen the materials and proposed a selection. All the authors checked and refined the selection of the studies. Each author drafted a section of this manuscript. All authors reviewed the whole manuscript, read and approved the submitted version.

FUNDING

The work leading to this invention has received funding from the Spanish Research Grants EDU2017-88666-R and EDU2015-66395-R (MINECO/FEDER, UE).

REFERENCES

Atkins, M. S., Hoagwood, K. E., Kutash, K., and Seidman. E. (2010). Toward the integration of education and mental health in schools. *Admin. Pol. Mental Health Mental Health Serv. Res.* 37, 40–47. doi: 10.1007/s10488-010-0299-7

Atkins, M. S., Shernoff, E. S., Frazier,S. L., Schoenwald, S. K., Cappella, E., Marinez-Lora, A., et al. (2015). Redesigning community mental health services for urban children: supporting schooling to promote mental health. *J. Consult. Clin. Psychol.* 83, 839–52. doi: 10.1037/a0039661

Bloemraad, I., and Terriquez, V. (2016). Cultures of engagement: the organizational foundations of advancing health in immigrant and low-income communities of color. *Soc. Sci. Med.* 165, 214–222. doi: 10.1016/j.socscimed.2016.02.003

Bradshaw, C. P., Zmuda, J. H., Kellam, S. G., and Ialongo, N. S. (2009). Longitudinal impact of two universal preventive interventions in first grade on educational outcomes in high school. *J. Educ. Psychol.* 101, 926–37. doi: 10.1037/a0016586

Bronfenbrenner, U. (1979). The Ecology of Human Development : Experiments by *Nature and Design*. Cambridge, MA: Harvard University Press.

Cappella, E., Hamre, B. K., Kim, H. Y., Henry, D. B., Frazier, S. L., Atkins, M. S., et al. (2012). Teacher consultation and coaching within mental health practice: classroom and child effects in urban elementary schools. *J. Consult. Clin. Psychol.* 80, 597–610. doi: 10.1037/a0027725

Cole, M. (1996). *Cultural Psychology : A Once and Future Discipline.* Cambridge, MA: Belknap Press of Harvard University Press.

Connell, A. M., and Dishion, T. J. (2008). Reducing Depression among at-risk early adolescents: three-year effects of a family-centered intervention embedded within schools. *J. Fam. Psychol.* 22, 574–585. doi: 10.1037/0893-3200.22.3.574

de la Barra M, F. (2009). Epidemiología de trastornos psiquiátricos en niños y adolescentes: estudios de Prevalencia. *Rev. Chil. Neuro Psiquiatr.* 47, 303–314. doi: 10.4067/S0717-92272009000400007

Dowdy, E., Ritchey, K., and Kamphaus, R. W. (2010). School-based screening: a population-based approach to inform and monitor children's mental health needs. *School Mental Health* 2, 166–176. doi: 10.1007/s12310-010-9036-3

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., and Schellinger. K.B. (2011). The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. *Child Dev.* 82, 405–432. doi: 10.1111/j.1467-8624.2010.01564.x

Fazel, M. (2015). A moment of change: facilitating refugee children's mental health in UK schools. *Int. J. Educ. Dev.* 41, 255–261. doi: 10.1016/j.ijedudev.2014.12.006

Fazel, M., Hoagwood, K., Stephan, S., and Ford, T. (2014). Mental health interventions in schools in high-income countries. *Lancet Psychiatry* 1, 377–87. doi: 10.1016/S2215-0366(14)70312-8

Flecha, R., and Soler, M. (2013). Turning Difficulties into possibilities: engaging roma families and students in school through dialogic learning. *Camb. J. Educ.* 43, 451–65. doi: 10.1080/0305764X.2013.819068

García-Carrión, R., Molina Roldán, S., and Roca Campos, E. (2018). Interactive learning environments for the educational improvement of students with disabilities in special schools. *Front. Psychol.* 9:1744. doi: 10.3389/fpsyg.2018.01744

Gough, D., Oliver, S., Thomas, J. and Hobbs. A. (2013). "Learning from research: systematic reviews for informing policy decisions a quick guide," in *Principal Public Health Adviser NHS Chief Scientist Office Overseas Development Institute Cabinet Office Director of Social Research & Policy*, no. December: 1–36. Available online at: www.alliance4usefulevidence.org.

Green, J. G., McLaughlin, K. A., Alegría, M., Costello, E. J., Gruber, M. J., Hoagwood, K., et al. (2013). School mental health resources and adolescent mental health service use. *J. Am. Acad. Child Adolesc. Psychiatry* 52, 501–510. doi: 10.1016/j.jaac.2013.03.002

Hennessy, S., Rojas-Drummond, S., Higham, R., Márquez, A. M., Maine, F., Ríos, R. M., et al. (2016). Developing a coding scheme for analysing classroom dialogue across educational contexts. *Learn. Culture Soc. Inter.* 9, 16–44. doi: 10.1016/j.lcsi.2015.12.001

Houlston, C., Smith, P. K., and Jessel, J. (2011). The relationship between use of school-based peer support initiatives and the social and emotional well-being of bullied and non-bullied students. *Child. Soc.* 25, 293–305. doi: 10.1111/j.1099-0860.2011.00376.x

Howe, C., and Abedin, M. (2013). Classroom dialogue: a systematic review across four decades of research. *Camb. J. Educ.* 43, 325–356. doi: 10.1080/0305764X.2013.786024

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., and Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Arch. General Psychiatry* 62, 593–602. doi: 10.1001/archpsyc.62.6.593

Kia-Keating, M., Santacrose, D. E., Liu, S. R., and Adams, J. (2017). Using community-based participatory research and human-centered design to address violence-related health disparities among Latino/a youth. *Fam. Commun. Health* 40, 160–169. doi: 10.1097/FCH.0000000000000145

Lockwood, C., Munn, Z., and Porritt, K. (2015). Qualitative research synthesis: methodological guidance for systematic reviewers utilizing meta-aggregation. *Int. J. Evid. Based Healthcare* 13, 179–187. doi: 10.1097/XEB.0000000000000062

Manjula, M. (2015). "Community-based mental health interventions in adolescents," in *A Practical Approach to Cognitive Behaviour Therapy for Adolescents*, eds M. Mehta and R. Sagar (New Delhi: Springer India), 43–53. doi: 10.1007/978-81-322-2241-5_3

McWhirter, J. J., Herrman, D. S., Jefferys, K., and Quinn, M. M. (1997). Tools for violence prevention. *Catholic School Stud.* 70, 15–19.

McWhirter, P. T., and McWhirter, J. J. (2010). Community and school violence and risk reduction: empirically supported prevention. *Group Dynamics* 14, 242–256. doi: 10.1037/a0020056

Mehta, N., Croudace, T., and Davies, D. S. C. (2015). Public mental health: evidenced-based priorities. *Lancet*. 385, 1472–1475. doi: 10.1016/S0140-6736(14)61400-8

Mills, C., Stephan, S. H., Moore, E., Weist, M. D., Daly, B. P., and Edwards, M. (2006). The President's new freedom commission: capitalizing on opportunities to advance school-based mental health services. *Clin. Child Fam. Psychol. Rev.* 9, 149–161. doi: 10.1007/s10567-006-0003-3

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., and The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 6:e1000097. doi: 10.1371/journal.pmed.1000097

Moreira, P., Crusellas, L., Sa, I., Gomes, P., and Matias, C. (2010). Evaluation of a manual-based programme for the promotion of social and emotional skills in elementary school children: results from a 4-year study in Portugal. *Health Promotion Int.* 25, 309–317. doi: 10.1093/heapro/daq029

Ogden, T., and Halliday-Boykins, C. A. (2004). Multisystemic treatment of antisocial adolescents in Norway: replication of clinical outcomes outside of the US. *Child Adolesc. Mental Health* 9, 77–83. doi: 10.1111/j.1475-3588.2004.00085.x

Ohl, M., Fox, P., and Mitchell, K. (2013). Strengthening socio-emotional competencies in a school setting: data from the pyramid project. *Br. J. Educ. Psychol.* 83, 452–466. doi: 10.1111/j.2044-8279.2012.02074.x

Osher, D., Dwyer, K. P., Jimerson, S. R., Brown, J. A. (2012). "Developing safe, supportive, and effective schools: facilitating student success to reduce school violence," in *Handbook of School Violence and School Safety*, eds M. Furlong, S. Jimerson, A. B. Nickerson, M. J. Mayer (Mahwah, NJ: Lawrence Erlbaum Associates). Available online at: https://www.routledgehandbooks.com/doi/10.4324/9780203841372.ch3 (accessed March 10, 2018).

Puffer, E. S., Green, E. P., Sikkema, K. J., Broverman, S. A., Ogwang-Odhiambo, R. A., and Pian, J. (2016). A church-based intervention for families to promote mental health and prevent HIV among adolescents in rural Kenya: results of a randomized trial. *J. Consult. Clin. Psychol.* 84, 511–525. doi: 10.1037/ccp0000076

Rogoff, B. (1990). *Apprenticeship in Thinking : Cognitive Development in Social Context*. New York, NY: Oxford University Press.

Rogoff, B. (2003). *The Cultural Nature of Human Development*. New York, NY: Oxford university press.

Seikkula, J., and Arnkil, T. E. (2006). *Dialogical Meetings in Social Networks*. London: Karnac.

Suldo, S. M., Gormley, M. J., DuPaul, G. J., and Anderson-Butcher, D. (2014). The impact of school mental health on student and school-level academic outcomes: current status of the research and future directions. *School Mental Health* 6, 84–98. doi: 10.1007/s12310-013-9116-2

Valls, R., and Kyriakides, L. (2013). The power of interactive groups: how diversity of adults volunteering in classroom groups can promote inclusion and success for children of vulnerable minority ethnic populations. *Camb. J. Educ.* 43, 17–33. doi: 10.1080/0305764X.2012.749213

Villardón-Gallego, L., García-Carrión, R., Yáñez-Marquina, L., and Estévez, A. (2018). Impact of the interactive learning environments in children's prosocial behavior. *Sustainability* 10:2138. doi: 10.3390/su10072138

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Mental Process*. Cambridge, MA: Harvard University Press.

Weist, M. D., and Murray, M. (2008). Advancing school mental health promotion globally. *Adv. School Mental Health Promotion* 1, 2–12. doi: 10.1080/1754730X.2008.9715740

WHO (2004). *Promoting Mental Health: Concepts, Emerging Evidence, Practice: Summary Report*. Geneva, World Health Organization. Retrieved. http://www.who.int/mental_health/evidence/en/promoting_mhh.pdf (accessed March 10, 2018).

WHO (2016). *"WHO | Child and Adolescent Mental Health." WHO*. World Health Organization. Available online at: http://www.who.int/mental_health/maternal-child/child_adolescent/en/

WHO (2017). *"WHO | "Depression: Let's Talk" Says WHO, as Depression Tops List of Causes of Ill Health." WHO*. World Health Organization. Available online at: http://www.who.int/mediacentre/news/releases/2017/world-health-day/en/

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

SYSTEMATIC REVIEW
published: 02 July 2019
doi: 10.3389/fpsyg.2019.01474

Promoting Social Creativity in Science Education With Digital Technology to Overcome Inequalities: A Scoping Review

*David Aguilar and Manoli Pifarre Turmo**

Faculty of Education, Psychology and Social Work, University of Lleida, Lleida, Spain

Enhancing creativity and developing technology skills in the classroom are the future of education and can turn out to be powerful tools to smooth out inequalities in class. This paper presents a systematic scoping review study of the literature focusing on cases of social creativity and digital technology embedded in science education. To this end, 23 empirical studies were selected from several databases—all in English and subjected to a blind peer-review process—to address the interconnectedness of key themes encapsulated in the following three research questions: (i) which digital technology roles support collaborative and creative processes in science education? (ii) which forms of technology and technological features support and organize the aforementioned creative processes? and (iii) what pedagogical principles guide the promotion of social creativity using technology in science education and involve all the students? Results show that technology can play different roles in promoting social creativity: (1) as a tutoring device that nurtures some key science creative processes; (2) as a tool that shapes students' creative thinking; and (3) as a medium that builds the supportive environment to perform collective creativity processes. In our project, these three roles were performed using a wide range of web 2.0 technologies (e.g., web-based environments, digital platforms, mobile technology) that both engaged all students in active and rich user experience for collective knowledge creation and equipped all learners with the necessary skills that would turn them into active, i.e., dynamic and resourceful, citizens in a swiftly changing world.

Keywords: creativity, collaboration, technology, science, education

OPEN ACCESS

Edited by:
Rocio Garcia-Carrion, Universitat de Lleida, Spain

Reviewed by:
Marta Soler-Gallart, University of Barcelona, Spain
Louis Major, University of Cambridge, United Kingdom

***Correspondence:**
Manoli Pifarre Turmo
pifarre@pip.udl.cat

Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Psychology

Received: *03 December 2018*
Accepted: *11 June 2019*
Published: *02 July 2019*

Citation:
Aguilar D and Pifarre Turmo M (2019) Promoting Social Creativity in Science Education With Digital Technology to Overcome Inequalities: A Scoping Review. Front. Psychol. 10:1474. doi: 10.3389/fpsyg.2019.01474

INTRODUCTION

The switch to digital has prompted high-speed social and economic changes on a global scale. In this respect, recent EU reports endorse education's innovative capacity and encourage the development of twenty-first century skills or 4C's competencies (Wegerif, 2015) namely *Creativity, Collaboration, Criticality,* and *Caring*. In the same vein, Cheng (2010) confirms that educational reforms around the world have recently introduced creativity as a key educational target.

Recent research in education also highlights the social and collaborative dimension of creativity. Sawyer (2012), a leading creativity researcher, states that a creation process can be enhanced by collaboration and focus on the processes involved, named as "process approach." It follows then that a creative process can be explained as a set of mental activities which people engage in when they are creating collaboratively. Consequently, compulsory education can become a

crucial environment to promote the necessary creative mindset in all students to become active and creative thinkers. Those students, once furnished with a broad range of thinking and creative skills, would be empowered to overcome any possible inequality. Despite intensive discourse in this area, there are still barriers to overcome in terms of creativity and innovation in compulsory education (Cachia et al., 2010; Bocconi et al., 2012). This paper aims to fill this gap by reviewing existing research on promotion of social creativity in science education through technology-enhanced learning environments as a tool to overcome inequalities among compulsory education students. In particular, we report on a scoping review related to the aforementioned topic. A scoping review is a rigorous form of secondary research that involves collecting, assessing and summarizing available evidence (Arksey and O'Malley, 2005). In our study, we interpret such evidence and identify the most salient features of existing research (e.g., Kitchenham et al., 2015) that can provide an insight into further research on new pedagogies that embed creativity in science education. Researchers can use scoping reviews to study and clarify complex concepts and refine future research inquiries. Nowadays, scoping reviews are considered as a useful tool for reviewing educational research across different topics, especially those that are new and contemporary (e.g., Major et al., 2018).

Creativity is a multi-faceted concept that has been studied from different approaches and perspectives (e.g., Kampylis and Valtanen, 2010). One of these theories holds that creativity can be considered as "the ability to produce work that is both novel and appropriate" (Sternberg and Lubart, 1999, p. 3). Loveless (2003) highlights that this definition expresses four characteristics of creativity: a fashioning process, pursuing purpose, being novel, and judging value. Thus, creativity can be understood as the combination of different skills, knowledge, motivations, and attitudes that individuals use to evaluate a variety of input ideas in multiple perspectives and dimensions to create a new, valuable and original idea or product. In this way, Yager (2005) says that academic science programs should be considered important in the formation of a creative mind. According to him, some of the main human abilities in this domain are the following: visualizing-producing mental images, posing high-level problems and questions, making decisions, combining ideas in new ways, promoting critical thinking, solving problems, or designing devices and products that are novel and have a social or personal value.

On the other hand, there is another line of research that frames creativity on sociocultural theory and highlights the cultural and social settings where creativity is developed. In this respect, an increasing number of studies focuses on how creativity is developed inside a group or community and how organizations and groups can provide creative answers to new social and economic challenges. This socio-cultural conceptualization of creativity stresses the role of intersubjectivity, communication, collaboration, and dialogical interaction in the creative expression (Glăveanu, 2008, 2010). This novel line of research has coined such concepts as *social creativity*, *collaborative creativity*, *group creativity,* or *distributed creativity* (Sawyer, 2012; Glăveanu, 2014). The present paper focuses on this strand of research and advocates that creativity cannot be reduced to a set of psychological processes, studied in isolation from their social, material, and temporal context (Glăveanu, 2018). Therefore, in this scoping review we only take into consideration those studies that stimulate creativity in collaborative environments.

Recent research in the arena of computer-supported collaborative learning points out to the fact that technology provides a set of tools that can enrich the learning context and nurture social creativity processes (Lee and Chen, 2015; Henriksen et al., 2016).

In the context of educational research, technology has shown great potential in coordinating and orchestrating such creative processes as finding information, representing concepts, arguing, and sharing ideas, which lead to the promotion of collaborative and creative thinking (Gijlers et al., 2013). Online settings, mobile tools, digital blackboards are clear-cut and distinct examples of technologically-rich learning media. Such media can support successful teaching and learning practices while catalyzing skills such as creativity, cooperation, collaboration, or communication (Kumar and Sharma, 2017).

Curricular reforms around the world highlight the need to design technology-enhanced pedagogy for promoting collaborative creativity skills as key curricular objectives to be introduced in different subject domains or curriculum areas (Craft, 2012). Actually, *science* is a domain that can contribute to this end. The 2015 report of the European Commission on Science Education (http://ec.europa.eu/research/swafs/pdf/pub_science_education/KI-NA-26-893-EN-N.pdf) remarks on the relevance of the STEAM skills (i.e., *S*cience, *T*echnology, *E*ngineering, *A*rts, and *M*athematics) for solving current social challenges in creative and novel ways. In particular, science subjects are potentially creative social environments since they favor interaction of a series of factors including *domain-specific knowledge*, divergent thinking, imagination and visualization, and a social dimension (Hadzigeorgiou et al., 2012). These aspects can be developed through different pedagogical approaches that have been reported to enhance creativity in science classrooms, namely creative writing, inquiry-based or problem-based learning, and video gaming (Kind and Kind, 2007; Hadzigeorgiou et al., 2012; Wimmer, 2016). In particular, inquiry-based learning has been widely used to propel creativity in science education (Kind and Kind, 2007). When applying this pedagogical approach, students follow a set of steps, referred to as the *inquiry cycle*, which consists of orientation, conceptualizing (e.g., asking questions, generating hypothesis), investigation (e.g., exploration, experimentation, and data interpretation), conclusion and discussion (e.g., communication and reflection) (Barrow, 2010; Pedaste et al., 2015). Remarkably, this pedagogical approach is in line with the stages of the creative process suggested by Sawyer (2012).

Scope and Aims of the Analysis

In the last decade, science education has progressively launched a whole raft of interactive and mobile technologies which are now extensively used both in scientific research and everyday

activities. The introduction of interactive technology in science classrooms has opened up new possibilities and challenges in the design of learning scenarios that promote social creativity skills among all students. Some review studies analysing the development of creativity in science education can also be found in educational literature (Hadzigeorgiou et al., 2012). However, there is a lack of review studies that focus on the analysis of pedagogical variables that can be aligned with affordances of technology to support and orchestrate collaborative and creative processes in science education applicable to all students. This scoping review aims to fill this research gap and provide new and valuable pedagogical insights into designing technology-enhanced science projects that can offer support to the students' development of co-creativity processes and, by so doing, equip all students with key contemporary skills. Consequently, this pedagogical knowledge would contribute to reducing differences among students and increasing their opportunities to become active and creative thinkers. With this scoping review, our aim is to give an overview of works in this budding field. This work is not a systematic literature review or meta-analysis. Systematic reviews tackle precise questions, with defined methodologies to evaluate and discuss study quality (O'Brien et al., 2010). In a scoping review, the purpose is to examine and summarize a range of evidence, presenting board findings and relationships to convey the breadth, depth, and innovation of the aforementioned field of study (Arksey and O'Malley, 2005; Levac et al., 2010). Thus, the present study establishes connections between creativity, technology, and collaboration in science education that can support further research and research analysis with different intentions and designs (Levac et al., 2010; Kitchenham et al., 2015).

In our study, we focus on research carried out on elementary and secondary education students (compulsory education: 6–18 years old) as well as science teacher education. This study covers recent research carried out in the last 10 years, a decade heavily marked by higher integration of web 2.0 technologies in science classrooms. The whole Web 2.0 concept was first coined in 2004 by O'Reilly (2004) in reference to a group of technologies (e.g., blogs, wikis, web-based environments, etc.) that promoted collaboration and the exchange of information between users. But, according to Scopus, it was not until 2008 when the number of studies that showed the incorporation of this kind of technologies in science education expanded, which justifies the interest of focusing the present study in the last decade. Specifically, we will address the following research questions (RQ):

RQ 1. Which specific roles of digital technologies have been identified in the existing literature that support collaborative and creative processes in science education?
RQ 2. Which forms of technology and technological features have been used to support and orchestrate collaborative and creative processes in science education?
RQ 3. What pedagogical principles have been identified focusing on the promotion of social creativity using technology in science education practices and for all the students?

METHODOLOGY

Literature Search and Criteria for Paper Selection

A scoping review was carried out following the methodological framework initially proposed by Arksey and O'Malley (2005) and improved years later by Levac et al. (2010). This framework establishes five different stages: (a) identifying the corresponding research questions; (b) identifying studies that are relevant for those questions; (c) selecting studies; (d) charting data; and (e) summarizing and reporting results. Automated searches of selected digital libraries were carried out to identify the most relevant studies on the development of social creativity skills using digital technology in science education. We selected the main articles within this field from Scopus and Web of Science (WOS), which are relevant databases for educational research.

Firstly, we examined the titles, abstracts, and keywords of different studies previously found as relevant (Jang, 2009; Seitamaa-Hakkarainen et al., 2010; Sullivan, 2011). In this first stage of the search method, we identified the following set of keywords: "science," "creativity," "learning," "technology," "computer," "collaboration," and "collaborative." Then, some keywords were iteratively developed after examining the titles, abstracts and keywords of studies identified in the first search stage. Thus, the following keywords were also included in the search process: "mobile," "computer," "laptop," "robotic," "virtual," "web," "wiki," "online." Finally, the following search string was created to cover the variables proposed in the research questions (science, collaboration, creativity, and technology):

"science" AND "creativ*" AND "collab*" AND "learn*" AND ("techno*" OR "mobile", "computer" OR "laptop" OR "robotic" OR "virtual" OR "web" OR "wiki" OR "online").

Inclusion and Exclusion Criteria

The authors of the present paper conducted all the screening stages and discrepancies and citations that partially meet the criteria were solved by consensus since member checking is a well-established procedure to build up "trustworthiness" in qualitative research (Toma, 2006, p. 412).

Table 1 presents the general inclusion and exclusion criteria applied that ensure that only relevant literature for the objectives of the present work were accepted.

More specifically, **Figure 1** summarizes the screening procedure followed where the aforementioned inclusion and exclusion criteria were applied in order to select the key studies. The initial selection comprised 540 articles and, after excluding duplicated texts, was shortlisted to 461 articles. During a first screening, we excluded conference proceedings, books, books chapters, and papers whose title and abstract were unrelated to the purposes of the present review. After this initial screening, 91 full-text papers, considered potentially relevant for this study, were fully read and assessed on their adequacy to our research purposes. As a result, 48 of them were discarded since they were not related to the domain of science (excluding mathematics or social sciences studies) or not aimed to our targeted educational levels. Also, 20 more articles were discarded because they did not explicitly report on the development of a creative process in the

TABLE 1 | Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
- Publications were included if they report on the development of social creativity or a creative process with technology. - Studies that are related to the domain of experimental science. - Publications that were peer-reviewed. - Studies focused on elementary and secondary education students as well as science teacher education students. - Papers published between 2008 and 2018.	- Conference proceedings were excluded as we focused on completely blind peer-reviewed texts. - Books and book chapters were discarded because of accessibility difficulties. - Publications not focused on the domain of experimental science (e.g., we excluded studies focusing on mathematics or social sciences). - Publications that are not focused on the targeted educational levels. - Studies that were not written in English.

domain of science using technology. This process resulted in a final selection of 23 relevant documents for our research.

Data Extraction, Analysis, and Synthesis

In order to answer the proposed research questions, the following five ranges of data values were extracted from the 23 selected studies: (a) study aims and objectives; (b) participants (age, level of education); (c) role and type of digital technology; (d) main pedagogical principles to promote creativity in science education for all students; and (e) collaborative learning pedagogies.

In order to address the research questions, data were extracted from the abstract, findings, or conclusions sections of the studies. The authors of the present paper participated in the process and the data obtained were stored in evidence tables. This facilitated the handling of the information extracted including charting of key features of the selected studies. To develop a critique and identify key themes, a narrative synthetic approach was applied (Davis et al., 2009). In this phase, we analyzed and categorized separately the data and, later, discussed and agreed collaboratively a set of themes deriving from the initial research questions.

Methodological Limitations

The search only considered peer-reviewed papers written in English between 2008 and 2018. Admittedly, the choice of keywords used or omitted and the data-bases used may have limited our findings. Thus, other studies relevant to the topic of the present work may have been excluded. It is also possible that methodological decisions for extracting and synthesizing data could have introduced some subjectivity. Some actions to mitigate the impact of some of these limitations could be to examine the reference list of the selected publications and perform trial searches.

RESULTS

Firstly, this section provides a brief overview of key findings of the scoping review. Secondly, it lays out the results that tackle the three research questions posed in this review.

Table 2 provides an overview of the core data extracted from the selected studies aiming to give an answer to the proposed research questions.

A first overview of **Table 2** shows that the proportion of research performed in elementary (students between 5 and 12 years old) and secondary (students between 12 and 18 years old) education is practically even ($n = 10$ for elementary education and $n = 11$ for secondary education). In three of these works, the study was undertaken with a sample that includes both elementary and secondary students. On the other hand, only five studies were carried out with either pre-service teachers or in-service elementary or secondary teachers.

Figure 2 displays the results in relation to the roles that technology plays in fostering students' social creativity in science education in the reviewed studies (RQ1) and in relation to the forms of technology used to support social creativity (RQ2).

In relation to which *specific roles of digital technologies could be identified in the existing literature to support collaborative and creative processes in science education* (RQ1), the qualitative analysis of the papers selected for this review identified three different roles of technology in fostering students' social creativity in science education: (1) technology as a tutor that supports and facilitates the emergence of key creative processes in science; (2) technology as a tool which utilization and appropriation of its characteristics by the students becomes an instrument to think creatively; and (3) technology as a medium or an environment that stimulates collaborative and creative thinking. These three roles are not mutually exclusive, e.g., a robotics, can be used in initial stages of the educational project as a tutor to script and guide the student's learning of specific design processes and, in more advanced stages, this technology can be used as a tool for thinking creatively in order for students to use the programming language autonomously.

As shown in **Figure 2**, technology as a medium and technology as a tool are the most frequent roles among the studies reviewed ($n = 11$ and $n = 8$, respectively). Both roles were introduced through the use of a wide range of digital technologies.

Six different forms of digital technology were identified in the studies reviewed in order to promote social creativity in science education for all students (RQ2). The studies analyzed used mainly web-based environments ($n = 4$), digital platforms ($n = 5$), mobile technology ($n = 6$), and robotics ($n = 4$). A limited number of studies introduced cloud technology ($n = 2$) or video ($n = 2$). In particular, when technology was introduced as a medium for promoting social creativity, web-based ($n = 3$) and mobile ($n = 5$) technologies were the most frequent ones. When digital technologies were implemented as a tool, then, robotics ($n = 4$) was the main one. Technologies with a tutoring role were introduced to a much lesser extent ($n = 3$), being video and digital platforms the only digital technologies implemented with the aforementioned role.

Furthermore, the studies also reported on different pedagogical principles and scenarios where knowledge creation was performed (RQ3). On the one hand, authentic science problems were tackled in the selected studies in which three different types of student-centered activities were designed to

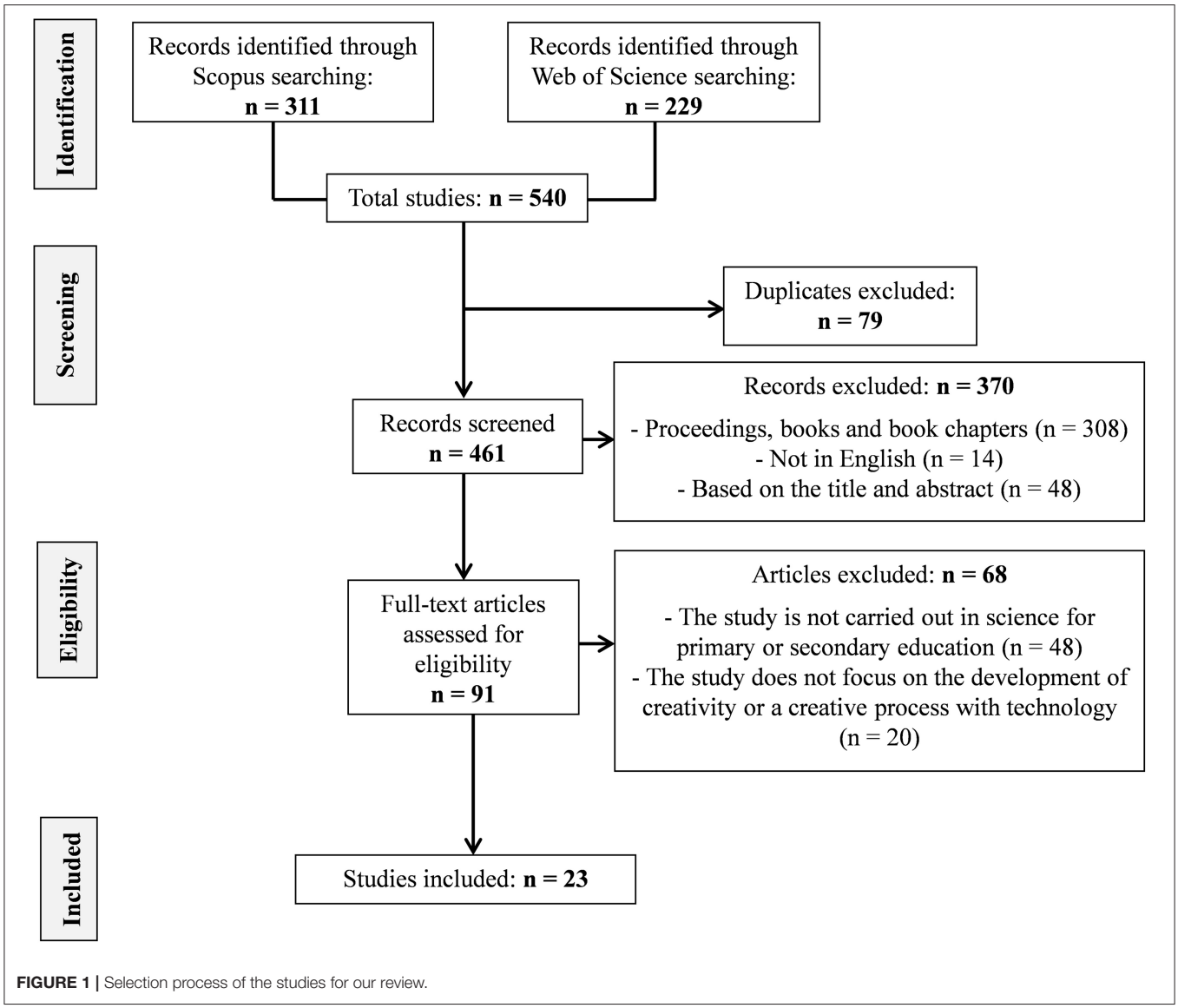

FIGURE 1 | Selection process of the studies for our review.

promote skills and knowledge for solving scientific problems: i.e., construct a creative knowledge-object ($n = 7$), construct or design a new product ($n = 9$), and research about daily-life phenomena to facilitate knowledge building ($n = 7$). Different forms of technology were used to perform these three different types of student-centered activities, as **Figure 3** shows.

As seen in **Figure 3**, web-based technology, digital platforms, mobile technology and robotics are the forms of technology most frequently used to mediate in solving the three types of student-centered activities. Furthermore, it is worth emphasizing the overriding role of robotics to enhance learners to construct or design a new product ($n = 4$), and mobile technology when students are asked to do some research on a daily-life phenomenon ($n = 4$).

Next, we address the discussion of the results obtained in relation to the three research questions proposed in this review.

DISCUSSION

Roles of Technology in Fostering Students' Social Creativity in Science Education (RQ1)

Knowledge in the twenty-first century is highly shaped by the development and affordances of technology (Higgins, 2014). Certainly, a specific technology imposes certain constrains and opens up a range of opportunities available to a group of learners. In this line, Wegerif (2015) claims that technology shapes thinking from within because it impacts on how we actually think and interact with others.

Although technological settings establish preconditions for educational opportunities, they do not causally determine these activities, or their peer-assisted learning outcomes (Oliver, 2011). Because of this, there is a need to study how collaborative

TABLE 2 | Summary of the reviewed studies that report on creative practices with digital technologies in the science domain.

References	Grade	Role of technology	Form of technology	Pedagogy		
				Science content	Student centered activity	Teachers' role
Plessis and Webb, 2008	Elementary education (12 years old)	Medium	Web-based technology (Encarta) and multimedia presentations	Different real-life science topics (marine life, birds, reptiles)	Construct a creative knowledge-object about a science topic and produce a visual presentation	Give specific and planned guidance
Jang, 2009	Secondary education (13 years old)	Medium	Web-based technology	Different real-life science topics (e.g., evolution, nutrition, buoyancy, biodiversity)	Research about a scientific real-life phenomenon and produce a visual presentation	Give specific and planned guidance
Smith et al., 2009	Secondary education (13–16 years old)	Medium	Handheld sensors (carbon monoxide sensor), GPS, note tracker, blogs	Contamination around the school	Research about a scientific real-life phenomenon	Give specific and planned guidance
Arnold et al., 2009	Pre-service teachers	Tutor	Instructional movies and online discussion forum	Life and the environment (e.g., ecosystems, structure and functions of plants, animal life)	Construct a creative knowledge-object about a science topic	Support the dialogue of students
Seitamaa-Hakkarainen et al., 2010	Elementary education (10–12 years old)	Medium	Knowledge forum	Study the properties and design of an artifact (e.g., lamp, properties of light)	Construct or design of a new product	Organizer of the shared knowledge practices
Wishart and Triggs, 2010	Elementary and secondary education (11–18 years old)	Medium	Mobile phones and Evolution (authoring tool)	Different real-life science topics (e.g., plants, soils, minerals)	Research about a scientific real-life phenomenon and produce a visual presentation	Give specific and planned guidance
Sullivan, 2011	Elementary education (12 years old)	Tool	Robotics	Light-sensor-enabled robotics problem	Construct or design of a new product	Support the dialogue of students
Zhang and Sun, 2011	Elementary education (9–10 years old)	Tutor	Knowledge forum	Light	Construct a creative knowledge-object about a science topic	Organizer of the shared knowledge practices
Hong et al., 2013	Secondary education (13–14 years old)	Tool	Robotics	Design and program a wooden robot	Construct or design of a new product	Give specific and planned guidance and support the dialogue of students
Lee et al., 2013	Elementary education (7–12 years old)	Medium	Tablet-PCs	Different real-life science topics (e.g., materials, plants, minerals)	Research about a scientific real-life phenomenon	Give specific and planned guidance
Yang and Chang, 2013	Secondary education (13–14 years old)	Tool	Design digital games	Biology	Construct or design of a new product	–
Hemling et al., 2014	Secondary education	Medium	Web-based environment	Microfluidics and properties of acid-base chemistry	Construct or design of a new product	Enrich and structure student's collaborative inquiry
Lee et al., 2014	Elementary school teachers	Tool	Robotics and online spaces (i.e., Moodle)	Lego® Educational Toolkits for constructing physical artifacts (e.g., a mountain stretcher)	Construct or design of a new product	Give specific and planned guidance and support the dialogue of students
Chen et al., 2015	Pre-service teachers	Tool	Wikis	Life and understandable science content (e.g., Newton's law, Bernoulli's law)	Construct a creative knowledge-object about a science topic	Give specific and planned guidance

(Continued)

TABLE 2 | Continued

References	Grade	Role of technology	Form of technology	Pedagogy		
				Science content	Student centered activity	Teachers' role
Kim et al., 2015	Elementary education (10–11 years old)	Medium	Mobile phones	Air, wind, force, and energy	Construct or design of a new product	Give specific and planned guidance
Mudaly et al., 2015	Pre-service teachers (20–24 years old)	Tool	Digital animation and digital concept-mapping	Socially relevant science topics: health issues (e.g., HIV, weight, malnutrition), environmental issues (e.g., pollution, climate change)	Construct a creative knowledge-object about a science topic	Organizer of the shared knowledge practices
Ramírez-Benavides and Guerrero, 2015	Elementary education (4–6 years old)	Tool	Robotics	Programming in mobile devices for Lego Mindstorm (abstract and logic thinking)	Construct or design of a new product	–
Guo and Woulfin, 2016	Elementary and secondary education (6–18 years old)	–	Web-based environment, wikis	Different real-life science topics (e.g., gardening project, decomposition of natural and human-designed materials)	Research about a scientific real-life phenomenon	Give specific and planned guidance
Lin et al., 2016	Secondary education (14–15 years old)	Tool	Google Docs and digital concept-mapping	Design of a water rocket with a hydrogen-oxygen engine	Construct a creative knowledge-object about a science topic	Give specific and planned guidance
Kumar and Sharma, 2017	Elementary and secondary education (6–18 years old)	Medium	Cloud technology (e.g., virtual laboratories)	Different real-life science topics (no specific examples are given)	Research about a scientific real-life phenomenon	Organizer of the shared knowledge practices
Poce et al., 2017	Pre-service teachers	Tutor	Orbis Dictus (digital platform for online education)	Marine biodiversity	Construct a creative knowledge-object about a science topic	Give specific and planned guidance
Ridwan et al., 2017	Secondary education (15–17 years old)	Medium	Handheld sensor (pH meter) and mobile phones	Chemistry concepts (solubility, acid base, petroleum, hydrocarbon)	Research about a scientific real-life phenomenon	Give specific and planned guidance
Sanabria and Arámburo-Lizárraga, 2017	Secondary education (17–18 years old)	Medium	Interactive application that supports Augmented Reality	Digital creation of *learning objects* in a STEAM context	Construct or design of a new product	–

activities occur interactively in a rich-technology context in order to further understand the students' peer-assisted learning results.

Following this argument, in this review paper we analyse how technology is used to promote social creativity in science classes. Thus, we study how interaction between participant agents (i.e., teachers, students, and community) and technology affordances are mutually shaped to promote learning. This analysis will contribute to creating a more insightful discourse and conceptualizing the relationship between different technologies, the way in which they are used and the impact they may have on the users' creative thinking in science education.

The qualitative analysis of the papers selected for this review identified three different roles of technology in fostering students' social creativity in science education: (1) technology as a tutor; (2) technology as a tool; and (3) technology as a medium for collaborative and creative thinking (see **Figure 2**). As mentioned above, these three roles are not mutually exclusive and a particular technology can be used for different purposes or could even be used for different educational objectives during the different students' learning stages. In the following sections, we discuss how technology is used in these three different roles in science classrooms.

(1) **Technology as a tutor of creative thinking.** Digital technologies can be seen as tools available to facilitate key creative processes in science. In this situation, technology contributes to increasing opportunities to facilitate creative processes in science. The teacher plays an important role in using technology because s/he designs and supervises activities requiring the use of technology.

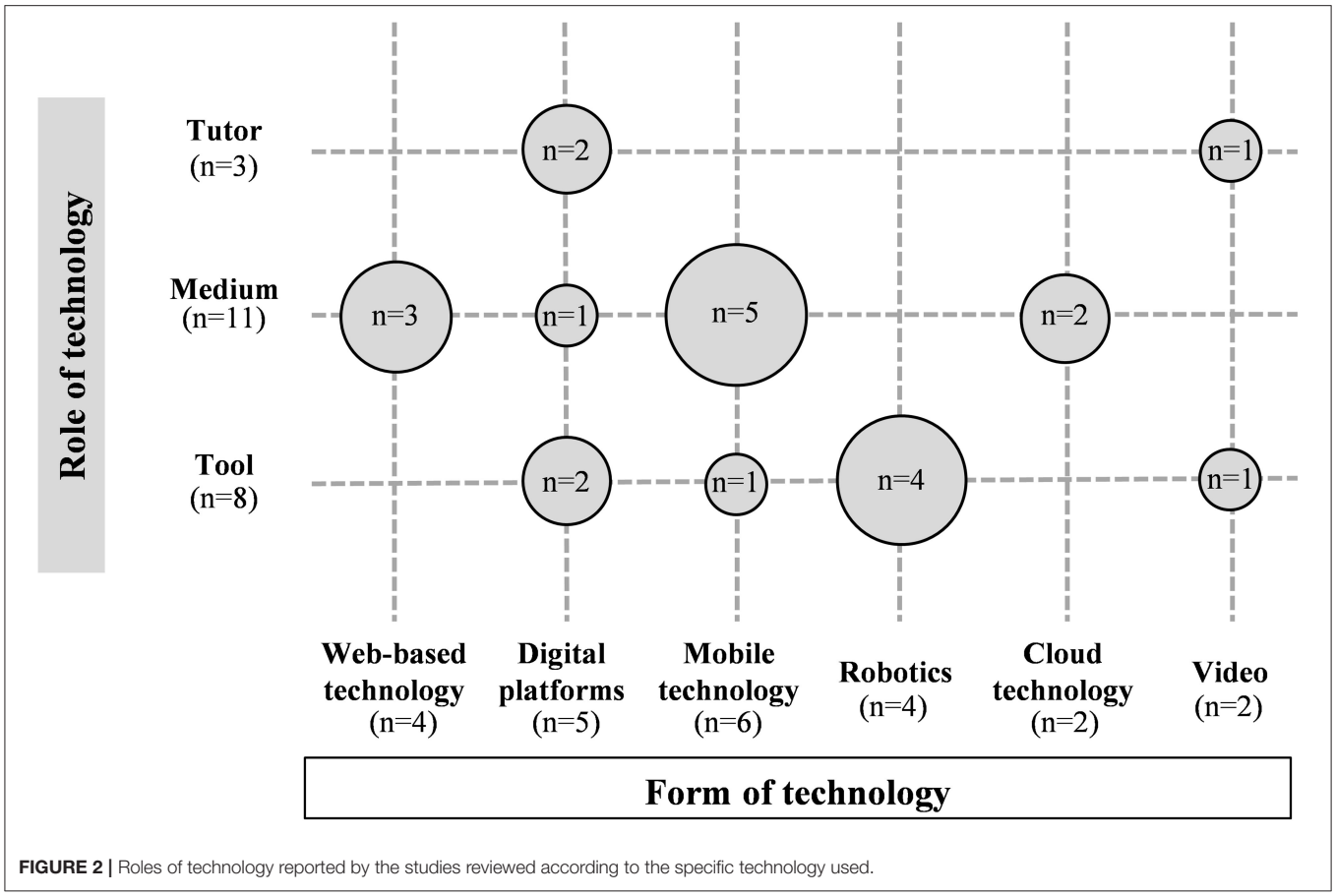

FIGURE 2 | Roles of technology reported by the studies reviewed according to the specific technology used.

In these activities, specific guidance is given by means of scripts or prompts that stimulate the performance of a specific creative process. For example, technology is used to tutor the understanding of the typical characteristics of the language of science and create the structure of a creative text with a scientific topic through cooperative writing (Poce et al., 2017). Technology also tutors the development of professional knowledge in an activity in which pre-service teachers design instructional movies following a script while participating in online guided discussion activities (Arnold et al., 2009). The educational activity is usually monitored by an e-tutor who provides information on the use of the platform and engages students' participation to solve a creative activity (Poce et al., 2017).

The relationship between technology and learning underlying the use of technology as tutor is that technologies possess inherent qualities, and are capable of having a particular "impact" and/or "effect" on learners if used in a *correct* manner in a science classroom. The "correct" usage of technology is usually scripted by the teacher, who decides which technology is used, how it is embedded in a specific science methodology and when it is used.

(2) **Technology as a tool for thinking creatively**. The socio-cultural theory argues that individuals learn to think through internalizing the use of cultural tools—such as language or technology—which, in turn, become cognitive tools or tools to think with (Vygotsky, 1987). This "instrumental genesis" (Rabardel and Bourmaud, 2003) addresses the connection of human agents and technical artifacts through the concept of instrument. An instrument is a heterogeneous entity, composed of both a technical artifact and a human agent. The instrument emerges from a "double-development movement" which connects the artifact and its utilization scheme, while agents adapt and give form to the artifact (Overdijk et al., 2012). Technology can be seen as an "instrument" of sorts, inasmuch as it is a tool used to shape and develop a creative activity. Therefore, instrumentalization changes both the tool and its user.

In science education, several studies (Sullivan, 2011; Hong et al., 2013; Lee et al., 2014; Ramírez-Benavides and Guerrero, 2015) have delved into instrumentalization processes where tools such as robotics serve students solve problems creatively and shape the way they think. Usually, these tools are introduced in science activities whose solution involves solving a challenge by creating a product through technology. For instance, Sullivan (2011) explores the development of a creative solution designed by students working collaboratively to solve a light-sensor-enabled robotic problem in a sixth-grade science classroom. In this study, students solve creatively a challenge using robotic tools while they plan, share opinions, and build or integrate ideas from other

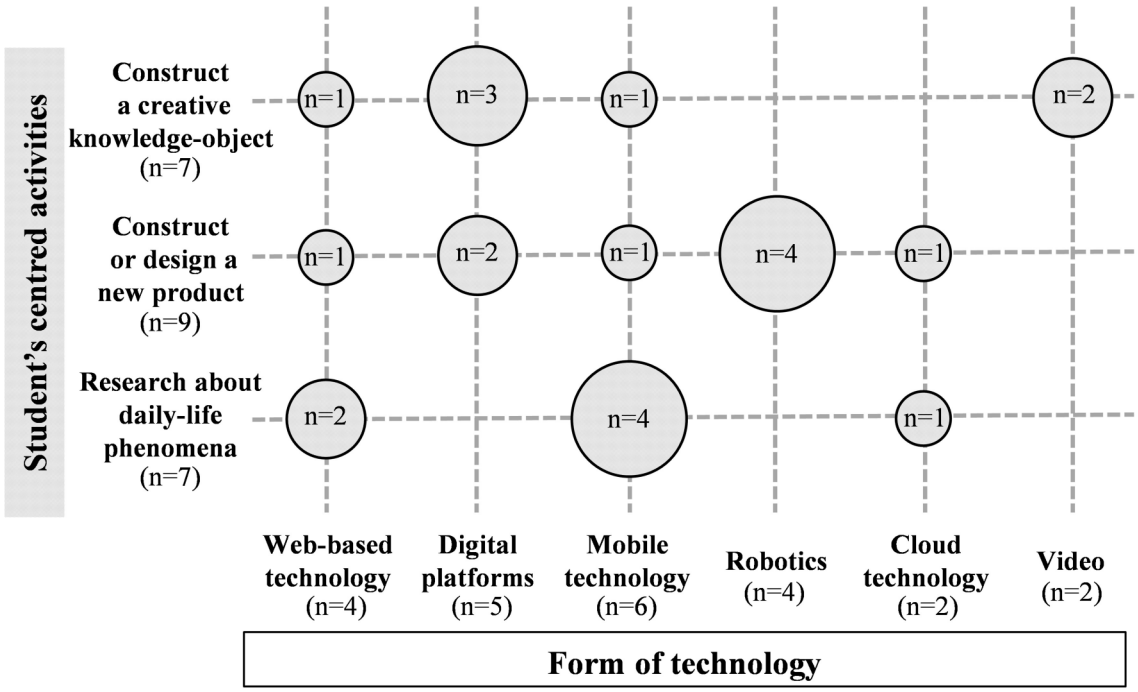

FIGURE 3 | Type of student-centered activities reported by studies selected according to the form of technology used.

people. Hong et al. (2013) discuss the importance of an after-school Science-Technology club in which junior high-school students engage themselves in solving a scientific problem, in particular, the creation of a robot to win a nationwide contest. Through these proposals, students develop informal science, think about creative ways to complete their project and search new ways of integrating their knowledge and experience in science and technology to, eventually, assemble a robot.

In the same line, Mudaly et al. (2015) and Lin et al. (2016) study how a structured concept-mapping activity supported by digital technologies and social media might be used creatively for co-constructing science knowledge through observation, modification, and interaction.

Finally, in all of these studies, the process of thinking creatively with a dedicated technology—such as robotics or concept-mapping—converts the technology into an instrument of thinking that promotes the development of key creative processes to complete their project such as: idea and knowledge creation, development and improvement, idea selection or idea representation, as well as elaborate high-quality scientific knowledge.

(3) **Technology as a medium for social creative thinking**. Digital technologies offer many possibilities which can be exploited and experimented to support the performance and orchestration of creative processes. In this respect, digital technologies can contribute to establishing further creative processes, by providing new tools, media and environments for learning to be creative and learning through creativity. Learners and teachers can use different technologies to design an educational environment which stimulates, orchestrates and supports specific creative processes such as developing ideas, making connections, fostering collaborations, and encouraging imaginative expressions.

In the selected studies, technology has been used preferably as a medium for social creative thinking (see **Figure 2**). In particular, the main roles of technology as a medium in the development of creative experiences in inquiry-based science found in this literature review are the following three:

- *Cultivate specific creative processes by providing a wide range of technologies*. Plessis and Webb (2008) and Jang (2009) designed a web-based environment that promotes students' abilities to discover, think, and discuss problems by posing key real-life problems, providing key resources, enhancing discussion forums, answering online questions and offering links to related and useful websites. Sanabria and Arámburo-Lizárraga (2017), as members of a STEAM project, implemented a cognitive-pedagogical approach using Augmented Reality (AR) which successfully nurtured the development of key creative processes. The project guided the students through three modules in order to fulfill the creative process. Module I familiarized teams of learners with a specific topic and the development of six key creative processes: observation, combination, association, grouping, discernment, and evaluation. Module II revolved around digital creation and development of creative design processes as: generation, modification, and visualization. Finally, Module III focused on displaying and communicating.

These studies reveal the importance of integrating network and inquiry activities into a real-life science experience. The situations that participants encounter along the process can stimulate creative thinking, flexibility, originality, and elaboration of fluency to express scientific ideas.

- *Orchestrate the social creativity process in science education*. Kim et al. (2015) proposed a rich technology-enhanced project in which 5th grade students designed their own experiments with mobile phones and relevant applications and sensors. The project, which encouraged students to engage in problem-solving by finding solution designs, orchestrated, and scaffolded the following scientific processes: (re)defining the problem, planning action, implementing, evaluating, and specifying findings, documentation, evaluation, and finally, reporting scientific phenomena.

  A similar study carried out by Seitamaa-Hakkarainen et al. (2010) aimed to promote genuine inquiry at primary education level by analyzing and designing artifacts within a cultural context. The study engaged students in a collaborative inquiry using the virtual platform Knowledge Forum which scaffolded and orchestrated the different stages and processes of the collaborative and creative design: namely, defining a task and its constraints, creating conceptual, and visual design ideas, evaluating design ideas and constraints, connecting to an expert culture and facilitating data collection, experimentation, and evaluation.
- *Expand the creative learning space*. Mobile technologies can exemplify this role since they provide a diverse and rich educational context beyond the classroom (Plessis and Webb, 2008; Smith et al., 2009; Wishart and Triggs, 2010; Lee et al., 2013; Kim et al., 2015). The provision of such new learning spaces can facilitate the students' improvement by developing new ideas, making connections between concepts and collaborating with other participants. For example, Lee et al. (2013) report on the educational effects of mobile-technology-based science classes on the performance of creative activity-oriented discovery processes. The combination of mobile technology with social networking services for carrying out inquiries facilitated the understanding of scientific knowledge and propelled the students' interest and motivation.

The Forms of Technology and Features That Have Been Used to Support and Orchestrate Collaborative and Creative Processes in Science Education (RQ 2)

Different forms of technology have been introduced in the studies analyzed and all of them offer a wide range of specific properties that support creativity processes in science. Web 2.0 technology activities that promoted social creativity were grouped together into different categories.

The vast majority of studies included in the present study ($n = 6$, **Figure 2**) incorporated **mobile technologies** (**Figure 2**). This form of technology is being gradually integrated into education on account of its capacity to expand the learning space beyond the classroom and enrich the learning contexts. Kim et al. (2015) claim that a wide range of mobile platforms can help students better observe the world, record significant moments, synthesize their ideas, and increase their engagement in science. Among the selected articles, different mobile technologies stand out for supporting collaborative and creative processes in science. For instance, *Tablet PCs* with online connectivity are used to support scientific discoveries with flexibility of time and space. Lee et al. (2013) describe how students used these devices to access scientific content wherever and whenever they needed, and collect real data and evidence (e.g., photos, videos, sounds) for their scientific inquiries. *Mobile phones* are also highlighted in a project by Kim et al. (2015) with a special focus on two main features: (i) they can provide instant communication between peers; (ii) they can be used for gathering real-time data (e.g., angles, time, or distances) by using specific applications. Wishart and Triggs (2010) also emphasize that mobile phones expand the learning spaces beyond the traditional formal environments and allow taking photographs and notes during a visit to a museum. Finally, *Scientific handheld sensors* are also highlighted as professional instruments to perform specific field measurements. In particular, Smith et al. (2009) report on the use of a handheld carbon monoxide sensor to monitor air pollution in the school surroundings while Ridwan et al. (2017) depict how students tracked the acidity of water from an aquarium using a pH-meter.

Five studies report on the use of different specific **digital platforms** for managing data, information, knowledge and supporting a collaborative creative process in science education. In particular, two of these studies highlight *Knowledge Forum* as a collaborative online platform rooted into research on knowledge building discourse. The platform provides a shared and multimedia space where students' ideas are given a visual and public representation: they can share information, participate in online debates, reflect upon their findings, launch collaborative inquiries and build new ideas together. Seitamaa-Hakkarainen et al. (2010) also used Knowledge Forum affordances to orchestrate learner's inquiry practices for designing new artifacts. Likewise, Zhang and Sun (2011) used this platform as a space for supporting reading practices in science where students could contribute with their own ideas, examine their peers', as well as revise, combine, synthesize, and build up new ideas. In both studies, Knowledge Forum provided an on-line space of permanent dialogue and streamlined insights through sustained knowledge-building discourse and management of group flow. These studies emphasize the significance of organizing collaborative inquiry processes in a visual way by using the multimedia facilities of this digital platform. These facilities provide students with new opportunities to better identify, represent, and structure the different skills and processes implemented along an inquiry activity which, according to scholars, is one of the main hurdles students encounter when using digital platforms (Piekny and Maehler, 2013).

Google Docs is another digital platform reported in the studies. This platform is a web-based collaborative word processor that enables discussion and interaction in order to build, co-edit, and share information. Lin et al. (2016) emphasize the effectiveness of Google Docs for performing creative concept maps about physics. In this line, Wishart and Triggs (2010) introduce one digital platform called *Evolution*, a multimedia

collaborative authoring tool for creating interactive presentations on scientific findings in a museum. This platform followed the principle of "learning by teaching" and provided all the necessary functionality and templates for organizing the students' ideas and preparing communication with their peers. Likewise, Poce et al. (2017) focus on *Orbis Dictus,* an online multilingual educational environment that offers a flexible and dynamic setting with the necessary tools for scaffolding a didactic path. In this study, this platform is introduced for creative co-writing activities in science. It allows organizing a set of on-line group activities for students to reflect on the levels of complexity and language used in a series of texts and, subsequently, participating in co-writing creative scientific texts. *Wiki* is the last digital platform reported in the studies analyzed. It is a collaborative web page authoring system where different users can freely contribute, create, or modify any content, even contents previously created by other users. It allows uploading multimedia information such as texts, videos, images, hyperlinks, or documents (Kim et al., 2012). Chen et al. (2015) explore the influence of wiki environments on the growth of pre-science teachers in a *T*echnological, *P*edagogical and *C*ontent *K*nowledge (TPACK) framework. Wiki facilitates storage, presentation, and modification of ideas, organization of teaching materials, instructional plans as well as the members' collaboration to come to an agreement on a series of creative instructional approaches related to different science topics.

Web-based environments were highlighted in four of the studies analyzed. This form of technology focuses on the World Wide Web as a tool to obtain, receive and manipulate up-to-date information in different areas through a single computer (Guo and Woulfin, 2016). Jang (2009) and Hemling et al. (2014) describe the application of web-site environments to decrease the complexity of learning scientific goals by making the task structure explicit, motivating and able to guide students through the inquiry process. By means of a web-site environment, the teacher provides explicit instructions, online conceptual presentations, task structuring scaffolds and experimentation hints. Students, in turn, become interactive learners, collaborate between them and enrich their problem strategies to solve creatively a science problem.

Four of the studies analyzed highlight **robotic technology** as it provides new opportunities for introducing students into open-ended, goal-oriented tasks. These tools allow students to interplay between logic and reasoning and between play and seriousness (Sullivan, 2011). In robotic problem-solving activities, students construct digital artifacts by following a programming cycle that consists of: (i) writing and testing a program; (ii) diagnosing problems with the program or structure of the device; (iii) proposing and arguing changes to the program or structure; (iv) making changes to the program and testing the device again. The studies developed by Sullivan (2011), Hong et al. (2013), Lee et al. (2014), and Ramírez-Benavides and Guerrero (2015) emphasize the benefits of following an inquiry cycle using robotic technology. They are the following four: (a) it provides students with new opportunities to research ideas and to experiment; (b) students can move between rule acquisition and rule modification because risks can be taken safely as it is possible to make and remake, repurpose, and recycle easily and effectively; (c) it facilitates direct and swift application of choices and, by so doing, students can modify and improve their ideas collaboratively, and (d) it increases the students' motivation and playfulness, which fuels their creativity.

The introduction of **cloud computing technologies** is breaking new ground in education. These technologies facilitate innovation, creativity, and experimentation in science because they contribute to reducing costly infrastructures such as labs or scientific instruments. Kumar and Sharma (2017) describe the application of this technology to provide *virtual laboratories* or *virtual simulators* that emulate real environment technologies. These settings are safe and can be accessed anytime, anywhere and help students to understand concepts from real world contexts. In the same line, Sanabria and Arámburo-Lizárraga (2017) used the affordances of a particular cloud computing technology, *Augmented Reality (AR),* to integrate 3D digital elements into the real world, provide real-time interaction and enrich the perceived information. AR allowed introducing abstract, difficult-to-assimilate and conventionally-inaccessible information which enhanced digital creation, organization, communication, management of information, and problem-solving skills.

Finally, **video** is reported in **two** of the studies analyzed and has been generally applied in science education as a representational and communicative tool. Mudaly et al. (2015) explore the use of video and digital animations as a medium for communication of a socially relevant science issue (e.g., health diseases). The authors remark that this tool provides unique opportunities to capture and present scientific contents while promoting critical thinking. On the other hand, Arnold et al. (2009) claim that producing a video can foster creativity since it allows students to record, organize and develop the ideas they want to share.

To sum up, the studies reviewed have used the affordances of a wide range of interactive Web 2.0 tools to promote the students' development of creative thinking skills. Also, such tools provide online and collaborative environments in which both teachers and learners can have a rich user experience and contribute with new and valuable knowledge to the online learning community.

Aligning Pedagogy and Technology for Promoting Social Creativity in Science Education (RQ 3)

The selected papers followed a common approach toward learning that Paavola and Hakkarainen (2005) defined as the *knowledge creation approach (KCA)*. This approach claims that learning is not only a process of acquisition and construction of existing knowledge but it is mainly an active and contextualized process of constructing and creating new knowledge. Knowledge is created on the basis of personal and inter-personal experiences, in which all students' contributions are important. In addition, knowledge is created in activities developed in social contexts and by using and developing common objects of activity such as conceptual artifacts, practices, or products.

The selected papers designed different pedagogical scenarios to implement the knowledge creation approach

for school learning purposes. The pedagogical scenarios are the following ones:

(1) **Authentic science problems and science contents.** The selected papers emphasized the social character of knowledge by engaging students in solving authentic, real-life and complex problems that could arise inside or outside the educational institution. Rather than addressing mere pre-structured problems, fragmented according to subject-domain, students carry out inquiries by themselves and are engaged in real research related to science topics. The studies analyzed concluded that science problems engaged all the students around meaningful science in new ways and supported the development of new forms of scientific inquiry skills. Authentic learning is a key pedagogy to engage all students in a research-grounded scenario capable of promoting creative skills, regardless of their previous knowledge and therefore, contributes to reducing their initial differences. For instance, Kim et al. (2015) describe how a diverse group of students succeed in a problem-solving project where they performed iterative experimental designs to provide solutions and explanations to different scientific phenomena. One key aspect for the success of this project was the high amount of contributions from each and every participant involved.

(2) **Extending the learning community and breaking boundaries between spaces and communities.** In this pedagogical approach, the classroom walls become more permeable to students' outside experiences and the classroom becomes a node, or "an intersection" (Leander et al., 2010 p. 336) within a background of different learning experiences. These learning backgrounds as grounded on wider social groups and on students' participation in life-long learning processes and practices can afford to effectively deal with societal challenges and with the contributions of all the participants. Indeed, the articles selected promote social interactions within different cultural settings. In these studies, different pedagogical strategies are used to promote the social character of knowledge. The strategies are the following:

- *Students solve problems related to everyday science contents*: for instance, marine biodiversity (Poce et al., 2017), light and heat energy (Sullivan, 2011), forces and energy (Kim et al., 2015), reproduction and genetics (Yang and Chang, 2013), exploration of evolution or energy of nutrition (Jang, 2009). The process of solving problems of real-life science enables students to bring into class discussions of their own experiences as well as scientific knowledge and, thus, facilitates knowledge-construction processes.
- *Students solve different kinds of information*. The use of global e-science data and different kind of facilities enables students to go through the experience of working as "real scientists" by developing skills related to data access, data visualization, and global scientific collaboration (Smith et al., 2009).
- *Students expand the learning scenarios beyond the classroom and with experts other than teachers*. The idea is to expand the learning community and help students create new knowledge to solve science problems. Some studies promote students' interactions in museums (Plessis and Webb, 2008; Wishart and Triggs, 2010), in extracurricular courses with the participation of parents (Hong et al., 2013), in on-line communities of science experts or in a university setting (Smith et al., 2009).

(3) **Student-centered activities: hands-on and minds-on activities**. Student-centered activities are designed to promote the students' skills and knowledge needed to solve a scientific challenge. The articles selected contain three types of activities: (a) *hands-on* activities in which students are engaged actively in practical experiences (e.g., assembling a robot); (b) *minds-on* activities in which students generate conceptual artifacts as products of their working ideas and theories (e.g., a concept map); and (c) *attitudes-on* activities in which students have to self-direct their learning (e.g., designing a plan).

These three types of activities engaged students in sustained work focusing on the creation of shared objects of inquiry through a whole series of devices and platforms that support and allow collaborative knowledge creations. Consequently, the object-orientation of the students' activities resulted in a two-fold challenge, i.e., as a collaborative joint venture in their learning process and as a solution to a science problem. In the papers selected, the students' learning outcomes revolved around one of the following three shared-knowledge objects (see **Figure 3**):

- *Construct or design of a new product*. Seitamaa-Hakkarainen et al. (2010), Lee et al. (2013), or Kim et al. (2015) engaged their students in the design of a new object by getting them to make a decision on such features as structure, materials, and function. In the same line, Sanabria and Arámburo-Lizárraga (2017) asked their students to design a digital creation using augmented reality tools. In fact, robotics has been the main technology used for constructing or designing new products (**Figure 3**). The ease to introduce choices, modifications, and ideas immediately has confirmed robotics as a very affordable technology for this kind of collaborative online activity. For instance, Hong et al. (2013) proposed their students to create a new robot with an eye to winning a nationwide contest. Sullivan (2011) and Ramírez-Benavides and Guerrero (2015) managed to develop a creative solution to solve a robotics problem and students ended up assembling a new robot. In a similar way, Lee et al. (2014) proposed pre-service teachers to solve technological challenges using Lego Education toolsets.
- *Research about a scientific real-life phenomenon and production of a creative and visual communication for presentation in front of an audience*. A group of studies shared technological tools to facilitate collaborative knowledge building. These studies enhance the necessity of recognizing technology not as "playing with gadgets," but rather as "engaging in inquiry." From this perspective, technology becomes a collaborative environment that allows participants to follow a shared inquiry. Accordingly, if networked learning environments are used adequately, they tend to move the students' own ideas

into the center rather than the periphery of discussion (Paavola and Hakkarainen, 2005). In this line of argument, Jang (2009) proposes on-line research on real-life topics as nutrition, animal evolution or diversities of organisms as a way to raise the students' curiosity and foster discussion and creativity. As an outcome of this scientific research, students elaborate a powerpoint presentation with the key concepts researched. Plessis and Webb (2008) and Wishart and Triggs (2010) propose students to use the information collected in a museum to design short interactive multimedia presentations by means of collaborative authoring tools and mobile technology.

- *Construct a creative knowledge-object about a science topic*. Interactive digital platforms have been the most frequent devices in the studies analyzed when performing this kind of activity (see **Figure 3**) probably to facilitate ease of sharing, building and reflecting on ideas in a visual way. For instance, Zhang and Sun (2011) use Knowledge Forum to ask students to create new knowledge collaboratively on a science topic through reading key scientific papers. Students posed as scientists producing new knowledge through a deep understanding and interpretation of different sources. Poce et al. (2017) asked their students to write a critical and creative science text through a collaborative online platform. Using this interactive setting, students analyzed narrative scientific texts according to the elements of narratology, scientific language, and creativity and they could participate in the writing process of creative scientific texts. Similarly, Lin et al. (2016) report on how students elaborated conceptual maps collaboratively using interactive digital platforms. On the other hand, Mudaly et al. (2015) introduced the use of other technologies such as video and digital animation for performing also conceptual maps on the new roles of digital technologies for teaching purposes.

(4) **Teacher's role**. Teachers play an important role in encouraging the students' activity during the learning process by promoting their students' self-directed learning and using group-based discussions to articulate, reflect upon and modify their own understanding. In the reviewed studies, the teacher creates learning opportunities to enhance students' interaction, collaboration, and knowledge creation when s/he assumed one/s of the following four roles:

- *Enriching and organizing students' collaborative inquiry*. Teachers are in charge of guiding the phases, steps, and implementation of an advanced inquiry process. Additionally, teachers divide the inquiry process into sub-tasks with tangible sub-goals that help pave the way for the group's progress and success in achieving higher levels of creative inquiry. In this respect, teachers organize the key steps of the science inquiry by: posing questions or challenges; searching for data and evidence; generating explanations and solutions to a challenge/questions (Hemling et al., 2014).
- *Giving specific and planned guidance*. Teachers scaffold their students' creations or elaboration of their shared ideas and thoughts by providing specific resources, templates, hints, and tools from networked databases. By offering these scaffolds, teachers help students acquire specific strategies to reach further elaboration and articulation of their own ideas and construct a better creative solution to the scientific challenge (e.g., Jang, 2009; Kim et al., 2015).
- *Organizing the shared knowledge practices*, instead of acting as a controller of the students' learning processes. In some studies, the teacher organizes and plans the group's workflow by providing the necessary resources to help students develop intersubjectivity and commitment to negotiate their perspectives; to establish the group's ground rules for thinking together; and to enrich students' own ideas to better solve creatively the scientific challenge (e.g., Seitamaa-Hakkarainen et al., 2010; Mudaly et al., 2015).
- *Supporting and encouraging dialogue among students to create the shared object*. Recent researchers have claimed that the students' ability to use talk collectively is crucial for collaborative creation. Thus, partners are engaged in generating a continuing and dynamic framework for their talk about their joint endeavor. Teachers can help use language purposefully for thinking, discussing and creating together, which includes aspects such as: questions, reasons, justifications, examples, and explorations. Teachers' talk is intended to help students understand that learning is an interactive process and that understanding has to be built up as a joint activity between teacher and students and among students in collaboration. By so doing, the students develop a gradual sense of responsibility for what and how they learn. Besides, this type of interaction can help students realize that knowledge is not only transmitted but also negotiated and re-created (Alexander, 2017). For instance, Seitamaa-Hakkarainen et al. (2010) conclude that the teacher's role can change the classroom culture. In this study, moving from a *transmission* culture to a *creative and collaborative working classroom* culture means that each participant is respected and his or her own voice is heard and valued to pursue a collective learning objective. Similarly, Sullivan (2011) emphasizes the importance of dialogue as a key pedagogical variable to explain the students' creative solution to a robotics problem. In this study, teachers supply a technological environment that allows students to jointly develop a shared understanding achieved through tool-mediated, communicative, and cognitive interaction.

All these teacher strategies have furnished students with the necessary creative mindset skills to solve the educational tasks proposed. Research in education has already shown that higher students' success in solving a creative task has an impact on their self-confidence and self-esteem which can be transferred to other class situations (Intasao and Hao, 2018).

CONCLUSIONS

Collaborative creativity skills are in great demand in the current global and digital knowledge society and should be implemented taking into account all students in order to give them all the opportunity to play an active role. This paper reviews studies of designs of technology-enhanced learning environments that promote collaborative creativity skills in

science education. The ultimate aim of this review has been to obtain valuable pedagogical knowledge for designing future science-related learning projects and developing future research capable of cultivating collaborative creativity using technology in the education of science.

Our work aims to fill a gap in educational research as very little research is done on collaborative creativity skills in science education. In fact, only 23 blind peer-reviewed studies met our selection criteria, i.e., which included four essential research variables to promote creativity in a global knowledge society: collaboration, creativity, technology, and science.

From our study we conclude, firstly, that the design of powerful and increasingly prevailing web 2.0 technologies opens up opportunities for learners to generate, modify and evaluate new ideas through on-line and multimodal interaction. Their use can thereby support rich new forms of knowledge creation in the domain of science. **Figure 4** summarizes the results of our review analysis from which we can outline three ways of promoting social creative thinking using technology (RQ 1): (1) technology as a tutor that nurtures key creative processes in science; (2) technology as a tool that shapes the students' creative thinking; and (3) technology as a resource that supplies the supportive environment to perform collective creative processes. Therefore, in our study the use of technology plays a crucial role in promoting creativity for all students.

Secondly, the reviewed studies have used several strands of technology to perform these roles. After analysing these studies, we have identified five platforms of web 2.0 technology in science education (RQ 2) teaching. They are the following: web-based environments, digital platforms, mobile technology, cloud computing technology and robotic technology. These platforms promote online learning communities that engage students in active and rich-user experience for collective knowledge creation. In all the studies analyzed, these platforms facilitated the creation of a diverse, rich and guided learning environment capable of overcoming the students' differences and learning obstacles.

Thirdly, a pedagogical approach based on knowledge creation arises as a framework capable of promoting technology-enhanced collaborative creativity in science education for all students. After analysing these studies, we identified four pedagogical advantages in the design of science knowledge creation learning scenarios (RQ 3): (1) designing authentic science problems; (2) extending the learning community outside the classroom walls; (3) designing student-centered activities that include hands-on and minds-on tasks; and (4) verifying the central role of the pedagogical uses of technology in promoting rich, new, and multimodal forms of students' learning processes. Additionally, our research study has identified four main teaching roles when promoting collaborative creativity processes with technology: organization, enrichment, orchestration, and support of the students' collaborative creativity processes with technology.

Finally, it should be noted that, despite following a methodology based on analysis of literature review and search through popular and widely-recognized databases in education (Scopus and Web of Science), there have been limitations in the process of selecting the papers, which may have influenced

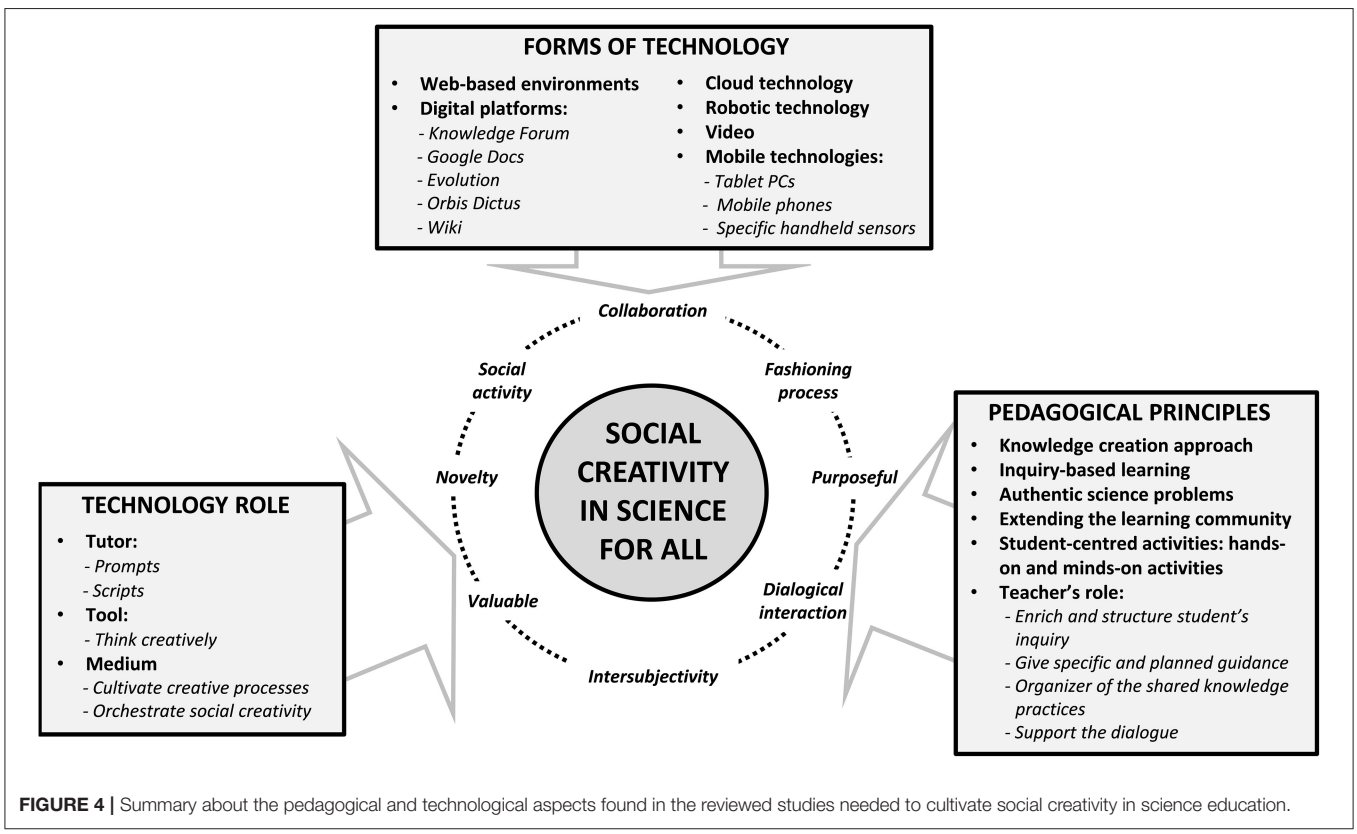

FIGURE 4 | Summary about the pedagogical and technological aspects found in the reviewed studies needed to cultivate social creativity in science education.

our search. Among these limitations are the following three: (i) only peer-reviewed papers were selected; (ii) only publications in English were considered while other publications, even key studies, in other languages were discarded; and (iii) we might have failed in developing an appropriate search terms strategy. Moreover, the broad focus of the present study (i.e., it focuses on a wide range of technologies, different educational contexts, etc.) has resulted in a heterogeneous screening of studies. The diverse nature of the studies analyzed and the fact that only 23 publications have been analyzed may have limited the impact of our conclusions and recommendations.

In a nutshell, this paper has reviewed a series of key studies in the context of science education designed to promote three highly significant educational variables for solving twenty-first century challenges: i.e., collaboration, creativity, and technology. In particular, it reveals the multiple roles and possibilities that new technology tools can offer in fostering social creativity. Our work has also revealed that both technology and pedagogy are equally important and needed to promote social creativity in science classrooms. In this respect, the teacher's pedagogical stance and understanding on how best to exploit the affordances of digital technologies are critical in determining the productive use of these tools in teaching and learning (Mercer et al., 2017, p. 9). Our paper may well-contribute to supplying equal education for all students by bringing inspiration to teachers on how to design technology-enhanced learning environments that promote collaborative creativity in science education.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

FUNDING

This work was supported by the Ministerio de Economía y Competitividad of the Spanish Government under Grant EDU2016-80258-R.

REFERENCES

Alexander, R. (2017). "Developing dialogue: Process, trial, outcomes." *Paper Presented at the 17th Biennial European Association for Research on Learning and Instruction Conference* (Tampere).

Arksey, H., and O'Malley, L. (2005). Scoping studies: towards a methodological framework. *Int. J. Soc. Res. Methodol.* 8, 19–32. doi: 10.1080/1364557032000119616

Arnold, S. R., Padilla, M. J., and Tunhikorn, B. (2009). The development of pre-service science teachers' professional knowledge in utilizing ICT to support professional lives. *Eurasia J. Math. Sci. Technol. Educ.* 5, 91–101. doi: 10.12973/ejmste/75261

Barrow, L. (2010). Encouraging creativity with scientific inquiry. *Creat. Educ.* 1, 1–16. doi: 10.4236/ce.2010.11001

Bocconi, S., Kampylis, P. G., and Punie, Y. (2012). *Innovating Learning: Key Elements for Developing Creative Classrooms in Europe*. Luxembourg: Publications Office of the European Union. Available online at: http://ftp.jrc.es/EURdoc/JRC72278.pdf (Retrieved March 26, 2018).

Cachia, R., Ferrari, A., Ala-Mutka, K., and Punie, Y. (2010). *Creative Learning and Innovative Teaching: Final Report on the Study on Creativity and Innovation in Education in the EU Member States*. Luxembourg: Publications Office of the European Union. Available online at: http://ftp.jrc.es/EURdoc/JRC62370.pdf (Retrieved March 26, 2018).

Chen, Y.-H., Jang, S.-J., and Chen, P.-J. (2015). Using wikis and collaborative learning for science teachers' professional development. *J. Comput. Assist. Learn.* 31, 330–344. doi: 10.1111/jcal.12095

Cheng, V. M. Y. (2010). Teaching creative thinking in regular science lessons: potentials and obstacles of three different approaches in an Asian context. *Asia Pac. Forum Sci. Learn. Teach.* 11, 1–21.

Craft, A. (2012). Childhood in a digital age: creative challenges for educational futures. *Lond. Rev. Educ.* 10, 173–190. doi: 10.1080/14748460.2012.691282

Davis, K., Drey, N., and Gould, D. (2009). What are scoping studies? A review of the nursing literature. *Int. J. Nurs. Stud.* 46, 1386–1400. doi: 10.1016/j.ijnurstu.2009.02.010

Gijlers, H., Weinberger, A., van Dijk, A. M., Bollen, L., and van Joolingen, W. (2013). Collaborative drawing on a shared digital canvas in elementary science education: the effects of script and task awareness support. *Int. J. Comput. Support. Collab. Learn.* 8, 427–453. doi: 10.1007/s11412-013-9180-5

Glăveanu, V. P. (2008). Thinking outside the box of individualism: creativity in light of a socio-cultural approach (editorial). *Europe's J. Psychol.* 4. doi: 10.5964/ejop.v4i4.437

Glăveanu, V. P. (2010). Principles for a cultural psychology of creativity. *Cult. Psychol.* 16, 147–163. doi: 10.1177/1354067X10361394

Glăveanu, V. P. (2014). *Distributed Creativity: Thinking Outside the Box of the Creative Individual*. New York, NY: Springer. doi: 10.1007/978-3-319-05434-6

Glăveanu, V. P. (2018). Are people working together inclined towards practicality? A process analysis of creative ideation in individuals and dyads. *Psychol. Aesthet. Creat. Arts.* 1–38. doi: 10.1037/aca0000171

Guo, J., and Woulfin, S. (2016). Twenty-first century creativity: an investigation on how the partnership for 21st century instructional framework reflects the principles of creativity. *Roeper Rev.* 38, 153–161. doi: 10.1080/02783193.2016.1183741

Hadzigeorgiou, Y., Fokialis, P. M., and Kabouropoulou, M. (2012). Thinking about creativity in science education. *Creat. Educ.* 3, 603–611. doi: 10.4236/ce.2012.35089

Hemling, M., Crooks, J. A., Oliver, P. M., Brenner, K., Gilberston, J., Kisensky, G. C., et al. (2014). Microfluidics for high school chemistry students. *J. Chem. Educ.* 91, 112–115. doi: 10.1021/ed4003018

Henriksen, D., Mishra, P., and Fisser, P. (2016). Infusing creativity and technology in 21st century education: a systemic view for change. *Educ. Technol. Soc.* 19, 27–37.

Higgins, S. (2014). Critical thinking for 21st-century education: a cyber-tooth curriculum? *Prospects* 44, 559–574. doi: 10.1007/s11125-014-9323-0

Hong, J.-C., Chen, M.-Y., and Hwang, M.-Y. (2013). Vitalizing creative learning in science and technology through an extracurricular club: a perspective based on activity theory. *Think. Skills Creat.* 8, 45–55. doi: 10.1016/j.tsc.2012.06.001

Intasao, N., and Hao, N. (2018). Beliefs about creativity influence creative performance: the mediation effects of flexibility and positive affect. *Front. Psychol.* 9:1810. doi: 10.3389/fpsyg.2018.01810

Jang, S.-J. (2009). Exploration of secondary students' creativity by integrating web-based technology into an innovative science curriculum. *Comput. Educ.* 25, 247–255. doi: 10.1016/j.compedu.2008.08.002

Kampylis, P., and Valtanen, J. (2010). Redefining creativity - analyzing definitions, collocations and consequences. *J. Creat. Behav.* 44, 191–214. doi: 10.1002/j.2162-6057.2010.tb01333.x

Kim, H. J., Miller, H. R., Herbert, B., Pedersen, S., and Loving, C. (2012). Using a wiki in a scientist-teacher professional learning community: impact on teacher perception changes. *J. Sci. Educ. Technol.* 21, 440–452. doi: 10.1007/s10956-011-9336-x

Kim, P., Suh, E., and Song, D. (2015). Development of a design-based learning curriculum through design-based research for a technology-enabled science classroom. *Educ. Technol. Res. Dev.* 63, 575–602. doi: 10.1007/s11423-015-9376-7

Kind, P. M., and Kind, V. (2007). Creativity in science education: perspectives and challenges for developing school science. *Stud. Sci. Educ.* 43, 1–37. doi: 10.1080/03057260708560225

Kitchenham, B. A., Budgen, D., and Brereton, P. (2015). *Evidence-Based Software Engineering and Systematic Reviews, Vol. 4*. Boca Raton, FL: CRC Press.

Kumar, V., and Sharma, D. (2017). Cloud computing as catalyst in STEM education. *Int. J. Inform. Commun. Technol. Educ.* 13, 38–51. doi: 10.4018/IJICTE.2017040104

Leander, K. M., Phillips, N. C., and Taylor, K. H. (2010). The changing social spaces of learning: mapping new mobilities. *Rev. Res. Educ.* 34, 329–394. doi: 10.3102/0091732X09358129

Lee, J., Koo, Y., and Kim, Y.-L. (2013). Use of mobile technologies to promote scientific discovery learning in elementary school. *New Educ. Rev.* 32, 264–274.

Lee, K.-T., Chalmers, C., Chandra, V., Yeh, A., and Nason, R. (2014). Retooling Asian-Pacific teachers to promote creativity, innovation and problem solving in science classrooms. *J. Educ. Teach.* 40, 47–64. doi: 10.1080/02607476.2013.864017

Lee, M. R., and Chen, T. T. (2015). Digital creativity: research themes and framework. *Comput. Human Behav.* 42, 12–19. doi: 10.1016/j.chb.2014.04.001

Levac, D., Colquhoun, H., and O'Brien, K. K. (2010). Scoping studies: advancing the methodology. *Implement. Sci.* 5:69. doi: 10.1186/1748-5908-5-69

Lin, Y.-T., Chang, C.-H., Hou, H.-T., and Wu, K.-C. (2016). Exploring the effects of employing Google Docs in collaborative concept mapping on achievement, concept representation, and attitudes. *Interact. Learn. Environ.* 24, 1552–1573. doi: 10.1080/10494820.2015.1041398

Loveless, A. (2003). Creating spaces in the primary curriculum: ICT in creative subjects. *Curric. J.* 14, 5–21. doi: 10.1080/0958517032000055965

Major, L., Warwick, P., Rasmussen, I., Ludvigsen, S., and Cook, V. (2018). Classroom dialogue and digital technologies: a scoping review. *Educ. Inform. Technol.* 23, 1995–2028. doi: 10.1007/s10639-018-9701-y

Mercer, N., Hennessy, S., and Warwick, P. (2017). Dialogue, thinking together and digital technology in the classroom: some educational implications of a continuing line of inquiry. *Int. J. Educ. Res.* doi: 10.1016/j.ijer.2017.08.007 Available online at: https://www.sciencedirect.com/science/article/pii/S0883035517303877

Mudaly, R., Pithouse-Morgan, K., van Laren, L., Singh, S., and Mitchell, C. (2015). Connecting with pre-service teachers' perspectives on the use of digital technologies and social media to teach socially relevant science. *Perspect. Educ.* 33, 23–41.

O'Brien, K., Wilkins, A., Zack, E., and Solomon, P. (2010). Scoping the field: identifying key research priorities in HIV and rehabilitation. *AIDS Behav.* 14, 448–458. doi: 10.1007/s10461-009-9528-z

Oliver, M. (2011). Technological determinism in educational technology research: some alternative ways of thinking about the relationship between learning and technology. *J. Comput. Assist. Learn.* 27, 373–384. doi: 10.1111/j.1365-2729.2011.00406.x

O'Reilly, T. (2004). *Web 2.0 Conference*. Retrieved from: http://conferences.oreillynet.com/web2con/

Overdijk, M., van Diggelen, W., Kirschner, P. A., and Baker, M. (2012). Connecting agents and artifacts in CSCL: towards a rationale of mutual shaping. *Comput. Support. Collab. Learn.* 7, 193–210. doi: 10.1007/s11412-012-9143-2

Paavola, S., and Hakkarainen, K. (2005). The knowledge creation metaphor – an emergent epistemological approach to learning. *Sci. Educ.* 14, 535–557. doi: 10.1007/s11191-004-5157-0

Pedaste, M., Mäeots, M., Siiman, L. A., Jong, T., van Riesen, S. A. N., Kamp, E. T., et al. (2015). Phases of inquiry-based learning: definitions and the inquiry cycle. *Educ. Res. Rev.* 14, 47–61. doi: 10.1016/j.edurev.2015.02.003

Piekny, J., and Maehler, C. (2013). Scientific reasoning in early and middle childhood: the development of domain-general evidence evaluation, experimentation, and hypothesis generation skills. *Br. J. Dev. Psychol.* 31, 153–179. doi: 10.1111/j.2044-835X.2012.02082.x

Plessis, A., and Webb, P. (2008). Generative use of computers: promoting critical outcomes of the South African curriculum. *Educ. Change* 12, 15–27. doi: 10.1080/16823200809487192

Poce, A., Agrusti, F., and Re, M. R. (2017). Enhancing higher education students' XXI century skills through co-writing activities in science teaching. *J. E-Learn. Knowl. Soc.* 13, 51–64.

Rabardel, P., and Bourmaud, G. (2003). From computer to instrument system: a developmental perspective. *Interact. Comput.* 15, 665–691. doi: 10.1016/S0953-5438(03)00058-4

Ramírez-Benavides, K., and Guerrero, L. A. (2015). MODEBOTS: environment for programming robots for children between the ages of 4 and 6. *IEEE Rev. Iberoam. Tecnol. Aprendizaje* 10, 152–159. doi: 10.1109/RITA.2015.2452692

Ridwan, A., Rahmawati, Y., and Hadinugrahaningsih, T. (2017). STEAM integration in chemistry learning for developing 21st century skills. *MIER J. Educ. Stud.* 7, 184–194.

Sanabria, J. C., and Arámburo-Lizárraga, J. (2017). Enhancing 21st century skills with AR: using the gradual immersion method to develop collaborative creativity. *EURASIA J. Math. Sci. Technol. Educ.* 13, 487–501. doi: 10.12973/eurasia.2017.00627a

Sawyer, R. K. (2012). *Explaining Creativity: The Science of Human Innovation*. New York, NY: Oxford University Press.

Seitamaa-Hakkarainen, P., Viilo, M., and Hakkarainen, K. (2010). Learning by collaborative designing: technology-enhanced knowledge practices. *Int. J. Technol. Design Educ.* 20, 109–136. doi: 10.1007/s10798-008-9066-4

Smith, H., Underwood, J., Fitzpatrick, G., and Luckin, R. (2009). Classroom e-science: exposing the work to make it work. *Educ. Technol. Soc.* 12, 289–308.

Sternberg, R. J., and Lubart, T. I. (1999). "The concept of creativity: prospects and paradigms," in *Handbook of Creativity,* ed R. J. Sternberg (New York, NY: Cambridge University Press), 3–15. doi: 10.1017/CBO9780511807916.003

Sullivan, F. R. (2011). Serious and playful inquiry: epistemological aspects of collaborative creativity. *Educ. Technol. Soc.* 14, 55–65.

Toma, J. D. (2006). "Approaching rigor in applied qualitative research," in *The Sage Handbook for Research in Education: Engaging Ideas and Enriching Inquiry,* eds C. F. Conrad and R. C. Serlin (Thousand Oaks, CA: Sage Publications, Inc.), 405–423. doi: 10.4135/9781412976039.n23

Vygotsky, L. (1987). *The Collected Works of L.S. Vygotsky*. New York, NY: Plenum Press.

Wegerif, R. (2015). How can dialogic theory help us understand the role of technology in teaching thinking for the Internet age? *Distance Educ. China* 3, 21–30.

Wimmer, L. (2016). Problem solving as a sufficient condition of the creative process: a case for closer cooperation of creativity research and problem solving research. *Front. Psychol.* 7:488. doi: 10.3389/fpsyg.2016.00488

Wishart, J., and Triggs, P. (2010). MuseumScouts: exploring how schools, museums and interactive technologies can work together to support learning. *Comput. Educ.* 54, 669–678. doi: 10.1016/j.compedu.2009.08.034

Yager, R. E. (2005). A vision for what science education should be like for the twenty-five years of a new millennium. *Sch. Sci. Math.* 100, 327–341. doi: 10.1111/j.1949-8594.2000.tb17327.x

Yang, Y.-T. C., and Chang, C.-H. (2013). Empowering students through digital game authorship: enhancing concentration, critical thinking, and academic achievement. *Comput. Educ.* 68, 334–344. doi: 10.1016/j.compedu.2013.05.023

Zhang, J., and Sun, Y. (2011). Reading for idea advancement in a grade 4 knowledge building community. *Instruct. Sci.* 39, 429–452. doi: 10.1007/s11251-010-9135-4

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor declared a shared affiliation, though no other collaboration, with the authors.

Advantages of publishing in Frontiers

OPEN ACCESS
Articles are free to read for greatest visibility and readership

FAST PUBLICATION
Around 90 days from submission to decision

HIGH QUALITY PEER-REVIEW
Rigorous, collaborative, and constructive peer-review

TRANSPARENT PEER-REVIEW
Editors and reviewers acknowledged by name on published articles

Frontiers
Avenue du Tribunal-Fédéral 34
1005 Lausanne | Switzerland

Visit us: www.frontiersin.org
Contact us: info@frontiersin.org | +41 21 510 17 00

REPRODUCIBILITY OF RESEARCH
Support open data and methods to enhance research reproducibility

DIGITAL PUBLISHING
Articles designed for optimal readership across devices

FOLLOW US
@frontiersin

IMPACT METRICS
Advanced article metrics track visibility across digital media

EXTENSIVE PROMOTION
Marketing and promotion of impactful research

LOOP RESEARCH NETWORK
Our network increases your article's readership