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# Pedagogical change and innovation culture in secondary education: a Delphi study

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Secondary education in Spain is being the most controversial educational stage in educational reform processes, in relation to youth cultures and ways of learning and knowing in the emerging digital society. We present the results of the application of a Delphi methodology, as the first phase of a broader research on disruptive practices in Secondary Education. Its aim was to gather the opinion of 20 experts on how educational innovation processes are perceived at this educational level, as well as the mediations on which they are based. The Delphi questionnaire was applied in 3 Spanish regions (Andalusia, Castile and Leon, Extremadura) and was carried out in two consecutive rounds. Subsequently, focus groups were held with these experts in each of the regions. The results are grouped around 4 axes: the school institution, learning in non-formal contexts, educational innovation and innovation culture, and technological mediation. The conclusions reveal the main limitations of Secondary Education in Spain: lack of curricular flexibility, leadership for change and openness to the community, technocentric vision of educational innovation and insufficient training in digital competence of teachers.

## KEYWORDS

educational innovation, educational change, role of education, secondary schools, Delphi technique

## 1. Introduction

Students in secondary education in Spain are characterized by a progressive lack of motivation toward learning throughout their education at this stage, and low participation in the classroom. Moreover, their academic goals are oriented toward obtaining the minimum grade necessary to avoid repeating a year. Students perceive the educational process as being result-oriented rather than process-oriented. They feel they are taught to pass exams rather than to learn, that there is an excessive demand for memorization, and that content is repeated and of little use. Teaching methodologies do not motivate them, they are transmissive and not very stimulating. Their relationship with teachers is not satisfactory, and they demand a type of teacher with better communication and guidance skills (van Leeuwen and Janssen, 2019; Vázquez-Toledo et al., 2021).

Grade retention is not automatic in Spain, and is a major problem in Compulsory Secondary Education (ESO) (Goos et al., 2021; Jerrim et al., 2022; Santos et al., 2023). According to PISA data, Spain ranks third among countries with the highest percentage of 15-year-old students who have repeated at least once (28.7%). Socio-economic and cultural level are predictors of the repetition rate at age 15: a lower level corresponds to a higher degree of repetition. On the other hand, grade retention is a good predictor of a lower graduation rate in ESO. Consequently, repetition is a phenomenon that particularly affects socially disadvantaged students. Educational compensation mechanisms in Spain are not effective (Martínez-Valdivia and Burgos-García, 2020; López-Rupérez et al., 2021). Among the factors identified to explain the high retention rates of Spanish students in secondary education are the following: (a) a highly extensive, academicist and propaedeutic curriculum; (b) secondary school teacher training does not adequately trained teachers with the pedagogical skills needed to overcome isolated work in the classroom, it is dependent on the textbook and oriented, fundamentally, toward conceptual learning and mechanical activities; (c) educational investment in Spain does not provide sufficient resources to act regarding learning difficulties from the moment they are detected with the reinforcement and attention measures required by the diversity of students; (d) the organization of educational centers is based on a group of students per classroom that have one teacher in each teaching period who imparts a subject predominantly by means of the lecture class; (e) the different educational regulations governing assessment and the passing of the year have not managed to reverse the high rates of repetition in Spain in comparison with other European countries (Consejo Escolar del Estado, 2020).

The most important variables influencing teacher satisfaction in secondary education in Spain are participation and collaboration in the school, as well as the school's support for new initiatives that foster an innovative environment (Echeverría-Molina and Sanchez-Cabrero, 2021). However, in Spain, there is no tradition related to the development of collaborative teacher practices such as assessing peers through direct observation, carrying out cooperative activities with other classes of different ages or collaborating to teach as a team (Fernandez Díaz et al., 2015). Forty per cent of teachers never teach collaboratively with others in a classroom, nor do they observe others as they develop their teaching practices (OECD, 2019). Co-teaching is a practice that offers complementarity of the different skills and competencies of teachers, allows professional learning in the practice itself, favors the integration of novice teachers, offers greater and better feedback on the educational process, enables a better diagnosis of the classroom ecosystem, supports sustainable innovation, shows itself to be a model of collaborative learning, promotes transparency, offers a less stressful work experience, reduces absenteeism and is a remedy against teacher isolation in the classroom (Fernández Enguita, 2020; Härkki et al., 2021; Rönn-Liljenfeldt et al., 2023).

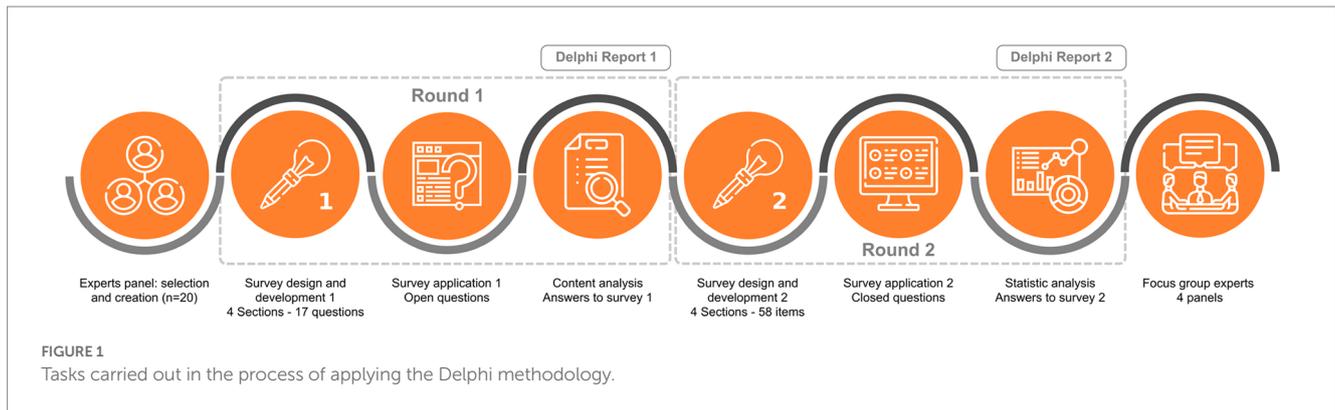
Teacher training in Spain takes the form of university degrees for early childhood and primary education teachers (four academic years), and a master's degree for secondary education teachers (one academic year; Gonzalez Sala et al., 2020). The undergraduate scientific specialization of future secondary school teachers, which gives access to postgraduate studies, does not include didactic training (Rebolledo Gámez, 2015). Until the academic year 2009–2010, secondary school teacher training consisted of a teaching skills course established by an educational law in 1970. However, this teacher

training process continues to be questioned by experts due to its limitations in promoting a professional culture adapted to the demands of 21st-century society (Escudero et al., 2019; Imbernón, 2019). There are different studies that identify significant deficiencies in the current initial training of secondary education teachers in educational inclusion and attention to diversity (López-Torrijo and Mengual-Andrés, 2015; Garcia-Garcia et al., 2020). In fact, students themselves identify the competence “designing and developing both group and personalized teaching methodologies adapted to the diversity of students” as the least developed in their initial training period (Sarceda-Gorgoso et al., 2020). Secondary education teachers recognize a lack of specific training to carry out their tutorial and guidance role (Vélaz-de-Medrano Ureta et al., 2013; González-Benito et al., 2018). Students of this postgraduate course in Spain show three different profiles: (a) a “circumstantial” motivation since they do not have a good opinion of teaching and take the course because it is a viable professional outlet (25%); (b) a “found” vocation, that emerged during the training process after having had no initial interest in teaching (33%); and (c) an “intrinsic” teaching vocation manifested by a desire to take up the profession due to their own employment preferences (42%; Muñoz-Fernandez et al., 2019).

In response to these problems, a new education law has been enacted in Spain (Estado español, 2020) to develop a “more open and less rigid” education system. It promotes “competent, autonomous, meaningful and reflective learning” in all compulsory secondary education subjects. Interdisciplinarity is encouraged through “learning situations” or integrated, inclusive, and contextualized pedagogical proposals that involve the development of tasks. “Service-learning” is introduced through collaborative community service projects. It has been established that the promotion of students from 1 year to the next will be decided by the teaching team. Grade repetition is considered “an exceptional measure” and must be subject to a “specific personalized plan.” Finally, the new law highlights the need to consider the digital change that is taking place in our societies and that affects educational activity.

Schools in Spain are increasingly required, from educational administrations and other public and private organizations, to implement pedagogical innovation projects. This phenomenon is a consequence of the emergence of a new educational ecosystem in which new goals and competencies are proposed, new methodologies are incorporated, and developing digital technologies emerge. All this forces us to redefine the very identity of schools and their functions in this new reality (Trujillo Sáez et al., 2020; Fernández-Miravete and Prendes-Espinosa, 2021).

The concept of “innovation” is complex because it refers simultaneously to a process and an outcome. From the analysis of a sample of 100 academic definitions of innovation from 10 different disciplines, including education, between the years 1934 and 2017, Morad et al. (2021, 11) concluded that “innovation is defining a need or a problem, generating new or changed ideas, and developing an outcome under new or changed ideas, implementing a new or improved outcome for the addressee, and adopting a new or improved outcome with added value.” Any innovation process is defined by five meta-components (Morad et al., 2021): (a) the definition of a need or problem: its identification can be an opportunity for innovation; (b) the production of new ideas or the modification of previous ideas: innovation is associated with “invention” and “discovery”; (c) the achievement of an outcome derived from new or modified ideas: this



involves the development, creation or application of the novel or recreated idea, to generate a product, process, service, method, technique, technology, etc.; (d) the application of the new or improved outcome by the recipients: it allows for the determination of the impact of the innovation, the degree of novelty, and the estimation of its success; and, finally, (e) the adoption of a new or improved outcome with added value: innovating involves the use of the novel or modified outcome for the improvement of a situation in a specific context. Halász (2018, 571) defines educational innovation as “deviation from routine operations (in various operational areas) and as the presence or adoption or sharing of novel solutions.” In education, innovation can appear as a new pedagogical theory, methodological approach, teaching technique, instructional tool, learning process or organizational structure which, when implemented, brings about a significant change in teaching and learning (Serdyukov, 2017).

The change process taking place in organizations is expressed through an “innovation culture,” which has been defined as “a multi-dimensional context which includes the intention to be innovative, the infrastructure to support innovation, operational level behaviors necessary to influence a market and value orientation, and the environment to implement innovation” (Dobni, 2008, p. 540). Innovation culture includes values and beliefs deeply rooted in the organization that are shared by its members and manifested through behaviors that encourage creativity, risk-taking, autonomy, collaborative work, or the search for solutions. Innovation culture is defined by six dimensions or factors (Danks et al., 2017): (1) resources (people, projects, and systems); (2) processes (ideation, prototyping, flexibility); (3) successes (individual, corporate, external); (4) values (creativity, learning, entrepreneurship); (5) behaviors (commitment, adaptation, vision); and (6) climate (collaboration, safety, facilitation).

In order to find out about the characteristics of pedagogical change and about the culture of innovation in secondary education, through the eyes of experts, the following research questions have been proposed:

P1. According to the view of experts in educational innovation, what are the opportunities/possibilities, challenges, problems and limitations of secondary education in the following dimensions: school institution, social and inclusive education, culture of innovation and technological mediation?

P2. What innovative educational models and/or practices emerge from the vision of the experts in each of these dimensions?

## 2. Methodology

The Delphi technique is a methodology that enables us to consult with experts for the purposes of obtaining consensus opinions and the view that represents the group (Reguant Alvarez and Torrado Fonseca, 2016). Even though there is no universal, standardized procedure (Keeney et al., 2006), this technique does follow a series of steps adopted by researchers (Flostrand et al., 2020): (1) the identification of a panel of experts who contribute knowledge, expertise and ideas, from different areas associated with the research topic, and who undertake to participate in the study. The ideal size for a panel of experts is considered to be between 12 and 30 participants (Landeta, 1999). The selection of experts is key to the quality of the process and the results in this methodology (López-Gómez, 2018); (2) the application of a personalized survey given to each panelist to find out their preferences, interpretations, evaluations or predictions about the subject of the study, which enables us to openly and accurately obtain answers to the research questions; (3) the integration of all the information from step 2 in a report that categorizes the main ideas and meanings; (4) the sharing of these results through a second survey for each panelist, with closed questions and drawn up on the basis of all the experts’ contributions as included in the report in step 3 (Meijering and Tobi, 2018) (5) the analysis of the data from the second survey, with central tendency measures and/or variability, to reach a convergence between the panelists; (6) the results are finally returned to the panelists on an individual basis or through discussion groups (Figure 1).

### 2.1. Participants

A total of 20 experts (10 women and 10 men) took part in our Delphi study, all with professional experience in secondary education. They come from different areas of knowledge and have recognized innovative teaching practices (active and collaborative methodologies, integration of digital technologies, and participation in teaching networks) (Table 1).

We conducted this study in keeping with the “Ethical guidelines for educational research” (BERA, 2018). All the participants agreed to take part voluntarily, giving their informed consent and on the understanding that they could freely leave the study at any time. They all signed a participation and confidentiality agreement in

TABLE 1 Experts' profile of Delphi Study II.

Expert	Sex	Education	Subject area	Teaching experience (years)	current job
EXP01	Male	Degree in Physical Education	Physical Education	35	Secondary School Principal
EXP02	Female	Degree in Physical Education	Physical Education	15	Teacher Guidance and Counselling
EXP03	Male	Degree in Mathematics	Mathematics	12	Secondary School Teacher
EXP04	Female	Degree in Hispanic Philology	Spanish Language and Literature	17	Secondary School Teacher
EXP05	Male	PhD in Psychology	Pedagogy and Psychology	39	School Counselling
EXP06	Male	PhD in English Philology	Didactics of Language and Literature	25	Secondary School Teacher
EXP07	Female	Degree in Philosophy	Philosophy	30	Secondary School Principal
EXP08	Female	Degree in English Philology	English	11	Secondary School Teacher
EXP09	Female	Degree in Hispanic Philology	Spanish Language and Literature	4	Secondary School Teacher
EXP10	Male	Degree in Chemistry	Sciences	24	Secondary School Principal
EXP11	Female	Master's degree in Digital Education	Special Education	16	Intermediate Administrative Units
EXP12	Male	Degree in Hispanic Philology	Spanish Language and Literature	35	Teacher Guidance and Counselling
EXP13	Male	Degree in Geography and History	Geography and History	19	Intermediate Administrative Units
EXP14	Male	Degree in Physical Education	Physical Education	16	Intermediate Administrative Units
EXP15	Female	Degree in Administration and Business Management	Organization and Business Management	15	Intermediate Administrative Units
EXP16	Male	Degree in Biology	Biology	32	Teacher Guidance and Counselling
EXP17	Female	Degree in Pedagogy	Pedagogy and Psychology	32	School Inspector
EXP18	Female	PhD in Pedagogy	History	18	Secondary School Teacher
EXP19	Male	Degree in Pedagogy	Pedagogy and Psychology	20	Intermediate Administrative Units
EXP20	Male	Degree in Pedagogy	Pedagogy and Psychology	35	Secondary School Teacher

which the methodological process to be followed was specified, and included the project's commitment to return of results processes.

## 2.2. Instruments

Two questionnaires were designed and applied, both arranged around four topics: (1) the school institution; (2) learning in non-formal contexts; (3) educational innovation and the culture of innovation; and (4) technological mediation. The Delphi I questionnaire is made up of 17 open questions.<sup>1</sup> For the analysis stage, a qualitative methodology of content analysis was applied (Drisko and Maschi, 2016; Neuendorf, 2017) using a process of coding and classifying in three stages: open, selective and theoretical coding (Bryant, 2017; Bryant and Charmaz, 2019).

The iterative nature of the Delphi technique requires both the consensus and agreements between the experts, as well as the differences of opinion, to be identified, after each stage, and which must be included in subsequent phases. For the Delphi 2 questionnaire, a wide selection of questions were used (58 items) where the panelist was required to arrange a set of answers (between 4 and 8 options for each item) according to their greater or lesser

degree of importance.<sup>2</sup> The selection of the items and their corresponding answers were drawn up on the basis of the results of the qualitative analysis of the Delphi I questionnaire. The literal expression provided by the panelists was respected in the preparation of the options as much as possible. To analyze the data, the percentage of mentions obtained by each option given within an item was used, and the weighted value percentage, to obtain the final classification. Lastly, different online discussion groups were carried out according to the panelists' geographical areas (Andalusia, Castile and Leon, Extremadura). The transcripts were analyzed and their results were included in the experts' final agreements. Two data coding processes were carried out, one on the first questionnaire and a second refining the analysis of the second questionnaire. The two encoding processes are shown in Table 2.

## 3. Results

The following sub-headings show the main answers that were obtained after the aforementioned method had been applied, also split into the four previously outlined topics. Within each section, to ensure the structure is simple and operational for the reader, the results are divided into: (a) opportunities and possibilities; (b) challenges, to

1 <https://figshare.com/s/3351a545117b44c1f493>

2 <https://figshare.com/s/81aef66d3c3daec09a0d>

TABLE 2 Delphi I and II: codification process.

Survey sections	First phase codification	Second phase codification
I. School institution	Challenges of secondary education	Challenges of secondary education
	Curricular changes	Curricular changes
		Curricular changes to improve teaching
	Standardized tests	Standardized tests
Effects of standardized tests		
Opening of the school to the context	Opening of the school to the context	
	School activities with the community	
II. Learning as education and social inclusion	School-context relationships	Educational projects in collaboration with the social community
	Teenagers' learning contexts	Exchange scenarios for secondary education
		Components of the school culture that make it difficult to connect with student learning
	Connections between academic and non-academic learning	Weaknesses of the curriculum that affect student learning
Proposals on how to improve the relationship between students and learning		
III. Educational innovation and culture of innovation	Concept	Ideas around educational innovation
		Trends in educational innovation
		Current definition of «educational innovation»
	Objectives	Promotion of educational innovation
	Teacher participation	Involvement of families and social agents
		Relations between innovation and school organization
Opposition	External pressures affecting educational innovation	
	Resistance to educational innovation	
IV. Technological mediation	ICT characteristics	Characteristics of ICT as a source of information
		Characteristics of ICT regarding its educational possibilities
	ICT and personal development	Relationship of ICT with new cognitive skills
		Physical-emotional problems related to ICT
		Dangers linked to digital technologies
		Effects of ICT on attention and interest
		Digital competence of students
	ICTs and social development	Potential of ICTs for participation and social change
		Use of ICTs to promote autonomy, inclusion and critical thinking
		Development of open knowledge and creativity through digital technologies
	ICT in education	Recognition of change by the education system
		Role of emerging technologies in education
		Role of media literacy in education
		Relationship of digital technologies with curricular change
		ICT infrastructures in education
		The coordination of schools
		ICT planning problems in education
		Introduction of new teaching methods
	Role of the educational administration in ICT matters	
Teachers and ICT	Characteristics of digital teacher education	
	Training needs in digital skills	

respond to the first question in the study (P1); (c) problems; and (d) limitations, to respond to the second question in the study (P2). The texts of the items that achieved the greatest agreement among the experts are included, and their weighted average and maximum value indicated (Table 3).

### 3.1. The school institution

The experts' views as regards the school institution do not add any particularly significant elements regarding the current operating model. Some proposals are suggested for improvements in specific

TABLE 3 Synthesis of the main Delphi results.

	Opportunities/ possibilities	Challenges	Problems	Limitations
The school institution	<ul style="list-style-type: none"> <li>- Curricular flexibility</li> <li>- Learning to learn</li> </ul>	<ul style="list-style-type: none"> <li>- Participatory education models</li> <li>- Emotional education</li> <li>- Strengthening fundamental literacies</li> <li>- Dealing with student diversity</li> <li>- Relationship with the community</li> </ul>	<ul style="list-style-type: none"> <li>- Truancy, school absenteeism</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of flexibility in schools</li> </ul>
Learning as education and social inclusion	<ul style="list-style-type: none"> <li>- Collaborative projects</li> <li>- Active methodologies</li> </ul>	<ul style="list-style-type: none"> <li>- Community communication channels</li> <li>- Curriculum Enrichment</li> </ul>	<ul style="list-style-type: none"> <li>- Teacher-centered instruction</li> <li>- Pedagogical training with deficits</li> <li>- Family involvement</li> </ul>	<ul style="list-style-type: none"> <li>- Assessment models</li> <li>- Out-of-school education</li> <li>- Leadership for change</li> </ul>
Educational innovation and culture of innovation	<ul style="list-style-type: none"> <li>- Student-centered instruction</li> <li>- Responding to students' demands</li> <li>- Distributed leaderships</li> </ul>	<ul style="list-style-type: none"> <li>- The teacher as reflective practitioner</li> <li>- Avoiding innovation islands</li> </ul>	<ul style="list-style-type: none"> <li>- Incentives for educational innovation</li> <li>- Workload and time constraints</li> </ul>	<ul style="list-style-type: none"> <li>- Technocentric view of educational innovation</li> </ul>
Technological mediation	<ul style="list-style-type: none"> <li>- The transformative power of digital technologies</li> <li>- Motivational effects of ICT</li> </ul>	<ul style="list-style-type: none"> <li>- ICT education model</li> <li>- New literacies</li> <li>- Redefining educational spaces</li> <li>- Personalized learning</li> </ul>	<ul style="list-style-type: none"> <li>- ICT and sociability</li> <li>- ICT and physical and mental health</li> </ul>	<ul style="list-style-type: none"> <li>- Teacher training for digital competence</li> <li>- Cognitive effects of ICT</li> </ul>

areas of the curriculum, the methodologies, and how they can open up to their local environment; all were related to greater flexibility in the three dimensions. The experts express little confidence in international tests and their capacity to have an impact on changes in the school institution. In fact, very little value is placed on them for daily operation, to the point that they can also be perceived as a problem, due to the effects caused by the increase in competitiveness or the pressure placed on contents, curriculum and teaching.

### 3.1.1. Opportunities/possibilities

The first dimension that we can consider relates to the curriculum. To this effect, a clear need for greater flexibility is observed, which leads to greater teaching autonomy, methodological change and an improvement in the coordination of teaching staff.

“Curricular flexibility.” (3.6/5)

Next, we find questions that are more focused on students and their learning. The competence defined as “learning to learn” resulted in a high level of consensus. This entails greater student autonomy, where students take on a more central role in their learning, as well as being more motivated toward new concepts and skills, which are implicit in this competence.

“The acquisition of the ‘learning to learn’ competence.” (3.26/5)

With regard to the standardized assessment tests, in the opinion of this group of experts, it appears evident that, they contribute very little to improving education. They are seen more as tests mediated by different contexts, from which results to all the diverse situations cannot be generalized.

“These assessments can be conditioned by each center’s social, demographic, economic and cultural context” (3.7/5) “They fall short in their evaluation of the knowledge and skills acquired in the classroom because they are decontextualized.” (3.4/5)

### 3.1.2. Challenges

According to these experts, the challenges facing the education institution revolve around two components: the curriculum and the necessary relations with the environment, although the evaluations in one way or another change a lot. With regard to the curriculum, the main challenge is to break away from current educational systems, and move toward curricular flexibility. Greater emphasis is placed on changing the procedures rather than the contents, which are not perceived to be urgently in need of transformation. In contrast, reinforcing the subjects that are considered to be fundamental literacies takes on greater importance, making a certain distinction between the creative and the instrumental dimensions.

“Abandon the educational models for participative models, where the teacher becomes a mediator” (5.3/7); “Modification of methodologies and organization (time/space)”. (4.7/7) “Incorporation of creativity, emotional education, a culture of thinking and transfer of values”. (4.6/7) “Strengthen the fundamental literacies (language, mathematics, science and technology, digital, artistic and musical literacies).” (4.15/7)

Furthermore, the greatest consensus was reached in the need to deal with student diversity, which, in a scenario of growing inclusiveness, is clearly perceived as a challenge for the education

system, at least as far as intentions are concerned. This also leads us to place the emphasis on students as essential participants in educational change, valuing the development of emotional intelligence, with the consequences this entails for their autonomy.

“Effectively deal with student diversity”. (4.95/7) “Develop emotional intelligence and student autonomy.” (4.32/7)

With regard to the contexts, the need for a greater presence of school institutions is valued, with them taking on a more active role in the environment in order, to boost change and act as a cultural engine. All this reveals a more permeable situation between the center and its environment, but it still has little effect on the population.

“Schools must take on a more active role with the population and have a greater presence in neighborhoods, villages and online (through ICT).” (3.2/4)

### 3.1.3. Problems

One of the main problems that arose is the students’ disaffection with the education center. Hence, the need to reduce school absenteeism, or truancy, is perceived as being just as important as the need to introduce active methods.

“End school absenteeism.” (5.2/7)

The other problem that appears in the majority of the most valued responses, is related to the institution’s rigidity. This fits in with the observed need for less instructive models with greater flexibility, or less rigid organizational models. There were reiterated responses that show a clear common theme or “route plan”.

“The school institution must drop its rigid models.” (3.63/5)

### 3.1.4. Limitations

The limitations follow the same line, with regard to the closed view of the institution and how overly rigid it is when it comes to the curriculum and organization. Thus, the center’s greater openness to their environment is valued as highly important, while bearing in mind that they are still only at the beginning of this opening up process. To this effect, emphasis is placed on the need to drop inflexible models.

“The classroom doors are still too closed; they are gradually opening, but only very slowly.” (3.68/5)

## 3.2. Learning as education and social inclusion

In this section, we explored those topics that are related to learning in non-formal contexts and their relationship with education and learning processes in secondary education centers.

### 3.2.1. Opportunities

For the experts who participated in the study, the opportunity to integrate learning that arises in the environment goes through two key processes. On the one hand, the development of collaborative projects with agents outside of the education center generate a wide range of contextualized learning.

“They have high educational value because they promote a wide variety of non-formal interactions, where a myriad of spontaneous learning occurs.” (3.42/4)

And on the other hand, the development of this learning through active and holistic methodologies, collaborative learning and joint classroom practice proposals among the teachers, which facilitate personalized attention.

“Learning through education projects and collaborative learning”. (4.84/6) “Shared teaching, to respond to diversity and to foster personalization in education.” (4.1/6)

These methodologies make pedagogical sense because there is a consensus on how to improve learning processes among young people, which is, essentially, within their peer group.

“Young people learn with their peer group.” (3/5)

Likewise, the development of methodologies with community links is seen as a great opportunity, where young people feel useful in their close social context.

“Young people learn from the outside with methodologies such as service learning, in which they find great motivation, as they are able to see how society can be transformed.” (3.84/6)

### 3.2.2. Challenges

Among the challenges facing secondary education in its relationship with the environment, the experts agree that there is a positive predisposition to establish communication channels with the community, although the process is deemed to be advancing at a slow pace with no solid base.

“There is a growing interest in establishing synergies between the center and its community environment, but this connection is happening very slowly and is still not sufficiently developed”. (3.57/5)

A second challenge is that of the development of a much more balanced curriculum between the more academic elements and those that have an impact on local or everyday reality.

“The balance between the ‘general and global’ curriculum and that which is dealt with in a more ‘specific and localized’ way, through activities and projects carried out locally, is key to good educational organization.” (2.78/4)

Furthermore, the aim to place students at the heart of the education process is also considered a challenge, and which entails

putting in place a range of strategies, such as the use of tools and procedures to discover students' education needs and help in the development of their individual capacities.

"Detect the students' needs and allow their skills to emerge." (4.31/5)

Alternatively, efforts can be made to promote students' active participation in the pedagogical model, actively involving them in their own learning process.

"Change the education model: from 'for the students' to 'for and with the students'." (3.57/5)

### 3.2.3. Problems

There is considerable consensus among the experts regarding the problems encountered by secondary education to integrate this learning and these environments in the different centres and classrooms. The main difficulty appears to be the development of classroom teaching practices with a predominance of methodologies based on information transmission, with the student playing a passive role:

"Methodologies that are neither participative nor active." (4/5)

In this regard, they acknowledge that methodological transformation in secondary education is still takes place on a minor scale.

"A small number of centers implement active, dynamic and attractive ICT-based methodologies in projects or workshops that connect with the students." (3.89/6)

Moreover, they find the root cause of the problem in the teachers' lack of pedagogical training for teachers in different methodologies that can promote change.

"The lack of teacher training in new pedagogies and the few resources available to be able to develop them effectively." (5.26/8)  
 "Insufficient technical training and, above all, methodological training to be able to consider new classroom models." (3.05/5)

Lastly, the limited involvement of families in the center's development and the curriculum is also seen as a problem.

"The families' involvement is limited to attending a parent-teacher meetings." (3.1/4) "Families and other institutions play a very limited role in the education centers, sometimes it is even non-existent." (2.8/4)

### 3.2.4. Limitations

Certain limitations are established when it comes to including non-formal learning in secondary education. On the one hand, the education centers' culture and their learning proposals are disconnected from young people's interests.

"Distance between the young people's centers of interest and the teachers' curricular projects." (5.36/8)

In this regard, the activities outside of school hours are recognized as being the center's only link with its environment.

"Interaction is limited to after-school activities or cross-curricular programs as part of the tutorial action." (3.42/5)

Another limitation is related to the role of assessment in students' learning and how this is applied on a general basis in classrooms.

"Assessment models that make it difficult to develop other activities." (3.63/5)

Lastly, a limitation has been identified that is associated with a more systematic component, which is education managers' absence of vision as regards innovation.

"Lack of leadership or courage on the administration's part to implement any significant changes." (4.21/5)

## 3.3. Educational innovation and culture of innovation

The experts, with regard to the concept of innovation in education and its incorporation into school culture, in response to the search for opportunities, challenges and problems that were raised in the first research question (P1), express the following:

### 3.3.1. Opportunities

On the one hand, the student is placed at the center, so that innovation has the main objective of their training in its sights. From a competence point of view, the purpose of this is to endeavor to change what is not currently working in traditional education models and which need to be modified.

"The purpose of educational innovation is to ensure that students can develop their potential, skills and abilities." (5.2/7)  
 "Educational innovation entails changing something that is not working, not change for change's sake. It must be implemented to meet a genuine need for change." (4.8/7)

In the same way, even though the essential role of teachers is recognized in the task of promoting the processes of innovation, there is an openness toward the co-design of training activities by students, or at least a kind of reverse directionality: students' demands are what promote a more innovative or attractive teaching process.

"Innovation is mainly promoted by the teaching staff, and motivated by the students, who demand more attractive teaching." (6.1/7) "The agents that promote innovation are wide-ranging: teachers, students, families, teaching centers, and the education inspectorate." (4.3/7)

On the other hand, as regards the centers' organization and their relationship with innovation, the experts also bear in mind the importance of distributed leaderships within education centers and the search for more open, horizontal and democratic models. Institutions that are more participative and open to the outside (families, local environment, other centers, etc.) are the ones that generate educational contexts in which innovation can emerge.

"The governing board must exercise democratic leadership that provides opportunities for innovation, generating a climate of trust and collegiality." (6.7/8) "Educational innovation needs the entire education community to get involved and a connection with the environment and other education centers is essential." (6.1/8)

### 3.3.2. Challenges

The experts feel that innovation allows for a reflection on the teaching-learning processes, and that it promotes the development of new education models that are better than the current options. However, the challenge arises when it comes to converting these improvement processes into ones that are genuinely shared by the teaching staff as a whole. In general, innovation emerges in small core groups of teachers.

"Innovation is a continuous process of reviewing and improving the established educational paradigm." (6.3/8) "Innovation normally emerges in a group of teachers rather than in the teaching staff as a whole." (4.7/8)

Another challenge raised is to connect innovation with reflexive research processes in the classroom. The experts do not consider a scenario in which innovation and research are independent processes, as they need each other to attempt to respond to today's ever-changing conditions. Innovation enables teaching to be updated and connected to the real world.

"Innovation is a process in which what we do and how we do it are questioned, which is the result of constant reflection that requires changes and adaptations in a wide range of fields." (6.3/8) "Innovation cannot be understood without research." (5.8/8) "Innovation must be promoted because it is necessary to gradually adapt education processes to changes in contexts, emerging values, neuroscientific discoveries, employment and people's needs." (6.4/8)

### 3.3.3. Problems

Several difficulties have been identified when promoting innovation processes in education centers. Firstly, the experts perceive a certain misguided motivation when it comes to encouraging this culture of innovation. The incentive seems to be more related to extrinsic rather than intrinsic motivation.

"Innovation is implemented for reasons of social recognition or to receive administrative and/or economic rewards." (3.2/4)

Secondly, there are clearly certain shortcomings in teachers' training, and the solution to this issue in education centers is through training in new teaching methods.

"A certain lack of training is perceived regarding innovation processes." (5.2/7) "Innovation in the center comprises teacher training aimed at methodological change." (4.8/7)

Lastly, the principal resistance expressed by the experts regarding the implementation of educational innovation is the lack of time in the schedule and the fact that the teachers' working day is fully occupied.

"Lack of time, work overload, organization of fixed working hours, routines and rituals." (6.3/8)

With regard to the second research question (P2), the experts' view on educational innovation and the culture of innovation does indeed reveal certain barriers.

### 3.3.4. Limitations

The main limitation is the principal and essentially technocentric view commonly held of educational innovation in schools. The experts do not hesitate to express their view that what currently defines an educational practice as an innovative practice in education centers is the use of ICTs.

"Educational innovation is currently defined as the use of digital technologies." (5.2/7)

## 3.4. Technological mediation

In the experts' opinion, the role of digital technologies within the teaching-learning process produces the following results:

### 3.4.1. Opportunities

The generic utility of digital technologies and their power to transform the education process are valued.

"Technology is revolutionizing our lives, and it has great educational potential". (3.9/6) "ICT provides fast, easy access to all kinds of information". (3.8/5) "Digital technologies are important both inside and outside school, which is why they should not be prevented from being used in education centers." (6.8/8)

In addition, ICTs are seen to have a positive motivational effect on students, as they are able to deal with individual differences, and enable learners to adopt more active role.

"Digital technology has provided a great incentive to motivate young people and to connect with their interests." (3.9/6) "Digital technologies enable schools to ensure attention to diversity, personalized education and a respect for individual learning patterns". (5.2/7) "Technology gives students a new role, the chance to be an agent of change, in other words, to be more proactive in the teaching-learning process." (5.1/7)

### 3.4.2. Challenges

The experts believe that technological tools are a necessary means or resource, but that they should be subordinated to an educational model.

“Digital technologies must not be considered as an end in themselves, but rather as a means or a tool.” (4.6/6) “Provide sufficient computers for all students.” (5.2/8) “The fundamental challenge lies in designing an education model with technology, not just for technology.” (6.1./8)

From a curricular and organizational perspective, the integration of digital technologies requires new educational media skills, active methodologies and an interdisciplinary nature.

“The use of ICT for learning requires a didactic and pedagogical approach.” (5.6/8) “The curriculum must include media education, understood as knowledge of the media and the development of a critical attitude toward the information it disseminates.” (3.6/5) “The school institution must provide educational experiences that awaken the students’ interest in learning and enable them to take an active role in the process.” (6.2/7) “Promote the creative design of learning projects that include technology across the board, where all areas of the curriculum are reflected, and develop all skill profiles.” (4.8/7) “Classrooms must become spaces where it is easy to use active methodologies, where it is simple to use technology and where interaction is fostered.” (5.8/8)

A change in attitude must be brought by encouraging people to correct mistaken ideas and dispel myths about the effects of technology in the education process, as well as changing contradictory behavior regarding their use in schools.

“Overcome prejudices related to ICT limitations and know how to harness their advantages.” (4.1/6) “Inconsistencies must be overcome: we idealize the use of ICT in the teaching-learning process, while at the same time we ban the use of mobile phones in the classroom.” (6.1/8) “The greatest challenge is to accept the reality.” (3.5/5)

With regard to the organizational aspects, the experts call for the recreation of physical classroom environments to facilitate new interactions, and the design of a project for the center that enables an agreement to be reached on the model for digitally transforming the education community.

“Digital technologies must generate new learning spaces to create other organizational systems and to facilitate connectivity.” (3.7/5) “Drawing up a digital plan for the center to define common lines in the pedagogical use of technologies.” (4.7/7)

Education must go beyond merely academic limits and foster the development of civic competences of social commitment, critical vision and digital identity.

“There is a need to educate to achieve a proactive population with discerning judgement, by promoting critical thinking.” (4.6/7) “The creation of a responsible digital identity must be encouraged.” (3.5/5)

Lastly, the experts believe that digital technologies must contribute to a fairer access to education through personalized attention.

“Education must come together with a technological model that guarantees equal access to education, as well as sufficient flexibility to adapt to the needs raised by the centers in the medium term.” (4.9/6) “Provide a Universal Design for Learning (UDL).” (4.2/6)

### 3.4.3. Problems

Two main difficulties are identified concerning ICT. Firstly, with regard to sociability, technologies can lead to a lack of social exchange in different areas.

“The effects of digital technologies on individuals’ sociability or isolation depends on their personal and family characteristics.” (5.9/8) “A reduction in social relationships based on physical presence and face-to-face communication has been observed.” (5.1/7)

Secondly, the effects of technologies on the users’ physical and psychological health, which have a negative impact on the education process.

“Mental and physical disorders linked to a dependence on technologies have been observed, such as: postural habits, sedentary behavior, anxiety, insomnia, addictions, eyesight problems, etc.” (6.1/8) “Students are not yet mature enough to discriminate between what is healthy and what is potentially dangerous regarding digital technology.” (4.9/7)

### 3.4.4. Limitations

Firstly, there is a need to improve teachers’ digital skills through specific mandatory training.

“A mandatory training itinerary is necessary for teachers, aimed at acquiring digital teaching literacy.” (6.4/8)

The introduction of digital technologies in the education system as optional and dependent on the individual teacher’s decision is criticized.

“Technology is increasingly more present in our classrooms, but in most cases the choice is left to the teacher.” (5.1/7)

Lastly, the effects that the use of technological devices has on individual cognitive abilities is highlighted.

“The brain is influenced by technological changes and it modifies our mindset.” (5.2/8)

## 4. Conclusion and discussion

The main findings of this Delphi study correspond to the Spanish context, which has specific characteristics at Secondary level. However, some connections and similarities with the international context will be highlighted below.

## 4.1. The school institution: sustained innovation and curricular flexibility

From the consensus opinion of the experts, we can conclude that they are more inclined to back “sustained” innovation rather than “disruptive” innovation (Christensen et al., 2016). Sustained innovation is aimed at improving processes without significantly transforming the education system’s structure and organization. Including new methodologies and educational resources in teaching practice is encouraged, and these can be used in the classroom without greatly altering the balance of the ecosystem. The prevailing view of the teaching-learning process held by the education community, the education authorities and the industry itself, promotes sustained innovation and limits the introduction of disruptive innovation in the education system. These types of innovation are not demanded on a large-scale basis, they are more of a minority option and are not easily applicable in any training context. This result is in keeping with other studies in which teachers also perceive innovation as a process of adaptation to social and technological changes, not a matter of radical transformation or break-up (Pascual Medina and Navío-Gómez, 2018).

The pedagogical needs of education systems tend to be relatively stable over time, while teaching innovations emerge at a much faster pace (leaning in recent years, in particular, on digital technologies). These new educational proposals (designs, methods, resources) do not initially adapt to most education centers and teachers, as they include roles, organizational models or teaching materials that the education systems cannot use directly, due to training, administrative, economic or cultural reasons (Christensen et al., 2016).

“Curricular flexibility” is an innovative concept in education that the experts in this study are calling for. Different international organizations that are highly influential in defining the education policies in their countries, include greater autonomy for education centers regarding their innovation proposals (OECD, 2016). The Dutch education system has the highest level of school autonomy out of all the countries in the OECD, as it does not have a national curriculum and a high percentage (86%) of education centers are able to make key decisions regarding their organization, economy and personnel (Neeleman, 2019). Furthermore, the Portuguese education system has designed and applied a “Project for Autonomy and Curriculum Flexibility,” which has been analyzed due to its innovative nature (Silva and Fraga, 2021).

Furthermore, curricular flexibility requires flexible learning spaces that conform to the needs of a student-based pedagogical approach: collaboration, debate, feedback, reflection, guidance, exhibition, demonstration, experimentation and self-regulation. Education policies are gradually recognizing the power and influence these spaces have on the change in school culture (Kariippanon et al., 2020).

## 4.2. Learning as education and social inclusion: co-teaching and service learning

Co-teaching has often been promoted as a strategy for educational change (Härkki et al., 2021). It is a common practice in the academic

culture of different European countries, such as England or Finland, and since the Salamanca Statement (UNESCO, 1994), many countries have included it to foster educational inclusion.

Co-teaching is designed as an instrument for personalizing teaching or for improving teachers’ professional abilities. It is a relational practice in which two or more teachers teach and assess the students together. Co-teaching is the result of numerous negotiations that require a great deal of time and effort. Teachers must negotiate a shared understanding of co-teaching and, consequently, it cannot develop without the teachers having reflected on their roles and agreeing on objectives, contents and materials. The requirements of co-teaching are varied: attitude toward collaboration, commitment to cooperation, mutual respect and knowledge, shared objectives, compatible teaching roles, agreed distribution of tasks, establishment of limits to collaboration and sense of belonging (Rytivaara et al., 2019; Jortveit and Kovač, 2021; Pesonen et al., 2021).

Co-teaching is appropriate for sharing professional responsibilities and skills, and for improving teaching efficiency. It enables the heterogeneity in the classroom to be dealt with more effectively, as it facilitates the process of splitting the students into small groups, which results in increased opportunities to provide students with individual support. One of the most important benefits is the opportunity it gives to share emotions and experiences about teaching. The main problems facing co-teaching is the lack of time available for joint planning and the difficulty in finding the ideal co-teacher (Kokko et al., 2021).

Service learning is an innovative method that brings theory and practice together, and connects the classroom with society. It is a pedagogical model that intentionally integrates academic learning and community service. Apart from strengthening the students’ curricular knowledge, it also has an influence on their critical thinking skills and their ability to solve problems as active citizens. The service learning process is characterized by self-reflection, self-discovery and the acquisition of values, skills and knowledge through experience. In any of its varieties, it has four common characteristics: recognition of academic credits, service to the community, structured reflection and reciprocal collaboration (Said et al., 2015).

## 4.3. Educational innovation and culture of innovation

The experts agreed that educational innovation is

“a continuous process of reviewing and improving the established education paradigm, a process in which what we do and how we do it are questioned, which is the result of constant reflection that requires changes and adaptations in a wide range of fields.”

They stated that their purpose is to improve students’ learning and meet the new social and pedagogical demands.

The traditional role of education centers with their duties of control, custody and classification, their grammar school structure of separating teaching and learning, their approach toward contents, their homogenization in learning patterns and the use of external incentives, is no longer in keeping with the educational innovation demanded by the experts in our study. The emerging competences that students need for their future are collaboration, creativity, civil responsibility, communication and critical

thinking. Consequently, the need is put forward to establish a new paradigm regarding educational innovation that, based on critical pedagogy, the professionalization of teachers and educational reforms as a joint construction process, defines educational change as a social movement (Rincón-Gallardo, 2020).

Educational innovations very often have sustainability problems. It has been shown that teachers go back to their traditional practices once support for innovations has been withdrawn (Hubers, 2020). Innovation is not a process of “restructuring,” but one of “reculturing” education centers (Fullan, 2007). Moreover, the key cultural components that have been identified in education centers with sustainable innovation are (Lee and Louis, 2019): the degree of importance given to learning achievements, the level of student support, attitudes of trust and respect, climate of optimism, and the establishment of a professional learning community (shared responsibility, reflective dialog, co-teaching and organizational learning). Other elements of school culture that determine the level of sustainability in educational innovation are: distributed leadership, which fosters teacher autonomy; curricular leadership, which limits this autonomy as regards the standards imposed by the education authorities; the vision and goals, which offer guidance for innovative teaching teams; and the integration of innovative practices in the teachers’ individual experiences and beliefs (Fix et al., 2021).

#### 4.4. Technological mediation

Despite the fact that ICT has been available in classrooms for decades, most teachers are not using digital technologies to produce significant changes in students’ learning achievements, but rather they are essentially being used as a content transmission supplement. To remedy this situation, teacher training must focus on developing teaching processes in which ICT resources are seen as a way to engage the students in their own learning process, with the “how” gaining more importance than the “what.” Technology tools change, but the education goals remain (Ertmer and Ottenbreit-Leftwich, 2013).

Teachers define the use of digital technologies according to their selection of other variables and curricular processes, such that they adapt their prior beliefs about what is considered “good” education and about the nature of their roles as teachers (Tondeur et al., 2008). Although teachers continue to introduce minor changes and improvements in their classrooms all the time, they do not entail the kind of transformation that “reformers” expected from the inclusion of ICT. The expectation was to move from a teacher-focused approach to offer greater autonomy to the students. In short, a change of roles, of the social organization in the classroom and of the power relationships between teachers and students (Cuban, 2018). Røkenes and Krumsvik (2014, 2016) identified a series of efficient approaches to train teachers in education technology, which have also been demanded by our team of experts: collaboration (teacher networks), metacognition (reflection on practice), blended learning, modeling (demonstration by experts), and authentic learning (application in real contexts).

The implementation of ICT in education systems is frequently based more on trends than on organized dissemination models, which are developed from decision-making based on evidence over prior experience. The use of digital technologies in classrooms is still a long way from generating systemic change; it leans more toward promoting “innovation islands” based on the work of excellent teachers who implement innovation in their teaching using ICT, without there being any formal process of lifelong learning (Albion et al., 2015). In fact, some contextual variables, such as school climate or trust within the education center, the role of the ICT coordinator and the governing board, as well as the existence of networks to access new information and shared knowledge among teachers, all have a greater positive effect on the use of ICT than traditional lifelong learning activities (Devolder et al., 2010; Lee and Choi, 2013; Vrasidas, 2015).

### Data availability statement

The datasets analyzed for this study can be found in Figshare via the following link: <https://doi.org/10.6084/m9.figshare.16782904.v2>.

### Author contributions

JV-B: idea, methodology, writing (original draft), and data analysis. JV-B, JR-F, RA-M, and RM-R: literature review (state of the art), result, discussion, and conclusions. JR-F and RA-M: project design and sponsorships. JV-B and RM-R: final revisions. All authors contributed to the article and approved the submitted version.

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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.

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## References

- Albion, P. R., Tondeur, J., Forkosh-Baruch, A., and Peeraer, J. (2015). Teachers' professional development for ICT integration: towards a reciprocal relationship between research and practice. *Educ. Inf. Technol.* 20, 655–673. doi: 10.1007/s10639-015-9401-9
- BERA (2018). *Ethical guidelines for educational research. 4th Edn.* London: British Educational Research Association.
- Bryant, A. (2017). *Grounded theory and grounded theorizing: Pragmatism in research practice.* New York, NY: Oxford University Press.
- Bryant, A., and Charmaz, K. (2019). *The SAGE handbook of current developments in grounded theory. 2nd.* Thousand Oaks, CA: SAGE.
- Christensen, C. M., Raynor, M. E., and McDonald, R. (2016). What is disruptive innovation? *Harv. Bus. Rev.* 93, 44–53.
- Consejo Escolar del Estado (2020). *El éxito en la educación primaria y secundaria.* Madrid: Ministerio de Educación y Formación Profesional.
- Cuban, L. (2018). *The flight of a butterfly or the path of a bullet? Using technology to transform teaching and learning.* Cambridge, Massachusetts: Harvard Education Press.
- Danks, S., Rao, J., and Allen, J. M. (2017). Measuring culture of innovation: a validation study of the innovation quotient instrument (part one): culture of innovation. *Perf. Improvement Qrtly* 29, 427–454. doi: 10.1002/piq.21236
- Devolder, A., Vanderlinde, R., Van Braak, J., and Tondeur, J. (2010). Identifying multiple roles of ICT coordinators. *Comput. Educ.* 55, 1651–1655. doi: 10.1016/j.compedu.2010.07.007
- Dobni, C. B. (2008). Measuring innovation culture in organizations: the development of a generalized innovation culture construct using exploratory factor analysis. *Eur. J. Innov. Manag.* 11, 539–559. doi: 10.1108/14601060810911156
- Drisko, J. W., and Maschi, T. (2016). *Content analysis.* New York: Oxford University Press.
- Echeverría-Molina, I., and Sanchez-Cabrero, R. (2021). Satisfaction of secondary education teacher in Spain through TALIS. *Rev. Fuentes* 3, 341–352. doi: 10.12795/revistafuentes.2021.15176
- Ertmer, P. A., and Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Comput. Educ.* 64, 175–182. doi: 10.1016/j.compedu.2012.10.008
- Escudero, J. M., Campillo, M., and Sáez, J. (2019). The master degree of secondary school teacher initial education: a review, balance and improvement proposals. *Profesorado, Revista de Currículum y Formación del Profesorado* 23, 165–188. doi: 10.30827/profesorado.v23i3.9409
- Estadística, español (2020). Ley Orgánica 3/2020, de 29 de diciembre, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación. Available at: <https://www.boe.es/eli/es/lo/2020/12/29/3> (Accessed June 7, 2023).
- Fernandez Díaz, M. J., Rodríguez Mantilla, J. M., and Martínez Zarzuelo, A. (2015). Teaching practice of secondary education teachers in Spain according to TALIS 2013. *Rev. Esp. Pedagog.* 73, 225–244.
- Fernández Enguita, M. (2020). Del aislamiento de la escuela a la cocodencia en el aula. Enseñar es menos colaborativo que aprender o trabajar, y debe dejar de serlo. *Participación educativa* 7, 15–29.
- Fernández-Miravete, Á. D., and Prendes-Espinosa, M. P. (2021). Análisis del proceso de digitalización de un centro de Enseñanza Secundaria desde el modelo DigCompOrg. *Revista Latinoamericana de Tecnología Educativa - RELATEC* 20, 9–25. doi: 10.17398/1695-288X.20.1.9
- Fix, G. M., Rikkerink, M., Ritzen, H. T. M., Pieters, J. M., and Kuiper, W. A. J. M. (2021). Learning within sustainable educational innovation: an analysis of teachers' perceptions and leadership practice. *J. Educ. Change* 22, 131–145. doi: 10.1007/s10833-020-09410-2
- Flostrand, A., Pitt, L., and Bridson, S. (2020). The Delphi technique in forecasting – a 42-year bibliographic analysis (1975–2017). *Technol. Forecast. Soc. Chang.* 150:119773. doi: 10.1016/j.techfore.2019.119773
- Fullan, M. (2007). *The new meaning of educational change.* London: Routledge.
- García-García, F. J., Lopez-Torrijo, M., and Santana-Hernandez, R. (2020). Inclusive education in secondary education teachers' training: the programs in Spain. *PRO* 24, 270–293. doi: 10.30827/profesorado.v24i2.14085
- Gonzalez Sala, F., Bisquert Bover, M., Haba-Osca, J., and Osca-Lluch, J. (2020). Secondary teacher training in Spain: a study through the official masters in secondary education in public universities. *Rev. Interuniv. Form. Prof. RIFOP* 34, 205–224. doi: 10.47553/rifop.v34i2.78055
- González-Benito, A., Vélaz-de-Medrano Ureta, C., and López-Martín, E. (2018). Tutoring in primary and secondary education in Spain: an empirical approach. *REOP* 29:105. doi: 10.5944/reop.vol.29.num.2.2018.23156
- Goos, M., Pipa, J., and Peixoto, F. (2021). Effectiveness of grade retention: a systematic review and meta-analysis. *Educ. Res. Rev.* 34:100401. doi: 10.1016/j.edurev.2021.100401
- Halász, G. (2018). Measuring innovation in education: the outcomes of a national education sector innovation survey. *Eur. J. Educ.* 53, 557–573. doi: 10.1111/ejed.12299
- Härkki, T., Vartiainen, H., Seitamaa-Hakkarainen, P., and Hakkarainen, K. (2021). Co-teaching in non-linear projects: a contextualised model of co-teaching to support educational change. *Teach. Teach. Educ.* 97:103188. doi: 10.1016/j.tate.2020.103188
- Hubers, M. D. (2020). Paving the way for sustainable educational change: Reconceptualizing what it means to make educational changes that last. *Teach. Teach. Educ.* 93:103083. doi: 10.1016/j.tate.2020.103083
- Imberón, F. (2019). Secondary education teachers' training: the eternal nightmare. *Profesorado, Revista de Currículum y Formación del Profesorado* 23, 151–163. doi: 10.30827/profesorado.v23i3.9302
- Jerrim, J., Lopez-Agudo, L. A., and Marcenaro-Gutierrez, O. D. (2022). Grade retention and school entry age in Spain: a structural problem. *Educ. Assess. Eval. Account.* 34, 331–359. doi: 10.1007/s11092-021-09375-7
- Jortveit, M., and Kovač, V. B. (2021). Co-teaching that works: special and general educators' perspectives on collaboration. *Teach. Educ.* 33, 286–300. doi: 10.1080/10476210.2021.1895105
- Kariippanon, K. E., Cliff, D. P., Okely, A. D., and Parrish, A.-M. (2020). The 'why' and 'how' of flexible learning spaces: a complex adaptive systems analysis. *J. Educ. Change* 21, 569–593. doi: 10.1007/s10833-019-09364-0
- Keeney, S., Hasson, F., and McKenna, H. (2006). Consulting the oracle: ten lessons from using the Delphi technique in nursing research. *J. Adv. Nurs.* 53, 205–212. doi: 10.1111/j.1365-2648.2006.03716.x
- Kokko, M., Takala, M., and Pihlaja, P. (2021). Finnish teachers' views on co-teaching. *Br. J. Spec. Educ.* 48, 112–132. doi: 10.1111/1467-8578.12348
- Landeta, J. (1999). *El método Delphi: una técnica de previsión para la incertidumbre.* Barcelona: Ariel.
- Lee, M., and Louis, K. S. (2019). Mapping a strong school culture and linking it to sustainable school improvement. *Teach. Teach. Educ.* 81, 84–96. doi: 10.1016/j.tate.2019.02.001
- Lee, Y., and Choi, J. (2013). A structural equation model of predictors of online learning retention. *Internet High. Educ.* 16, 36–42. doi: 10.1016/j.iheduc.2012.01.005
- López-Gómez, E. (2018). El método Delphi en la investigación actual en educación: una revisión teórica y metodológica. *Educación XX1* 21, 17–40. doi: 10.5944/educxx1.20169
- López-Rupérez, F., García-García, I., and Expósito-Casas, E. (2021). Grade repetition and graduation in compulsory secondary education in Spain. Empirical analysis and policy recommendations. *Revista de Educación*, 325–354. doi: 10.4438/1988-592X-RE-2021-394-510
- López-Torrijo, M., and Mengual-Andrés, S. (2015). An attack on inclusive education in secondary education. Limitations in initial teacher training in Spain. *J. New Approach. Educ. Res.* 4, 9–17. doi: 10.7821/naer.2015.1.100
- Martínez-Valdivia, E., and Burgos-García, A. (2020). Academic causes of school failure in secondary education in Spain: the voice of the protagonists. *Soc. Sci.* 9:11. doi: 10.3390/socsci9020011
- Meijering, J. V., and Tobi, H. (2018). The effects of feeding back experts' own initial ratings in Delphi studies: a randomized trial. *Int. J. Forecast.* 34, 216–224. doi: 10.1016/j.ijforecast.2017.11.010
- Morad, S., Ragonis, N., and Barak, M. (2021). An integrative conceptual model of innovation and innovative thinking based on a synthesis of a literature review. *Think. Skills Creat.* 40:100824. doi: 10.1016/j.tsc.2021.100824
- Muñoz-Fernandez, A., Rodríguez-Gutierrez, P., and Luque-Vilchez, M. (2019). Initial teacher training for secondary education in Spain: profile and motivations of the future teaching staff. *Education* 22, 71–92. doi: 10.5944/educXX1.20007
- Neeleman, A. (2019). The scope of school autonomy in practice: An empirically based classification of school interventions. *J. Educ. Change* 20, 31–55. doi: 10.1007/s10833-018-9332-5
- Neuendorf, K. A. (2017). *The content analysis guidebook. 2nd.* Los Angeles: SAGE.
- OECD (2016). *PISA 2015 results. Policies and practices for successful schools.* Paris: Organisation for Economic Co-operation and Development.
- OECD (2019). *TALIS 2018 results (volume I): Teachers and school leaders as lifelong learners.* Paris: OECD.
- Pascual Medina, J., and Navío-Gámez, A. (2018). Concepciones sobre innovación educativa. ¿Qué significa para los docentes en Chile? *Profesorado, Revista de Currículum y Formación del Profesorado* 22, 71–90. doi: 10.30827/profesorado.v22i4.8395
- Pesonen, H. V., Rytivaara, A., Palmu, I., and Wallin, A. (2021). Teachers' stories on sense of belonging in co-teaching relationship. *Scand. J. Educ. Res.* 65, 425–436. doi: 10.1080/00313831.2019.1705902
- Rebolledo Gámez, T. (2015). Initial teacher training for primary and secondary education in Germany, Spain, Finland, France and United Kingdom comparative study. *Rev. Esp. Educ. Comp.* 129. doi: 10.5944/reec.25.2015.14787
- Reguant Alvarez, M., and Torrado Fonseca, M. (2016). El método Delphi. *REIRE: revista d'innovació i recerca en educació* 9, 87–102.

- Rincón-Gallardo, S. (2020). Educational change as social movement: an emerging paradigm from the global south. *J. Educ. Change* 21, 467–477. doi: 10.1007/s10833-020-09374-3
- Røkenes, F. M., and Krumsvik, R. J. (2014). Development of student teachers' digital competence in teacher education - a literature review. *Nordic J. Digit. Lit.* 9, 250–280. doi: 10.18261/ISSN1891-943X-2014-04-03
- Røkenes, F. M., and Krumsvik, R. J. (2016). Prepared to teach ESL with ICT? A study of digital competence in Norwegian teacher education. *Comput. Educ.* 97, 1–20. doi: 10.1016/j.compedu.2016.02.014
- Rönn-Liljenfeldt, M., Sundqvist, C., and Ström, K. (2023). Between vision and reality: Finnish school leaders' experiences of their own and teachers' roles in the development of co-teaching. *Scand. J. Educ. Res.*, 1–14. doi: 10.1080/00313831.2023.2175247
- Rytivaara, A., Pulkkinen, J., and de Bruin, C. L. (2019). Committing, engaging and negotiating: teachers' stories about creating shared spaces for co-teaching. *Teach. Teach. Educ.* 83, 225–235. doi: 10.1016/j.tate.2019.04.013
- Said, H., Ahmad, I., Mansor, S. S. S., and Awang, Z. (2015). Exploring different perspectives on limitations and promises of service-learning as an innovative pedagogy: review of literature. *MJSS* 6, 311–317. doi: 10.5901/mjss.2015.v6n4s1p311
- Santos, N. N., Pipa, J., and Monteiro, V. (2023). Analysing grade retention beliefs within teachers' psycho-pedagogic beliefs system. *Teach. Teach. Educ.* 121:103939. doi: 10.1016/j.tate.2022.103939
- Sarceda-Gorgoso, M. D. C., Santos-Gonzalez, M. D. C., and Rego-Agraso, L. (2020). Pedagogical skills in the initial training of secondary education teachers. *PRO* 24, 401–421. doi: 10.30827/PROFESORADO.V24I3.8260
- Serdyukov, P. (2017). Innovation in education: what works, what doesn't, and what to do about it? *J. Res. Innov. Teach. Learn.* 10, 4–33. doi: 10.1108/JRIT-10-2016-0007
- Silva, S., and Fraga, N. (2021). Autonomia e Flexibilidade Curricular como Instrumentos Gestionários. O Caso de Portugal. *REICE* 19, 37–54. doi: 10.15366/reice2021.19.2.003
- Tondeur, J., Valcke, M., and Braak, J. V. (2008). A multidimensional approach to determinants of computer use in primary education: teacher and school characteristics. *J. Comput. Assist. Learn.* 24, 494–506. doi: 10.1111/j.1365-2729.2008.00285.x
- Trujillo Sáez, F., Segura Robles, A., and González Vázquez, A. (2020). Claves de la innovación educativa en España desde la perspectiva de los centros innovadores: una investigación cualitativa. *Participación educativa* 7, 49–58.
- UNESCO (1994). *The Salamanca statement and framework for action on special needs education*. Salamanca: UNESCO.
- van Leeuwen, A., and Janssen, J. (2019). A systematic review of teacher guidance during collaborative learning in primary and secondary education. *Educ. Res. Rev.* 27, 71–89. doi: 10.1016/j.edurev.2019.02.001
- Vázquez-Toledo, S., Latorre-Coscolluela, C., and Liesa-Orús, M. (2021). Un análisis cualitativo de la motivación ante el aprendizaje de estudiantes de educación secundaria. *REOP* 32, 116–131. doi: 10.5944/reop.vol.32.num.1.2021.30743
- Vélaz-de-Medrano Ureta, C., Manzanares Moya, A., and López-Martín, E. (2013). School counsellor competences and training: an empirical study in nine Spanish autonomous communities. *Revista de Educación*, 261–292. doi: 10.4438/1988-592X-RE-2013-EXT-249
- Vrasidas, C. (2015). The rhetoric of reform and teachers' use of ICT. *Br. J. Educ. Technol.* 46, 370–380. doi: 10.1111/bjet.12149