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Structure and flexibility: systemic and explicit assignment extensions foster an inclusive learning environment

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Many educators strive to create inclusive classrooms where students receive not only knowledge but also empathy from their instructors. When students face unexpected challenges due to illness, academic pressure, or exhaustion, they often seek extensions on assignments. Instructors insert their own biases when they decide who is eligible for an extension. An explicitly communicated penalty-free extension system can eliminate this bias, create an inclusive learning environment, and disinter extension requests from the hidden curriculum. Students used an "extension without penalty" system (EWP) in a large introductory biology course. Mid-semester qualitative data collection helped design an end-of-the-semester quantitative survey about students' perceived benefits. Assignment submission data, EWP use frequency and grades were directly extracted from the learning management system. Students preferred a two-tier extension system with ideal and extension due dates. The EWP system was used by 78% of the students, but half of them only used it once. Students reported benefits in stress reduction, handling of sickness and emergencies, and improved performance in other courses. Exploratory results indicate there were additional benefits in some areas for first-generation college students. Using the extension due dates did not impact student grades. This study uses evidence to debunk common misconceptions about assignment extensions.

KEYWORDS

undergraduate, extensions, inclusion, structure, deadline, flexibility, universal design for learning, self-determination theory

1 Introduction

Creating an inclusive classroom where flexibility and structure can both support pedagogical decisions became the focus of the higher education landscape following the COVID-19 pandemic (Hogan and Sathy, 2022; Sarvary et al., 2022). The cumulative stress that many students and instructors experienced during the pandemic (Adedoyin, 2022; Jackson et al., 2022; Novick et al., 2022; Roberts-Grmela, 2023) has dramatically influenced policies and processes often referred to as the "new normal" in many higher education institutions (Schapiro, 2021; Sarvary et al., 2022; Supiano, 2023). These policies responded to the broad range of impacts of the COVID-19 pandemic. In some cases, the pandemic resulted in decreased quality of education available despite the heroic efforts of many educators to transition smoothly and continue to improve an unplanned online classroom (Dindar et al., 2022; Kuhfeld et al., 2022). It resulted in an increased mental strain on many during the

difficult times brought on by a worldwide event that reached deeply into so many homes. Anxiety and depression became more commonplace (Ma et al., 2022; Canet-Juric et al., 2023; Klussman et al., 2023; Sánchez-Martín et al., 2023). Students faced many challenges in online classrooms (Castelli and Sarvary, 2021) and were more likely to feel overwhelmed and seek additional assistance to accomplish their tasks (Gagné et al., 2022; Samji et al., 2022). It created increased fear of the future as the recognized stability of circumstances such as employment and safety took on tremulous qualities (Yin et al., 2022). And finally, students lost social and societal capital due to isolation and other aspects of the pandemic that likely decreased their available resources and social network for information and direction but increased the associated costs of communicating with a professor (Shiyuan et al., 2022). All of these situations that occurred during the height of the COVID-19 pandemic continue to impact the student population today (Sarvary et al., 2022).

The education experience of current students is unique and different from previous generations and as such it comes with its own blind spots, pit falls, and hurdles that are difficult to anticipate and overcome (Kennedy et al., 2022). When it comes to addressing students' needs during these challenging post-pandemic times, instructors consider the students' circumstances and personal experiences. But how can instructors decide without bias when they should exercise flexibility? Instructors who have never owned pets may not understand someone's pain of losing one and do not consider that a valid reason for missing a class. Instructors who have never played group sports may be less inclined to give an athlete who missed an assignment because of a game a second chance. Instructors who were impacted by COVID-19, may be more lenient with students who suffer from long-term consequences of this illness than those instructors who never contracted this virus. Instructors may also have implicit bias based on students' names, pronouns, year in school, etc. In addition, in large introductory classes, the number of these individual requests can easily overwhelm the instructors. Therefore, creating an inclusive learning environment by addressing individual needs can be challenging and the decisions are often influenced by instructor bias and available time.

1.1 Creating an inclusive classroom

Most educational institutions lay claim to having a space where all are welcomed to learn and develop. Policies are enacted to push instructors toward classrooms that bring a sense of belonging to various approaches to learning, to make learners of all nationalities, races, and socio-economic backgrounds feel welcome and to help diverse ideas flourish and grow. But how this is done within the classroom is often left up to the individual instructor (Hogan and Sathy, 2022). Balancing content and proficiency or leniency and rigidity can lead to ambiguity in efforts to help students and leave them with the education they need and paid for (Oleson, 2021). An inclusive classroom demands more than just policy and good intentions. It requires a robust structure that facilitates effective learning and comes with the built-in flexibility to adapt to a myriad of challenges. This will curtail bias and fatigue that can lead to decisions that unintentionally alienate students we are trying to help within the classroom (Hogan and Sathy, 2022). Concepts such as the Universal Design for Learning (Silver et al., 1998) and hidden curriculum

(Alsubaie, 2015) can help educators to understand what students need and guide them to build solutions into the course structure that reduce students' need to request exceptions.

Universal Design for Learning (UDL) is an inclusive approach to the creation of environments and spaces that are to be usable by everyone regardless of ability or status. Its goal is to make solutions that are available to the largest portion of the spectrum of users. If used correctly, it should reduce the need to retroactively modify classroom assignments and structures to accommodate specific populations (Silver et al., 1998). The proactive application of its principles should reduce students' sense of exclusion and allow for increased participation in activities and assignments, thus increasing student retention and learning. UDL has been seen to positively impact student engagement, interactions, and attitudes (Belch and Barricelli, 2004; Cumming and Rose, 2022; Edwards et al., 2022). Additionally, design can impact students' learner-identity relating to inclusion via race (Chita-Tegmark et al., 2012; Griggs and Moore, 2023), gender (Couillard and Higbee, 2018), and disability (Nieminen and Pesonen, 2020). Finally, implementation was observed to improve self-efficacy and job satisfaction in teachers (Katz, 2015).

The concept of Self-Determination Theory (SDT) centers around the idea that people's choices are driven by internal factors rather than external influence (Deci et al., 1999). This theory highlights the significance of an individual's innate resources in shaping their personality development and self-regulation. According to SDT, creating an environment that promotes autonomy, competence, and relatedness can encourage the highest quality of motivation and engagement in activities. Incorporating these principles into the classroom can yield benefits not only for current students but also for their future classrooms. By fostering intrinsic motivation and implementing effective practices to support it, we can counteract the challenges of shorter attention spans and heightened anxiety (Ryan and Deci, 2000).

In this post-pandemic higher education environment, there is an increasing need to pay close attention and put in a significant amount of effort to truly understand and respond to the diverse circumstances and experiences among individuals (Luk et al., 2023). This diversity consists not only in appearance and culture, but in neurodiversity and mental divergencies, in addition to resources and assistance allotted to individuals (Cullinan et al., 2021; Stark et al., 2022). It also includes various circumstances that arise in the daily life of a student that affects the time and attention that can be put toward important tasks that need to be accomplished and can affect the hierarchy of tasks that they strive to accomplish (Nanath et al., 2022; Désiron and Petko, 2023). During times of pressure, it can be beneficial for students to allocate some extra time toward nonacademic tasks. This can alleviate mental strain and enhance performance in activities that are meant to cultivate knowledge for future success in one's professional life (Mehta et al., 2017).

With all of the new or more readily recognized requirements and pressures to assist students, educator duress has become evident (Bradshaw et al., 2023). It is difficult to know how best to reply to a student's needs and yet those demands are placed frequently upon an instructor's shoulders (Agyapong et al., 2022; Edwards et al., 2022). University requests, such as the ones from Student Disability Services, do not always cover all the needs of a student and balancing affordances for varied circumstances can lead to reduced student learning, inhibition of classroom pedagogy, and the appearance of

favoritism (Watermeyer et al., 2021). Addressing best pedagogical practices to assist students in their efforts, while maintaining fair practices for all, should be extensively tested to optimize educational norms (Hoffman et al., 2019). One of the strategies to achieve balance between flexibility and structure in an inclusive learning environment is the application of explicit extensions. Publications on the application of extensions to assignments within the classroom are rare and evidence of its benefits or drawbacks are anecdotal (Gonzalez, 2019; Kuimelis, 2022). An application of an explicit extension system, one in which gaining access to the system was not based on request but instead was built into the curriculum, could serve to alleviate both teacher and student stress during educational obstructions.

1.2 What are extensions?

Extensions or extension deadlines are a commonly employed technique to make allowances for any difficulties that may arise during educational content to allow for the completion of goals. An allotment of additional time is given for completion of required work. Methods by which this extension is employed are varied, including by request of the institution, in response to student outreach, on a case-by-case basis, or a preset quantity by course, by assignment, or by the student (Bosch, 2020). All extensions are designed to allow students to still reach learning- and content-based goals within an appropriate timeline but have the potential to introduce bias and additional negative outcomes to those who participate in the extension as well as to those who do not (Kuimelis, 2022).

1.3 Framing extensions within the classroom

When creating an extension for student usage, as educators, we frequently balance the pros and cons of such a system. We worry about developing a system that fails to equip students with the necessary skills for their future. However, we also strive to show empathy and prevent students from falling behind due to overwhelming workloads or inadequate knowledge. Knowing what benefits students take from an extension and how they make use of it would help to guide our actions. Deadlines do not always lead to the desired goal of continued learning. Amabile et al. found instead that creating a deadline caused a reduction of future student attention and motivation toward the desired subject matter (Amabile et al., 1976). By offering an extension due date without penalties, the policy reduces the extrinsic pressures associated with strict deadlines (Kohn, 1999). This could help maintain or even boost the students' intrinsic motivation, as they would be less likely to view the assignment as a task they are being externally forced to complete and more as something they choose to engage with at their own pace. While the study by Amabile et al. (1976) highlights the demotivating effects of strict deadlines, it does not necessarily imply that all structure is bad. If an assignment submission policy provides a structure (the ideal due date) but also offers flexibility (an extension on the assignment), it potentially offers a balanced approach that supports intrinsic motivation while still providing some guidelines to students.

Hidden curriculum refers to content and resources that are not explicitly stated within a classroom and yet benefit some students

(Bergenhenegouwen, 1987; Margolis, 2001; Alsubaie, 2015). When giving extensions, this comes into play as some may not feel comfortable asking for them (whether that is because they come from a school where interactions with educators were framed differently or they fear discrimination for sharing their circumstances, etc.) and others may not even know they exist (e.g., first-generation college students). In education, we want to create a system that allows access for every single student, and we want to avoid a system that advantages some over others. In this context, a systemic extension rather than a by-request extension may benefit the classroom. Establishing an explicit extension system that requires reduced communication to make use of, can fit well into the structure of Universal Design (Silver et al., 1998; Higbee and Goff, 2008) and follow the Self-Determination Pedagogical Theory (Ryan and Deci, 2000). When designing a curriculum with assignment extensions in mind, the goals of grades and learning outcomes should be addressed. Though courses are designed to elevate student knowledge and increase their ability to apply skills outside of the classroom, many students are focused on their Grade Point Average (GPA) at the end of the semester. While extensions may be created with the intent to allow students to complete their work and increase their alignment with the course goals, they may be taken advantage of to seek a higher letter grade. Students in large STEM courses have a lot of ideas and expectations (Meaders et al., 2020, 2021); therefore, the instructors' efforts in designing an unbiased extension system should be student-centered and include the analysis of student perceptions and the system's impact on final grades.

While the UDL, SDT, and the hidden curriculum are well studied concepts, as it is shown above, there is very little known about how unbiased and explicit assignment extensions contribute to the development of an inclusive classroom. Students submitting late work is a challenge for many instructors, and it is an often discussed issue in online forums (Gonzalez, 2019) and in pedagogy workshops. However, the solutions are usually based on anecdotes rather than evidence. When instructors discuss how to handle late assignment submission and provide extensions, there are many opinions and misconceptions. There is a gap in the pedagogy literature to address these opinions and real-world problems using evidence from education research. In this paper, we discuss hypothetical opinions based on the authors' experience using evidence from our study.

In this study, we designed an unbiased extension system that strives to maximize student learning while enabling them to achieve the desired grades. The system was designed to follow the Universal Design for Learning framework under the umbrella of the Self-Determination Theory and aims to bring extensions out of the hidden curriculum. It gives students a choice in when to submit their assignments—either by the ideal due date or the extension due date. By providing this flexibility, students can feel a greater sense of control over their learning, which can foster intrinsic motivation. Moreover, by allowing students to choose when they submit (within the given timeframe), they can work at their own pace and ensure they understand the material, thereby increasing their feeling of competence in the subject matter (Ryan and Deci, 2000). The absence of penalties for using the extension due date is expected to reduce the fear of failure, which can hinder the sense of competence. Furthermore, while the policy does not directly address relatedness (the need to feel connected to others), by recognizing and accommodating diverse life situations, the instructor communicates

understanding and empathy, potentially fostering a sense of connection. Using a mixed-methods analysis with qualitative and quantitative components, a survey instrument was developed to test the hypotheses that well-conducted and explicitly communicated assignment due date extensions will improve the classroom experience and create an inclusive and welcoming learning environment. By designing and employing a system with dual deadlines, we expected to see relatively few perceived negatives while reaping several positives. We also expected no impact on final grades when comparing those who used the extension and those who did not. Specifically, the following questions were explored in this study:

1. What assignment submission deadline system do students prefer?
2. What assignment submission behaviors are practiced when the Extension Without Penalty (EWP) system is deployed in a large introductory biology class?
3. Does the EWP system impact student performance?
4. What are the real and perceived benefits of the EWP system, and do they foster an inclusive learning environment?

2 Methods

2.1 The classroom application of "extension without penalty"

The study was conducted in a large introductory biology laboratory course with a maximum enrollment of 432 students each semester. This inquiry-based laboratory course teaches the scientific process, experimental design, science communication, and statistics using examples from the biological sciences (Sarvary et al., 2022). Both the lecture and laboratory portion of the course have active-learning components (Asgari et al., 2021) and related assignments, including audience participation through Poll Everywhere, an online response system (Sarvary and Gifford, 2017), peer review of written assignments (Biango-Daniels and Sarvary, 2021) and scaffolded exercises to build critical thinking, science literacy (Sarvary and Ruesch, 2023) and transferable skills (Deane-Coe et al., 2017). In Fall 2022, a syllabus was designed that involved an "extension without penalty" (EWP) for many assignments that occurred outside of class and a few that were performed in class. The syllabus explicitly identified a suggested due date by which the students were encouraged to complete the assignment and the EWP due date. The syllabus includes the following statement: "We understand that there can be circumstances when students need more time to complete their assignments. All assignments have ideal due dates, and they also have extension due dates. We highly recommend that you submit the assignments (if you can) by their suggested ideal due dates, to maintain a good rhythm of learning in the class. You can submit assignments by the extension due date without any penalty. We are providing the extension due dates so you can use them for certain times when you have other exams, sickness, or you just simply need a break and you do not want to think about an assignment." During the early introduction of the system within the classroom, instructors were encouraged to stress the advantages of completing the work by the ideal due date but confirm that the EWP was available for flexibility.

2.2 Student sample

The enrollment count for Fall 2022 was 347 students. In the mid-semester and end-of-semester surveys students were given the option to skip demographic survey questions or choose not to disclose. Students self-reported their gender and year-in-school (First year, Sophomore, Junior, or Senior). Race and ethnicity were also queried, with responses used to categorize students as persons historically excluded from science (PEER) or non-PEER. PEER was defined by identifying as black or African American; Hispanic, Latinx, or Spanish origin; and American Indian or Alaska Native, or a mix including one of these groups (Asai, 2020).

2.3 Survey development, validation, and dissemination

With limited published literature about the application of extensions, no prior surveys could be used to address our research questions. A mixed-method survey design thus began with careful deliberation by the authors to identify student perception of the EWP system and its advantages and disadvantages. Developed items for the survey were validated with the help of undergraduate teaching assistants, who having taken the course, were positioned to understand the clarity of the presented items. Questions were discussed one-by-one in a focus group and unclear questions were identified. Undergraduate teaching assistants who could not be present in person provided feedback via written communication (Ouimet et al., 2004; Vogt et al., 2004).

First, open-ended questions for the mid-semester survey were designed to be exploratory, identifying any potential impacts. Using the online survey software Qualtrics, questions were asked of the students during Week 8 of the course, designed to get feedback on course content, student experience, and teaching. This survey included the following open-ended question: *"What are your thoughts about the 'extension without penalty' due date system?"* (Supplementary material S.2). The responses to this question were emergently coded [inductive reasoning (Saldaña, 2013)] through several readings (Fereday and Muir-Cochrane, 2006) to develop 19 categories for the end-of-the-semester course evaluation survey (Figure 1). Initial coding was performed by a single party with categorical verification performed by another. Discussions led to the modification of the categories. Once categories had been finalized, all responses were coded by all parties until all classifications were agreed upon (100%). Participation in any of the surveys was performed in class and was voluntary, anonymous, with no credit given for participation.

The end-of-semester (EOS) survey in Fall 2022 was conducted using the online survey software Qualtrics and included an initial question dividing the students into groups based on whether they made use of the EWP during the semester. Post this division, students were asked "Choose all the advantages of "extension without penalty" that apply to you" and "Choose all the disadvantages of "extension without penalty" that apply to you." The categories in the answers were derived from the mid-semester survey (Figure 1). An additional question occurred about the students' preferences for an assignment submission system with the choices of no due date, one single due date, or a double due date with EWP (Supplementary material S.1). The question about the preferences was repeated in the Spring 2023 semester. Both semesters used a dual assignment deadline system, so
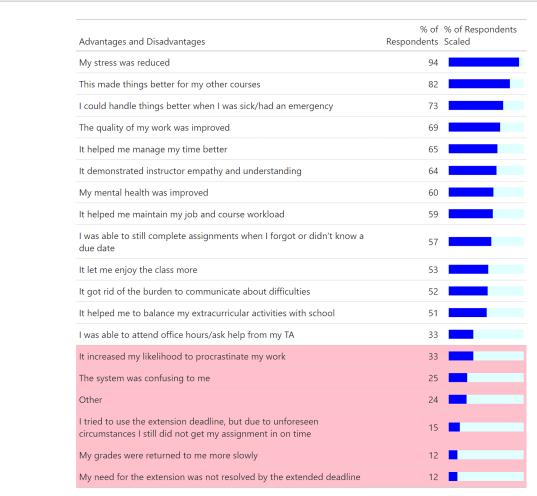
Advantages and Disadvantages	% of Respondents	% of Respondents Scaled
My stress was reduced	94	
This made things better for my other courses	82	
I could handle things better when I was sick/had an emergency	73	
The quality of my work was improved	69	
It helped me manage my time better	65	
It demonstrated instructor empathy and understanding	64	
My mental health was improved	60	
It helped me maintain my job and course workload	59	
I was able to still complete assignments when I forgot or didn't know a due date	57	
It let me enjoy the class more	53	
It got rid of the burden to communicate about difficulties	52	
It helped me to balance my extracurricular activities with school	51	
I was able to attend office hours/ask help from my TA	33	
It increased my likelihood to procrastinate my work	33	
The system was confusing to me	25	
Other	24	
I tried to use the extension deadline, but due to unforeseen circumstances I still did not get my assignment in on time	15	
My grades were returned to me more slowly	12	
My need for the extension was not resolved by the extended deadline	12	

FIGURE 1
Advantages and Disadvantages of the "Extension Without Penalty" (EWP) system as selected by those who used it. Advantages are uncolored ($n = 234$). The responses highlighted in pink are disadvantages ($n = 128$).

the answers for this one question were combined from the two semesters. This study's proposal was granted exemption from Institutional Review Board review by the University's Office of Research Integrity and Assurance (2109010595).

2.4 Submission dates and final grade analysis

Assignment submission dates were directly extracted from the Learning Management System (LMS). To assess the impact of EWP use on grades, the total points, points scored, and final grades (percentages) were also downloaded from the LMS. All data were accessed after the final grades were assigned, generalized and de-identified for analysis.

2.5 Statistical analysis

Statistical analyses were conducted with the support of the Cornell Statistical Consulting Unit. A generalized linear model was used to investigate the relationship between extension usage and first-generation college students, gender, PEER, and year-in-school. With extension usage being a binary variable, a logistic regression model was

employed. Only primary effects were analyzed in this model. Final grades were analyzed using a linear regression model, with EWP usage, first-generation college students, gender, PEER, and year-in-school as predicter variables. Interaction of EWP usage with the other predictors was emphasized in the analysis. Final grades, EWP usage and survey responses were all analyzed in R statistical software (v.4.3.0) (Crawley, 2012; R Core Team, 2023). Pairwise comparisons occurred for survey questions with the alpha level set at 0.05. Chi-squared tests were used to compare differences in survey responses between groups (first generation to non-first generation, men to women with non-binary, PEER to non-PEER, first-year to non-first-year). With the exploratory nature of these pairwise comparisons, we chose not correct for multiple measures (Bender and Lange, 2001).

3 Results

3.1 Course demographics

In the fall semester of 2022, 347 students were enrolled. Of those enrolled, 97% took the mid-semester survey ($n = 338$). The end-of-semester survey had 318 students who participated. Demographic categories were self-reported, and the choice to not disclose or

self-describe could be selected. Results were divided by gender [women ($n = 195$) and men ($n = 100$) with non-binary ($n = 5$)], PEER ($n = 111$) or non-PEER ($n = 217$). Additionally, first generation college students ($n = 88$) were compared to non-first-generation ($n = 220$) and first-year ($n = 133$) and non-first-year [a group consisting of sophomore ($n = 138$), junior ($n = 30$), and seniors ($n = 10$)] were compared.

3.2 Extension without penalty system users

The data downloaded from the LMS indicated 78% usage of the EWP system by students at the end of the semester. Of those who used EWP due dates, the largest percentage made use of it a single time (41%) during the semester on major assignments that required substantial time commitment from the students. A slightly smaller percentage of students (37%) used it for more than one major assignment during the semester. Approximately 22% of the students have not used the EWP system at all and submitted all of the assignments by the ideal due date.

The open-ended mid-semester survey questions were used to create categories for the end-of-the-semester (EOS) survey. In the EOS survey with the categorical questions, the top three most frequently selected advantages for those who used the EWP system ($n = 234$) were "My stress was reduced" (94%), "This made things better for my other courses" (82%) and "I could handle things better when I was sick/had an emergency" (73%). All advantages caused by the EWP system were selected at above 50%, except "I was able to attend office hours/ask help from my TA." (33%). A smaller proportion of students listed any disadvantages ($n = 128$). All disadvantages identified by those students who used the EWP system fell below 50%. The most frequently selected disadvantage was, "It increased my likelihood to procrastinate my work" (33%) followed by "The system was confusing to me" (25%). For the "Other" option under disadvantages (24%), most chose to self-describe with "None" or otherwise express a lack of disadvantage from the system.

3.3 Students who did not take advantage of the extension due dates

Those who chose not to use the EWP system and submitted all of their assignments by the suggested deadline, had similar selections for their *perceived* benefits ($n = 60$), with the top three for them being, "My stress was reduced" (78%), "I could handle things better when I was sick/had an emergency" (48%), and "This made things better for my other courses" (42%). While they did not take advantage of the EWP system, they clearly identified perceived advantages. Their perceived disadvantages ($n = 58$) were "The system was confusing to me" (47%), "My grades were returned to me more slowly" (36%), and "It increased my likelihood to procrastinate my work" (33%).

3.4 Final grades and response to extension without penalty

When analyzing the LMS data, there was no significant difference in final grades between those who used the EWP system and those who did not ($p = 0.157$), demonstrating that submitting one or more
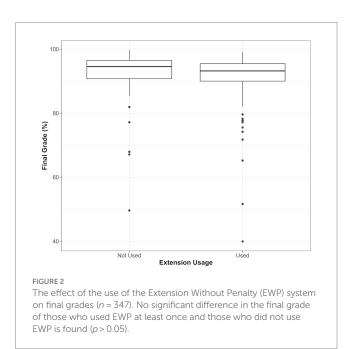
assignments after the suggested due date did not have a negative effect on student's final grades in the class (Figure 2).

3.5 Analysis by first-generation college students, gender, persons historically excluded from science, and year-in-school

Advantages and disadvantages of the EWP system, final grades for students within the course, usage of the EWP system, and selection of their preferred hypothetical classroom were all analyzed by various groups to explore whether a diverse impact occurred among student populations. The inclusion of the demographic variables did not make a significant difference from the null model ($p = 0.45$) for the usage of the EWP system (Supplementary material S.4). The model of final grades with extension usage was not significantly improved ($p = 0.29$) with the inclusion of interaction terms of the other predictors (Supplementary material S.5). The occasions when there were significant differences among the groups were rare. These occasions included an increased percentage of first generation college students that selected "I was able to attend office hours/ask help from my TA" ($p = 0.044$) than non-first-generation students. This was also true of non-first-year ($p = 0.041$) and non-first-years were also more likely to choose "I was able to still complete assignments when I forgot or did not know a due date" ($p = 0.039$). First-year students were more likely to select "It increased my likelihood to procrastinate" ($p = 0.0070$) than non-first-years as a disadvantage of the system. Relatedly, no significant results were found for analysis by gender or PEER (Supplementary material S.3).

3.6 Students' preferences of no due date, one due date, or dual due date

When given three choices for assignment due dates in a hypothetical classroom (n = 563 students), only 8% of the respondents

The effect of the use of the Extension Without Penalty (EWP) system on final grades ($n = 347$). No significant difference in the final grade of those who used EWP at least once and those who did not use EWP is found ($p > 0.05$).

selected "No deadline for assignments. All assignments are due by the end of semester ", and another 10% chose "A single deadline for each assignment." The overwhelming majority (82%) selected the system used in the class (normalized χ^2 test: $\chi^2 = 1735.6$, df = 5, $p < 0.01$), namely "A double deadline for each assignment, one being the ideal due date, the other being the extension deadline" (Figure 3).

4 Discussion

The return to in-person teaching after the pandemic has created many challenges for both instructors and students, as they were adapting to the "new normal" in higher education (Sarvary et al., 2022). While instructors aim to create inclusive classrooms (Hogan and Sathy, 2022), there has been an active discussion about how much structure and flexibility will benefit student learning (Kuimelis, 2022; Supiano, 2023). Students returned to the classroom with new expectations and looking for the same levels of empathy they received during the COVID-19 pandemic. In addition, the cumulative impact of social isolation and online learning resulted in a greater need for additional support (Gagné et al., 2022; Samji et al., 2022). To meet the need for unbiased systemic support in a large classroom, the authors employed explicitly communicated extension due dates (EWP—Extension Without Penalty). This is a powerful tool that can be used to create an inclusive learning environment which understands students have difficulties that arise while striving for their educational goals. It was developed with the Universal Design for Learning and Assessment framework in mind (Silver et al., 1998) using elements of the Self-Determination Theory (Deci et al., 1999). But as is inherent to each tool, it has a way and circumstance for its employment. Understanding when and how to make use of this opportunity will benefit students and, as with many systems, student understanding and agreement with the system helps with its effectiveness and
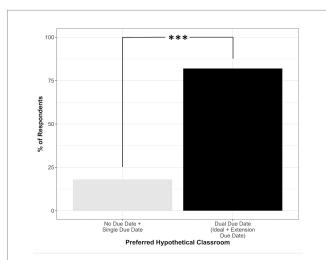

FIGURE 3
Selection of preferred hypothetical classroom by students during the end of semester surveys in two semesters combined. Selection was between "No deadline for assignments. All assignments are due by end of semester" (8%), "A single deadline for each assignment" (10%), and "A double deadline for each assignment, one being the ideal due date, the other being the extension deadline" (82%) (n = 563). The normalized Chi-squared test showed a highly significant preference for the EWP system over the other two choices (p < 0.01).

functionality (Cavanagh et al., 2016). In our study we found that by the end of the semester, when deciding which type of hypothetical classroom they would prefer, 82% of students chose a classroom with a dual deadline (instead of a single deadline at the end of the semester or one per assignment) such as was employed in our classroom. Student appreciation for the system was expressed in categorical selections and their written statements. This interest in the balance of structure (there is a due date) and flexibility (assignments can be submitted late without penalty) was expected, based on the post-pandemic discussions about accommodating increased student needs (Hogan and Sathy, 2022; Kuimelis, 2022).

Previous research has shown that educational innovations and assessments can disproportionately impact groups by gender (Ballen et al., 2017; Aguillon et al., 2020; Robnett et al., 2022), first-generation status (Busch et al., 2023; Metzger et al., 2023), race (Aikens et al., 2017; Castelli and Sarvary, 2021) and year-in-school (Biango-Daniels and Sarvary, 2021). For most student-identified benefits, the EWP system positively impacted everyone equally. However, in some cases, the EWP system had a more positive impact on certain groups. For example, the EWP system helped first-generation students to use the extra time for office hours and to seek help to complete the assignments. These positive impacts should not be overlooked, as one of the main goals of EWP was to remove bias and the hidden curriculum (Bergenhenegouwen, 1987; Margolis, 2001; Alsubaie, 2015). Time management is a skill that students can develop with practice. Significantly more first-year students worried that the EWP system would increase the likelihood of their procrastination. Instructors teaching large introductory classes have a unique opportunity to assist first-year students who have recently transitioned from high school (Meaders et al., 2020). The first experiences in college can have a profound impact (Lane et al., 2021), and instructors should share effective learning strategies and time management techniques, which are known to be the most common concerns voiced by college students (Meaders et al., 2021).

Categorical responses from students who used the EWP about the advantages of the system resulted in a high level of selection to nearly all possibilities for the perceived advantages of the system (Figure 1). The top three advantages included "My stress was reduced" at 94% of the EWP users reporting it as a benefit. "This made things better for my courses" was selected by 82% while "I could handle things better when I was sick/had an emergency" was at 73%. But the quality of work improvement, time management benefits, instructor empathy, and mental health were all chosen by 60+% of the students who took advantage of the EWP system. Those who did not use the system also reported perceived advantages, including stress reduction and improved time management. These findings align with the idea of an inclusive classroom that provides flexibility to help students when unexpected difficulty occurs (Hogan and Sathy, 2022). With the increased attention to mental health issues due to the COVID-19 pandemic (Ma et al., 2022; Canet-Juric et al., 2023; Klussman et al., 2023; Sánchez-Martín et al., 2023), these results show a promising solution to decreasing stress and improving mental health in the classroom. To analogize, the safety net created by allowing the built-in flexibility of EWP resulted in being able to perform without having to fear the fall.

The educational framework known as Universal Design for Learning exists to meet the diverse needs of all students by providing multiple methods of representation, engagement, and expression (Silver et al., 1998). Our policy fits into this framework as it offers both ideal and extended due dates, recognizing that students have varied pacing

needs and personal circumstances. This grants students the freedom to make choices based on their unique situations, which can increase motivation and engagement (Amabile et al., 1976). Furthermore, the tactic of providing both ideal and extended due dates displays a flexible approach to learning, acknowledging that students may require different lengths of time to understand and complete assignments. Differentiation involves tailoring instruction to meet individual needs (Westwood, 2001; Bromley, 2019), and this policy enables just that in terms of assignment completion, while also reducing unnecessary barriers. The provision of extension due dates without penalties is a policy that eliminates potential obstacles to learning. For students who may be dealing with external stressors such as illness or other exams, this approach guarantees that they are not further penalized in this course. Despite these allowances, the goal of the policy is not just to cause a relaxation of demands but to foster the metacognitive skills in students that help them to reflect on their own learning processes and self-regulate when they need to submit their assignments (Tanner, 2012). This autonomy allows intrinsic motivation to play a role in their engagement with material and retention (Deci et al., 1999). Acknowledging that students have a life outside of the classroom can influence the perspectives of both students and teachers, leading to a more holistic understanding. This approach enables students to feel recognized for their unique circumstances and individuality, which in turn, promotes empathy and ultimately enhances their learning experience (Coffman, 1981; Arghode, 2012). It is important that educational innovations do not have a negative impact on students' grades and performance (Sarvary et al., 2022). Therefore, with students demonstrating a preference for having this system with its benefits, it is important to see if academic outcome is affected by the frequency of usage of the EWP. The final grade comparison of those who used the system and those who did not showed that using EWP does not negatively impact grades. The systemic application of an extension with a suggested deadline arguably allows for improved capability to achieve learning outcomes under adverse circumstances while not affecting academic achievement. While published literature on this topic is scarce, there are many anecdotes and misconceptions regarding assignment extensions. We generated eight hypothetical instructor opinions based on our experiences and would like to argue against them with evidence found in our study, if appropriate. While these opinions are not based on surveys or interviews, they do reflect scenarios encountered during the experience of the authors.

4.1 Anecdotal instructor opinion 1: extensions encourage procrastination of work

In many discussions across campuses and conferences, the importance of deadlines for both academics and the workforce has come up. Work must be completed so it can be handed off to others for their work to be completed and a final product to be created within a reasonable deadline. Time is a valuable resource that does not ever get returned (Burkeman, 2021), and procrastination was the highest perceived cost to this system (33% reported by those who used EWP). Though this is true, time management is a skill that is sought after by employers in many fields (Hochheiser, 1998; Mancini, 2003; Woody and Coleman, 2015) and this is quality that the system encourages. "Procrastination" in the end is just an aspect of time management

wherein a student gets to choose the most important task at hand and work on it. Allowing them opportunities to prioritize other aspects of their lives or course load, while not impacting their learning, is a valuable part of their development. Instructors of introductory courses should pay close attention to their incoming first-year students, as the majority of the students who were concerned about procrastination in our study were the ones just starting their higher education.

4.2 Anecdotal instructor opinion 2: my students will just do the work at the last moment

Given the removal of a deadline or any enforcement of late work, it has been seen that students will try and complete all of their assignments at the last moment amounting to reduced quality and retention (Kuimelis, 2022). It becomes important to frame the creation of the extension in the right context. Within the classroom, explaining the advantages of following the ideal deadline is vital, highlighting that the extension exists as a safety net. There is also importance in having extensions for each assignment separately defined to reinforce the value of completing assignments sequentially. In our study, 78% of the students used EWP at least once, but 41% used it only a single time, while it was available for multiple assignments. Students overwhelmingly preferred a dual due date system (82%), so they benefit from a structure where an ideal due date is presented, but an extension due date is offered as a safety net. This study showed that students will not wait until the last moment to turn in the assignments but benefit from the system by reducing stress (94%) and by better handling other courses (82%) and emergencies (73%).

4.3 Anecdotal instructor opinion 3: application of a systemic extension does not always resolve the student's issue

Difficulties that arise in a student's life may take more than a week's time to resolve. As such, they will need to reach out and explain their difficulty. An instructor will then be required to respond and decide whether to give an extension, which can potentially reintroduce bias to the system. Our study showed that establishing EWP can address the majority of the challenges the students face and may reduce the total needed personal extensions. The mid-semester open-ended questions and the categories created based on those answers at the end of the semester showed that this EWP system does indeed provide a solution for a variety of issues, from stress reduction (94%) through emergencies (73%) to improving mental health (60%). While students do not always face these issues, responses from those who did not use the EWP showed that they enjoy the *perceived* benefits, as they know the system exists in case they need it. Only 12% of the students stated that "my need for the extension was not resolved by the extension deadline." The EWP system allows the instructors of large courses to focus on these few cases that need extra attention, instead of being flooded by extension requests. Another solution could be the use of a "token" in addition to the EWP system. Students could use the token for one assignment that needs more extension than the EWP system allows. In that case, the students could submit that one assignment by the end of the semester or by another instructor-defined due date. This

token assignment would help students with unexpected situations that cannot be resolved within the EWP timeframe.

4.4 Anecdotal instructor opinion 4: institutional extensions may be enforced on top of the EWP system

When accommodations are given to a student because of a disability that affects their ability to perform in the course and an extension is allowed to all students, the debate of whether that time should be augmented to the present extension or only laid alongside what is allotted in your course may be raised. This could affect the timelines that instructors are trying to maintain in the course learning objectives. Instructors need to work with the student disability services to make sure they follow the proper guidelines. This study provided results of an extension system that is outside of the institutionally required extensions, such as by the student disability services. Many students either do not know about those services or face challenges outside the purview of student disability. The EWP system creates an unbiased solution for those requests. It is not intended to overwrite the system created by the individual institutions.

4.5 Anecdotal instructor opinion 5: slower return times for assignments can negatively impact my students

Increased time between submissions and feedback can result in a disconnect of students' attention to prior work as well as application of feedback (Eckstein et al., 2020; Puppe et al., 2022). This is a loss that is built into the system. Efforts to overcome it can include verbal confirmation of when grades are posted as well as in class discussion of common pitfalls of the assignment (Torrance and Pryor, 2001; Puppe et al., 2022). Frequent formative assessments that are addressed within class time can also help to guide students toward better understanding and corrections for erroneous knowledge (Sari et al., 2022). In large biology courses graduate and undergraduate teaching assistants often support the teaching and grading efforts (Asgari and Sarvary, 2020), allowing a faster return of the assignments. In this study only 12% of the students listed that the grades were returned to them more slowly. Instructors can design EWP systems with due dates that do not impact their return time, or selectively apply it to assignments that are not part of a scaffolded learning system. The broad variety of real and perceived benefits of this system allows for plasticity based on the instructors' needs.

4.6 Anecdotal instructor opinion 6: this creates additional work for the instructors of the course

Due to the prep time to design a course that allows students leeway on assignments, the initial time put into course design may increase. Students may struggle with understanding the new system, therefore clear and repeated communication about the system will be required. Despite the instructors' communication efforts, 25% of the students listed "the system was confusing to me" as one of the disadvantages. Instructor grading may be compressed to a smaller

window of time, especially if it is desired that all assignments be returned before large summative assessments. In large courses without EWP the administrative burden of handling extension requests can be tremendous and introduce instructor bias. Prior to the implementation of the EWP system, hundreds of emails requesting extensions needed to be answered each semester. In addition, the instructors needed to decide for each request whether an extension should be granted and how long it should be. The EWP system decreased the number of these requests to only a few, freeing up time for the instructors and the academic staff. Therefore, we argue that an established EWP system should have similar or less time costs to a system with a single deadline.

4.7 Anecdotal instructor opinion 7: students feel that this system is unfair to those who complete their work on time

This was not observed by instructors or stated by students within the survey responses. Though massive use of EWP by all students could negatively impact student ability to participate in in-class activities, active learning, and group work. Therefore, instructors must make course-specific adjustments in response to said actions. This was not seen in our study, instead, students sought to manage their own time. The majority of the students (82%) expressed their preferences for the EWP system when they were asked whether they want EWP, a single deadline, or no due date at all for their assignments.

4.8 Anecdotal instructor opinion 8: dropping assignments provides flexibility in the classroom

All courses should have well-designed learning objectives, stating what students will take away from the class (Sarvary et al., 2022). If assignments are designed correctly, they assess the knowledge and skills of the students. In introductory courses, students gain skills that they will build on during their college years and beyond, therefore allowing students to skip specific assignments may lead to a knowledge or skill gap that can negatively impact the student in the long term. This study showed that when a safety net of EWP is provided to the students, they submit all the assignments and meet all the learning objectives without impacting their grades. They enjoy real or perceived benefits from the EWP system without losing an opportunity to gain the skills and knowledge the course was designed to provide them.

5 Conclusion

The objective of including Universal Design in academic courses is to ensure that all students can learn and participate in an inclusive environment without the need for extra assignments or presentations to accommodate those who struggle with traditional course material (Higbee and Goff, 2008). An explicitly communicated and systemically applied extension without penalty framework can be integrated readily into such a design as it inherently allows for flexibility when difficulties arise, no matter their reasons. By providing students with more control over when they hand in assignments, one can augment

student engagement, self-regulation, and motivation. Similarly, a reduction in the need to reach out to instructors for difficulties can help to eliminate aspects of the hidden curriculum while also cutting out opportunities for bias in allowances for extensions. When selection for a reduction in points (late grade) is done based on the educator's ability to understand the need for the extension, it inherently introduces bias. Evasion of this through an explicit extension is arguably beneficial.

The "Extension Without Penalty" system was well received by students, did not negatively impact their grades, and promoted inclusivity. In our efforts to develop an inclusive classroom environment, we should seek evidence-based practices that build up our students while not creating excessive additional work that fatigues educators and reinforces bad behaviors. This system, with the appropriate advanced planning, can be employed in a variety of classrooms and has potential in these efforts. Developing a system with explicitly communicated extension due dates brings equity to the classroom while balancing structure and flexibility.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Cornell Institutional Review Board for Human Participants, Protocol ID 2109010595. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JR: Conceptualization, Data curation, Formal analysis, Validation, Visualization, Writing – original draft, Investigation, Methodology, Writing – review & editing. MS: Conceptualization, Methodology, Writing – review & editing, Funding acquisition, Investigation, Project administration, Supervision, Validation, Visualization, Writing – original draft.

Conflict of interest

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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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2024.1324506/full#supplementary-material

References

Adedoyin, O. (2022). *As more stressed-out students consider dropping out, surgeon general pushes college leaders to ramp up support*. The Chronicle of Higher Education. Available at: https://www.chronicle.com/article/as-stressed-out-students-consider-dropping-out-u-s-surgeon-general-pushes-college-leaders-to-ramp-up-support.

Aguillon, S. M., Siegmund, G.-F., Petipas, R. H., Drake, A. G., Cotner, S., and Ballen, C. J. (2020). Gender differences in student participation in an active-learning classroom. *CBE—Life Sci. Educ.* 19:ar12. doi: 10.1187/cbe.19-03-0048

Agyapong, B., Obuobi-Donkor, G., Burback, L., and Wei, Y. (2022). Stress, burnout, anxiety and depression among teachers: a scoping review. *Int. J. Environ. Res. Public Health* 19:10706. doi: 10.3390/ijerph191710706

Aikens, M. L., Robertson, M. M., Sadselia, S., Watkins, K., Evans, M., Runyon, C. R., et al. (2017). Race and gender differences in undergraduate research mentoring structures and research outcomes. *CBE—Life Sci. Educ.* 16:ar34. doi: 10.1187/cbe.16-07-0211

Alsubaie, M. A. (2015). Hidden curriculum as one of current issue of curriculum. *J. Educ. Pract.* 6, 125–128.

Amabile, T. M., Dejong, W., and Lepper, M. R. (1976). Effects of externally imposed deadlines on subsequent intrinsic motivation. *J. Pers. Soc. Psychol.* 34, 92–98. doi: 10.1037/0022-3514.34.1.92

Arghode, V. (2012). Role of empathy in instruction. *Glob. Educ. J.* 2012, 128–143.

Asai, D. (2020). Excluded. *J. Microbiol. Biol. Educ.* 21:21.1.18. doi: 10.1128/jmbe.v21i1.2071

Asgari, M., Miles, A. M., Lisboa, M. S., and Sarvary, M. A. (2021). COPUS, PORTAAL, or DART? Classroom observation tool comparison from the instructor User's perspective. *Front. Educ.* 6:740344. doi: 10.3389/feduc.2021.740344

Asgari, M., and Sarvary, M. A. (2020). *The value of undergraduate teaching assistants in synchronous online learning environments: 10 steps that can make a positive change*. The Teaching Professor. Available at: https://www.teachingprofessor.com/topics/online-teaching-and-learning/teaching-strategies-techniques/the-value-of-undergraduate-teaching-assistants-in-synchronous-online-learning-environments-10-steps-that-can-make-a-positive-change/.

Ballen, C. J., Salehi, S., and Cotner, S. (2017). Exams disadvantage women in introductory biology. *PLoS One* 12:e0186419. doi: 10.1371/journal.pone.0186419

Belch, H. A., and Barricelli, J. (2004). Curriculum transformation and disability: implementing universal Design in Higher Education. *J. Coll. Stud. Dev.* 45, 107–110. doi: 10.1353/csd.2004.0002

Bender, R., and Lange, S. (2001). Adjusting for multiple testing—when and how? *J. Clin. Epidemiol.* 54, 343–349. doi: 10.1016/S0895-4356(00)00314-0

Bergenhenegouwen, G. (1987). Hidden curriculum in the university. *High. Educ.* 16, 535–543. doi: 10.1007/BF00128420

Biango-Daniels, M., and Sarvary, M. (2021). A challenge in teaching scientific communication: academic experience does not improve undergraduates' ability to assess their or their peers' writing. *Assess. Eval. High. Educ.* 46, 809–820. doi: 10.1080/02602938.2020.1812512

Bosch, B. (2020). Adjusting the late policy: using smaller intervals for grading deductions. *Coll. Teach.* 68, 103–104. doi: 10.1080/87567555.2020.1753644

Bradshaw, C. P., Kush, J. M., Braun, S. S., and Kohler, E. A. (2023). The perceived effects of the onset of the COVID-19 pandemic: a focus on educators' perceptions of the negative effects on educator stress and student well-being. *Sch. Psychol. Rev.* 53, 82–95. doi: 10.1080/2372966X.2022.2158367

Bromley, M. (2019). Differentiation in the classroom. *SecEd* 2019, 21–27. doi: 10.12968/sece.2019.10.21

Burkeman, O. (2021). *Four thousand weeks: Time management for mortals. 1st* Edn. New York: Farrar, Straus and Giroux.

Busch, C. A., Wiesenthal, N. J., Mohammed, T. F., Anderson, S., Barstow, M., Custalow, C., et al. (2023). The disproportionate impact of fear of negative evaluation on first-generation college students, LGBTQ+ students, and students with disabilities in college science courses. *CBE—Life Sci. Educ.* 22:ar31. doi: 10.1187/cbe.22-10-0195

Canet-Juric, L., Vernucci, S., Andrés, M. L., Flores-Kanter, P. E., Poó, F., Yerro, M., et al. (2023). "As time goes by: a longitudinal study on the mental health of Argentinians during the COVID-19 pandemic" in *Trends in Psychology*, 1–23.

Castelli, F. R., and Sarvary, M. A. (2021). Why students do not turn on their video cameras during online classes and an equitable and inclusive plan to encourage them to do so. *Ecol. Evol.* 11, 3565–3576. doi: 10.1002/ece3.7123

Cavanagh, A. J., Aragón, O. R., Chen, X., Couch, B. A., Durham, M. F., Bobrownicki, A., et al. (2016). Student buy-in to active learning in a college science course. *CBE—Life Sci. Educ.* 15:ar 76. doi: 10.1187/cbe.16-07-0212

Chita-Tegmark, M., Gravel, J. W., Maria De Lourdes, B. S., Domings, Y., and Rose, D. H. (2012). Using the universal Design for Learning Framework to support culturally diverse learners. *J. Educ.* 192, 17–22. doi: 10.1177/002205741219200104

Coffman, S. L. (1981). Empathy as a relevant instructor variable in the experiential classroom. *Group Organ. Stud.* 6, 114–120. doi: 10.1177/105960118100600111

Couillard, E., and Higbee, J. L. (2018). Expanding the scope of universal design: implications for gender identity and sexual orientation. *Educ. Sci.* 8:147. doi: 10.3390/educsci8030147

Crawley, M. J. (2012). *The R book. 1st* Edn. Chichester, West Sussex, United Kingdom: John Wiley & Sons, Ltd.

Cullinan, J., Flannery, D., Harold, J., Lyons, S., and Palcic, D. (2021). The disconnected: COVID-19 and disparities in access to quality broadband for higher education students. *Int. J. Educ. Technol. High. Educ.* 18, 1–21. doi: 10.1186/s41239-021-00262-1

Cumming, T. M., and Rose, M. C. (2022). Exploring universal design for learning as an accessibility tool in higher education: a review of the current literature. *Aust. Educ. Res.* 49, 1025–1043. doi: 10.1007/s13384-021-00471-7

Deane-Coe, K. K., Sarvary, M. A., and Owens, T. G. (2017). Student performance along axes of scenario novelty and complexity in introductory biology: lessons from a unique factorial approach to assessment. *CBE—Life Sci. Educ.* 16:ar3. doi: 10.1187/cbe.16-06-0195

Deci, E. L., Koestner, R., and Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychol. Bull.* 125, 627–668. doi: 10.1037/0033-2909.125.6.627

Désiron, J. C., and Petko, D. (2023). Academic dishonesty when doing homework: how digital technologies are put to bad use in secondary schools. *Educ. Inform. Technol.* 28, 1251–1271. doi: 10.1007/s10639-022-11225-y

Dindar, M., Çelik, I., and Muukkonen, H. (2022). #Wedont want DistanceEducation: a thematic analysis of higher education students' social media posts about online education during Covid-19 pandemic. *Technol. Knowl. Learn.* 27, 1337–1355. doi: 10.1007/s10758-022-09621-x

Eckstein, G., Sims, M., and Rohm, L. (2020). Dynamic written corrective feedback among graduate students: the effects of feedback timing. *TESL Canada J.* 37, 78–102. doi: 10.18806/tesl.v37i2.1339

Edwards, M., Poed, S., Al-Nawab, H., and Penna, O. (2022). Academic accommodations for university students living with disability and the potential of universal design to address their needs. *High. Educ.* 84, 779–799. doi: 10.1007/s10734-021-00800-w

Fereday, J., and Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: a hybrid approach of inductive and deductive coding and theme development. *Int J Qual Methods* 5, 80–92. doi: 10.1177/160940690600500107

Gagné, T., Schoon, I., McMunn, A., and Sacker, A. (2022). Mental distress among young adults in Great Britain: Long-term trends and early changes during the COVID-19 pandemic. *Soc. Psychiat. Psychiatr. Epidemiol.* 57, 1261–1272. doi: 10.1007/s00127-021-02194-7

Gonzalez, J. (2019). *A few ideas for dealing with late work* Cult of Pedagogy Available at: https://www.cultofpedagogy.com/late-work/.

Griggs, N., and Moore, R. (2023). Removing systemic barriers for learners with diverse identities: antiracism, universal Design for Learning, and Edpuzzle. *J. Spec. Educ. Technol.* 38, 15–22. doi: 10.1177/01626434221143501

Higbee, J. L., and Goff, E. (eds.) (2008). Pedagogy and student services for institutional transformation: Implementing universal Design in Higher Education. Minneapolis, Minnesota: The Center for Research on Development Education and Urban Literacy.

Hochheiser, R. M. (1998). *Time Management. 2nd* Edn. New York: Barron's Educational Series, Inc.

Hoffman, J., Blessinger, P., and Makhanya, M. (2019). *Strategies for facilitating inclusive campuses in higher education: International perspectives on equity and inclusion*, vol. *17. 1st* Edn. Bingley: Emerald Publishing Limited.

Hogan, K. A., and Sathy, V. (2022). *Inclusive teaching: Strategies for promoting equity in the college classroom*. Morgantown: West Virginia University Press.

Jackson, J., Almos, H., Karibian, N., Lieb, C., Butts-Wilmsmeyer, C., and Aranda, M. L. (2022). Identifying factors that influence student perceptions of stress in biology courses with online learning modalities. *J. Microbiol. Biol. Educ.* 23, e00233–e00221. doi: 10.1128/jmbe.00233-21

Katz, J. (2015). Implementing the three block model of universal Design for Learning: effects on teachers' self-efficacy, stress, and job satisfaction in inclusive classrooms K-12. *Int. J. Incl. Educ.* 19, 1–20. doi: 10.1080/13603116.2014.881569

Kennedy, M., Zamojski, D., and Perdue, M. (2022). *Defining the student experience post-pandemic*. Times Higher Education. Available at: https://www.timeshighereducation.com/campus/defining-student-experience-postpandemic.

Klussman, K., Nichols, A. L., and Langer, J. (2023). Mental health in the United States during the COVID-19 pandemic: a longitudinal examination of the ameliorating effect of meaning salience. *Curr. Psychol.* 42, 1915–1922. doi: 10.1007/s12144-021-01538-5

Kohn, A. (1999). *Punished by rewards: Twenty-fifth anniversary edition: The trouble with gold stars, incentive plans, A's, praise, and other bribes* (ed. Pbk). Boston, Mass: Houghton Mifflin Co. Available at: https://viewer.ebscohost.com/EbscoViewerService/ebook?an=21177&callbackUrl=https%3a%2f%2fdiscovery.ebsco.com&db=nlebk&format=EK&profId=eds&lpid=&ppid=&lang=en&location=https%3a%2f%2fdiscovery.ebsco.com%2fc%2fu2yil2%2fdetails%2fjyjlerqsif&isPLink=False&requestContext=&profileIdentifier=u2yil2&recordId=jyjlerqsif

Kuhfeld, M., Soland, J., and Lewis, K. (2022). Test score patterns across three COVID-19-impacted school years. *Educ. Res.* 51, 500–506. doi: 10.3102/0013189X221109178

Kuimelis, C. (2022). Deadline dilemma: does flexible grading hurt students? *The Chronicle of Higher Education*. Available at: https://www-chronicle-com/article/the-deadline-dilemm

Lane, A. K., Meaders, C. L., Shuman, J. K., Stetzer, M. R., Vinson, E. L., Couch, B. A., et al. (2021). Making a first impression: exploring what instructors do and say on the first day of introductory STEM courses. *CBE—Life Sci. Educ.* 20:ar7. doi: 10.1187/cbe.20-05-0098

Luk, J. W., Stangl, B. L., Schwandt, M. L., Gunawan, T., Joseph, P. V., Momenan, R., et al. (2023). A person-centered approach to capture health disparities and multidimensional impact of COVID-related stressors. *Am. Psychol.* 78, 321–332. doi: 10.1037/amp0001044

Ma, K., Liang, L., Chutiyami, M., Nicoll, S., Khaerudin, T., and Ha, X. V. (2022). COVID-19 pandemic-related anxiety, stress, and depression among teachers: a systematic review and meta-analysis. *Work* 73, 3–27. doi: 10.3233/WOR-220062

Mancini, M. (2003). *Time Management*. New York: McGraw Hill.

Margolis, E. (2001). *The hidden curriculum in higher education*. Psychology Press.

Meaders, C. L., Lane, A. K., Morozov, A. I., Shuman, J. K., Toth, E. S., Stains, M., et al. (2020). Undergraduate student concerns in introductory STEM courses: what they are, how they change, and what influences them. *J. STEM Educ. Res.* 3, 195–216. doi: 10.1007/s41979-020-00031-1

Meaders, C. L., Smith, M. K., Boester, T., Bracy, A., Couch, B. A., Drake, A. G., et al. (2021). What questions are on the minds of STEM undergraduate students and how can they be addressed? *Front. Educ.* 6:639338. doi: 10.3389/feduc.2021.639338

Mehta, R., Dahl, D. W., and Zhu, R. (2017). Social-recognition versus financial incentives? Exploring the effects of creativity-contingent external rewards on creative performance. *J. Consum. Res.* 44, 536–553. doi: 10.1093/jcr/ucx062

Metzger, K. J., Dingel, M., and Brown, E. (2023). "No matter what your story is, there is a place for you in science": students' ability to relate to scientists positively shifts after scientist spotlight assignments, especially for first-generation students and women. *CBE—Life Sci. Educ.* 22:ar12. doi: 10.1187/cbe.22-06-0103

Nanath, K., Sajjad, A., and Kaitheri, S. (2022). Decision-making system for higher education university selection: comparison of priorities pre- and post-COVID-19. *J. Appl. Res. High. Educ.* 14, 347–365. doi: 10.1108/JARHE-08-2020-0277

Nieminen, J. H., and Pesonen, H. V. (2020). Taking universal design Back to its roots: perspectives on accessibility and identity in undergraduate mathematics. *Educ. Sci.* 10:12. doi: 10.3390/educsci10010012

Novick, P. A., Lee, J., Wei, S., Mundorff, E. C., Santangelo, J. R., and Sonbuchner, T. M. (2022). Maximizing academic integrity while minimizing stress in the virtual classroom. *J. Microbiol. Biol. Educ.* 23, e00292–e00221. doi: 10.1128/jmbe.00292-21

Oleson, K. C. (2021). *Promoting inclusive classroom dynamics in higher education: A research-based pedagogical guide for faculty*. Sterling, Virginia: Stylus Publishing.

Ouimet, J. A., Bunnage, J. C., Carini, R. M., Kuh, G. D., and Kennedy, J. (2004). Using focus groups, expert advice, and cognitive interviews to establish the validity of a college student survey. *Res. High. Educ.* 45, 233–250. doi: 10.1023/B:RIHE.0000019588.05470.78

Puppe, L., Jossberger, H., and Gruber, H. (2022). Learning environments and the role of feedback in sculpting lessons. *Art Des. Commun. High. Educ.* 21, 85–98. doi: 10.1386/adch_00048_1

R Core Team (2023). *R: A language and environment for statistical computing (4.3.0) [computer software]* R Foundation for Statistical Computing Available at: https://www.R-project.org.

Roberts-Grmela, J. (2023). *Emotional stress remains a top challenge to keeping students enrolled* The Chronicle of Higher Education Available at: https://www.chronicle.com/article/emotional-stress-remains-a-top-challenge-to-keeping-students-enrolled.

Robnett, R. D., Ballen, C. J., Fagbodun, S., Lane, K., McCoy, S. J., Robinson, L., et al. (2022). Are synchronous chats a silver lining of emergency remote instruction? Text-based chatting is disproportionately favored by women in a non-majors introductory biology course. *PLoS One* 17:e0273301. doi: 10.1371/journal.pone.0273301

Ryan, R. M., and Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol.* 55, 68–78. doi: 10.1037/0003-066X.55.1.68

Saldaña, J. (2013). *The coding manual for qualitative researchers. 2nd* Edn. Los Angeles: SAGE.

Samji, H., Wu, J., Ladak, A., Vossen, C., Stewart, E., Dove, N., et al. (2022). Review: mental health impacts of the COVID-19 pandemic on children and youth – a systematic review. *Child Adolesc. Mental Health* 27, 173–189. doi: 10.1111/camh.12501

Sánchez-Martín, M., Muñoz-Fernández, N., García-Dantas, A., González-Vázquez, A., Lavadiño, L., Justo-Alonso, A., et al. (2023). Longitudinal mental health state during the COVID-19 pandemic. Longitudinal change of mental symptoms and its predictors during the COVID-19 pandemic: a prospective longitudinal study on Spanish population. *Psychol. Trauma*. doi: 10.1037/tra0001429

Sari, N. A. R. M., Winarto, , and Wu, T.-T. (2022). "Exemplifying formative assessment in flipped classroom learning: the notion of Bloom's taxonomy" in *Innovative Technologies and Learning: 5th International Conference, ICITL 2022, Virtual Event, August 29–31, 2022, Proceedings, 13449*, 388–397.

Sarvary, M. A., Castelli, F. R., and Asgari, M. (2022). Undergraduates' experiences with online and in-person courses provide opportunities for improving student-centered biology laboratory instruction. *J. Microbiol. Biol. Educ.* 23, e00289–e00221. doi: 10.1128/jmbe.00289-21

Sarvary, M. A., and Gifford, K. M. (2017). The benefits of a real-time web-based response system for enhancing engaged learning in classrooms and public science events. *J. Undergrad. Neurosci. Educ.* 15, E13–E16.

Sarvary, M. A., and Ruesch, J. M. (2023). A multistep science literacy training framework in an introductory biology classroom: teaching how to find, evaluate, comprehend, and cite scientific evidence. *J. Microbiol. Biol. Educ.* 24, e00197–e00122. doi: 10.1128/jmbe.00197-22

Schapiro, M. O. (2021). *Let's not return to Normal when the 'new Normal' finally arrives* The Chronicle of Higher Education Available at: https://www.chronicle.com/article/lets-not-return-to-normal-when-the-new-normal-finally-arrives.

Shiyuan, Y., Jinxiu, Y., Jingfei, X., Yuling, Z., Longhua, Y., Houjian, L., et al. (2022). Impact of human capital and social capital on employability of Chinese college students under COVID-19 epidemic—joint moderating effects of perception reduction of employment opportunities and future career clarity. *Front. Psychol.* 13:1046952. doi: 10.3389/fpsyg.2022.1046952

Silver, P., Bourke, A., and Strehorn, K. C. (1998). Universal instructional Design in Higher Education: an approach for inclusion. *Equity Excell. Educ.* 31, 47–51. doi: 10.1080/1066568980310206

Stark, J., Daniel, A., and Twardawski, M. (2022). Social disparities in students' intention to enter higher education during the COVID-19 pandemic. *PLoS One* 17, e0267978–e0267917. doi: 10.1371/journal.pone.0267978

Supiano, B. (2023). *Students demand endless flexibility—But is it what they need?* The Chronicle of Higher Education. Available at: https://www.chronicle.com/article/course-correction.

Tanner, K. D. (2012). Promoting student metacognition. *CBE—life sciences. Education* 11, 113–120. doi: 10.1187/cbe.12-03-0033

Torrance, H., and Pryor, J. (2001). Developing formative assessment in the classroom: using action research to explore and modify theory. *Br. Educ. Res. J.* 27, 615–631. doi: 10.1080/01411920120095780

Vogt, D. S., King, D. W., and King, L. A. (2004). Focus groups in psychological assessment: enhancing content validity by consulting members of the target population. *Psychol. Assess.* 16, 231–243. doi: 10.1037/1040-3590.16.3.231

Watermeyer, R., Crick, T., Knight, C., and Goodall, J. (2021). COVID-19 and digital disruption in UK universities: afflictions and affordances of emergency online migration. *High. Educ.* 81, 623–641. doi: 10.1007/s10734-020-00561-y

Westwood, P. (2001). Differentiation' as a strategy for inclusive classroom practice: some difficulties identified. *Aust. J. Learn. Disabil.* 6, 5–11. doi: 10.1080/19404150109546651

Woody, D. D., and Coleman, H. M. (2015). Time and workplace Management for Lawyers. *Colorado Lawyer* 44, 75–76.

Yin, O., Parikka, N., Ma, A., Kreniske, P., and Mellins, C. A. (2022). Persistent anxiety among high school students: survey results from the second year of the COVID pandemic. *PLoS One* 17, e0275292–e0275216. doi: 10.1371/journal.pone.0275292