

International Journal of Learning, Teaching and Educational Research
Vol. 22, No. 3, pp. 128-140, March 2023
<https://doi.org/10.26803/ijlter.22.3.8>
Received Jan 1, 2023; Revised Feb 17, 2023; Accepted Mar 8, 2023

From Onsite to Online: Perspectives on Preservice Teachers' Instructional Engagement

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Abstract. The abrupt transition from onsite to online learning modality has presented educational institutions with both challenges and opportunities. As institutions are slowly moving towards the now normal (post-pandemic), it is vital to reflect on effective online teaching and learning experiences, as these add to the new repertoire of practice, especially for teacher education institutions. The study employed a descriptive quantitative research design utilizing a validated survey questionnaire as the main data-gathering tool. The results of the study reveal that preservice teachers have high instructional engagement with technology and with course content, but the online modality has somehow limited their instructional engagement with instructors and classmates. Furthermore, the results reveal relevant insights on how teachers can maximize technological opportunities while maintaining human connections to enable more engaging online classroom experiences between teachers and students. Universities can therefore continue to actively provide relevant technical and educational training. This is important to accommodate in-person, online, and hybrid educational modalities.

Keywords: face-to-face modality; instructional engagement; online modality; perspectives; preservice teachers

1. Introduction

The abrupt transition from onsite to online learning modality has presented educational institutions with both challenges and opportunities. Considerable shifts have been observed among educational sectors because of the advent of the Covid-19 pandemic. Physical classrooms have been transformed into e-classrooms leveraging technologies to enhance students' learning experience and ensure that learning continues. However, educational institutions are posed with a crucial problem, as it has been reported that global learning poverty is at crisis levels (World Bank, 2022). Learning poverty indicators include school deprivation from the data on school enrolment and learning deprivation measured through varied learning assessments to measure the minimum proficiency level of the students. Although the World Bank report on learning poverty (World Bank, 2022) highlighted data covering basic education, the

concern about learning loss covered higher education. The cumulative impact brought by the pandemic on student outcomes and achievement should not be taken lightly.

In the context of improving student outcomes, teacher effectiveness is seen to be a strong predictor (Darling-Hammond, 2000). Specifically, one very important factor that constitutes teacher behavior associated with learning outcomes is student engagement (Konstantinidou & Kyriakides, 2022). Hence, it is imperative to investigate students' online learning engagement that warrants teaching effectiveness. In support, several studies have indicated that student engagement plays a vital role in student achievement (Clifton et al., 2012; Collie et al., 2017; Truta et al., 2018), satisfaction with university experience (Korobova & Starobin, 2015), and educational aspirations (Gordon et al., 2008). Since the mid-1980s, early efforts on improving student engagement have been observed with the National Survey of Student Engagement introduced in the United States. This was later modified and adapted to several contexts, paving the way for more empirical studies to determine the role of engagement in addressing issues such as school dropout and risky behaviors (Ansong et al., 2017; Archambault et al., 2009; Wang and Fredricks, 2014).

In higher education, student engagement is considered a valuable concept highlighting both academic and social orientations that positively impact student outcomes (Oz & Boyaci, 2021). Students' active involvement or engagement in classroom learning activities is termed "instructional engagement" (Reeve, 2002; Skinner et al., 2008). Varied teaching methods and strategies are used by teachers to deliver the content. The delivery of the content and the teaching method and strategy used depend on the intended learning outcomes and the students' interests and context. In educational institutions, teaching activities for students include lecture discussions, demonstrations, reporting, inquiry- and problem-based learning, etc. These students, who are referred to as preservice teachers, are exposed to varied ways of learning for them to explore and experience a plethora of strategies and methods. They also respond differently to various learning content and methods introduced by their teachers in the classroom. The attention, interest, and effort of these preservice teachers in complying with the activities in the classroom directed towards learning are referred to as their instructional engagement (Marks, 2000). Instructional engagement is regarded as a multidimensional construct (Fredricks et al., 2004) which covers the cognitive, emotional, and behavioral dimensions (Circic & Jovanovic, 2016) of students' engagement during classes. Behavioral engagement pertains to students' attendance and completion of course activities; cognitive engagement describes their self-regulated learning strategies; and emotional engagement pertains to the positive and negative affective states in response to their learning. The engagement is energized by motivation (Reeve, 2013) and supported by various contextual factors (e.g., teacher, peer, and environmental support) (Fredricks, 2011; Lam et al., 2012).

Moreover, several studies have claimed that teaching practices that offer a positive and supportive classroom environment and are anchored on clear

instructional practices encourage students' active engagement (Klieme et al., 2009; Lipowsky et al., 2009; Scherer & Gustafsson, 2015). These two elements of instructional engagement are mentioned in several theoretical frameworks of effective teaching and are regarded as important factors in promoting student learning outcomes (Hooper et al., 2013; Panayiotou et al., 2021).

Furthermore, teachers' efforts to ensure instructional engagement are challenged as they are expected to "give more" because of the shift from onsite to online delivery of teaching and learning due to the closure of schools during the pandemic. For instance, higher education institutions in the Philippines have adopted flexible learning and teaching options and approaches to ensure that alternative teaching and learning still take place. The Commission on Higher Education (CHED) of the Philippines released Memorandum Order (MO) no. 4, series of 2020, which stipulates the guidelines for the implementation of flexible learning among various higher education institutions. In the case of teacher education institutions in Region 7, various innovative learning modalities have been customized to respond to the needs and situations of their preservice teachers. Furthermore, these institutions have adopted different teaching strategies suited to synchronous and asynchronous learning modalities. The adoption of e-learning has somehow provided more opportunities for access to higher education and in so doing requires greater accountability and evidence of learning effectiveness. Techniques such as direct online lectures, prerecorded audio and video lectures, shared online resources, and blended learning were employed (Favale et al., 2020). Learning assessments have also shifted into online quizzes, exams, and assignments (George, 2020). Synchronous learning through web-based videoconferencing applications such as Zoom, Google Meet, MS Teams, etc. was employed to engage students in real-time discussions and interactions.

Studies have also supported that online synchronous and asynchronous learning allows students to develop higher order thinking and problem-solving skills (Ayouni et al., 2021), which encourage participation among students. Higher order skills such as collaboration, problem-solving, and stimulation are important aspects of student engagement in online learning (Thurmond & Wambach, 2004). However, it was observed that some instructors turned videoconferencing lessons into long lectures (Lederman, 2020). This results in lower engagement among students during synchronous classes as compared to onsite or face-to-face classes (Francescucci & Rohani, 2019). A survey conducted on students' engagement in online classes revealed that out of the 400 student respondents, 30% indicated that they are less willing to participate during online class discussions, and 36% were less willing to ask questions (Cavinato et al., 2021). Student instructional engagement is considered a better predictor of student learning in effective online teaching (Ayouni et al., 2021); thus, teachers should put a premium on employing strategies that foster worthwhile engagements during online classes.

Consequently, the study of Bruce and Young (2011) revealed that students find a welcoming environment, and teacher-student and student-student connections, as strong indicators of successful course learning. A successful online classroom

requires provision for appropriate faculty training, the creation of an active learning environment, and the integration of relevant teaching strategies such as chunking of lessons, collaborative student discussions, differentiated assignment, and assessments (Vai & Sosulski, 2016). These considerations that contribute to the success of online classes provide vital insights for teachers when planning for activities that prompt students to devote their time and effort to participate and accomplish the set activities. Teachers should be able to design relevant online learning activities that would motivate students to participate and be engaged.

This sudden shift from onsite to online learning has posed several redirections and redesigning of teaching practices. Even as schools have slowly reopened, it is important to gain insights and look back on what went well and what needs to be improved when doing online classes. Students' perspectives may provide rich input and pedagogical implications for fostering student engagement towards the achievement of learning outcomes in the digital age among teacher education institutions.

2. Research Aim

This study aimed to examine the online instructional engagement of preservice teachers in higher education institutions and online learning experiences.

3. Research Methodology

This study employed a descriptive quantitative research design utilizing a validated survey questionnaire as the main data-gathering tool. The questionnaire reflected a multiple-choice option with frequencies *very often*, *often*, *sometimes*, and *never*, with 24 items categorized into 3 sections (instructional engagement with teachers and classmates, with course content and activities, and with technology). Before conducting the study, a pilot test was used to administer the questionnaire to a group of 25 preservice teachers to establish reliability.

A total of 405 fourth year college students enrolled in an education degree program in public higher education institutions in Cebu City, Cebu province, Philippines participated in the survey. The students are referred to in this study as preservice teachers. The respondents had experienced two years of face-to-face classes and another two years of online classes. Concerning the demographic profile, 86.4% were female and only 13.6% were male, with ages ranging between 22 and 25.

Ethical considerations were observed in this study, including: (a) informed consent, (b) beneficence, (c) confidentiality and anonymity, and (d) respect for privacy, and the right to withdraw from the study at any time. Informed consent was sought and the respondents had the option whether they wanted to complete the questionnaire. Informal interviews were also conducted to support the qualitative component of the study.

The respondents were not linked to the data nor their affiliation revealed. After the data were collected and summarized, results were tallied, collated, and tabulated for analysis and interpretation.

4. Results and Discussion

The study determined the perceived online instructional engagement among preservice teachers in higher education institutions and provides insights on how online classes may become more engaging. Table 1 presents the results of respondents' perceived instructional engagement with teachers and classmates.

Table 1: Results of respondents' instructional engagement with teachers and classmates

Statement			Very often	Often	Some-times	Never
Based on your experience for school years 2020-2021 and 2021-2022 at your institution, how often have you done each of the following?						
1	Participated in class discussions (oral recitations, asking questions, etc.)	<i>f</i>	52	116	229	8
		%	12.4	28.64	56.54	1.97
2	Attended synchronous classes WITHOUT completing reading assignments	<i>f</i>	6	68	103	228
		%	1.48	16.80	25.43	56.30
3	Collaborated with classmates in completing tasks during online classes	<i>f</i>	45	198	141	21
		%	11.11	48.89	34.81	5.19
4	Collaborated with classmates/other students outside of class to complete assignments and projects	<i>f</i>	22	64	221	98
		%	5.43	15.80	54.57	24.20
5	Helped/tutored other students whether paid or voluntary	<i>f</i>	29	62	307	7
		%	7.16	15.31	75.80	1.73
6	Talked to the professors regarding grades and tasks	<i>f</i>	120	227	33	25
		%	29.63	56.05	8.15	6.17
7	Shared one's career plans with a professor	<i>f</i>	11	24	41	329
		%	2.72	5.93	10.12	81.23
8	Shared inputs from one's readings or learning outside of class with the professors	<i>f</i>	7	12	47	339
		%	1.73	2.96	11.60	83.70
9	Received prompt feedback from professors on one's academic performance	<i>f</i>	30	128	233	14
		%	7.41	31.60	57.53	3.46
10	Attended online classes while at work (part-time or fulltime)	<i>f</i>	18	25	45	317
		%	4.44	55.56	11.11	78.27

A myriad perspectives is unequivocal on the impact of student engagement on student performance (Ayouni, et al., 2021; Bruce & Young, 2011; Korobova & Starobin, 2015; Oz & Boyaci, 2021). However, there is still a dearth of literature from developing countries highlighting the influence of social support systems (classmates and teachers) on students' positive emotional and behavioral engagement (Ansong et al., 2017). Behavioral engagement describes students' active learning and participation in varied academic tasks. Skinner et al. (2008) described these engagements being manifested in classroom behaviors, such as asking and answering questions, concentration and attentiveness during class, and persistence in learning efforts.

The results in Table 1 show respondents' perceived instructional engagement with teachers and classmates, particularly during online synchronous classes. The

respondents indicated that they did not participate in class discussions during online classes very often as compared to onsite classes. Only 12.4% of the respondents claimed that they actively participated during class discussions. This finding is supported by responses during the informal interviews, where respondents described online classes as “*passive*” and “*isolating*” compared to onsite classes. According to them, a normal scenario of an online class included teachers talking non-stop, teachers showing prerecorded lectures, teachers muting the microphone to avoid disruptions while 90% of students are turning off their cameras, and student interaction mostly occurring through the chat box. Watson et al. (2023) also revealed that students indicated that online learning improved their technical skills but had a negative effect on communication with instructors. As teachers have also grappled with these changes at the onset of this major educational shift, they may have resorted to banking on expecting students to exercise rote memorization and pure lectures, which may not be so effective during online classes.

The respondents also believed that they become “less” engaged in terms of interacting with their teachers and classmates due to several factors, one being low internet connectivity. They shared that it is difficult to interact when they get disconnected most of the time. Several respondents also mentioned that they get distracted by opening other websites and social media during online classes. Moreover, some of their professors also do not indulge them in breakout rooms to collaborate and complete tasks with their classmates. Only 11.11% of respondents claimed that they had done collaborative work during synchronous classes and that most of the tasks had to be completed individually. The limitations brought by the pandemic have also prompted teachers to limit collaborative work, especially if these require students to meet onsite. Moreover, students’ limited technical capabilities (availability of hardware, internet connectivity, etc.) and resource-limited settings may have also hindered teachers to demand highly technical and collaborative tasks to consider these students.

Collaboration and a high level of engagement and interaction are expected from preservice teachers as these are part of the competencies that teachers need to develop. The limitations brought by the pure online modality may have prevented them from being engaged in meaningful discussions, working with peers, talking to teachers, sharing insights, and receiving prompt feedback. These findings are also supported by McKellar and Wang (2023), whose study revealed that academic engagement and connectedness to teachers and classmates were significantly observed for onsite classes compared to hybrid and remote learning modalities.

Table 2 presents results related to respondents’ instructional engagement with course content and activities, which was high compared to their engagement with teachers and classmates.

Table 2: Results of respondents' instructional engagement with course content and activities

Statement			Very often	Often	Some-times	Never
Based on your experience for school years 2020–2021 and 2021–2022 at your institution, how often have you done each of the following?						
11	Created presentations for their classes	<i>f</i>	214	125	66	-
		%	52.84	30.86	16.30	-
12	Watched instructional videos and other supporting resources and materials	<i>f</i>	317	63	25	-
		%	78.27	15.56	6.17	-
13	Integrated ideas from different online sources when writing a paper for submission and other academic tasks	<i>f</i>	252	121	27	5
		%	62.22	29.88	6.67	1.23
14	Integrated multiculturalism and sensitivity to different perspectives in class discussions and assignments	<i>f</i>	140	228	32	5
		%	34.57	56.30	7.90	1.23
15	Attended synchronous classes WITHOUT completing reading assignments	<i>f</i>	6	68	103	228
		%	1.48	16.80	25.43	56.30
16	Worked harder to meet the professors' standards and expectations	<i>f</i>	349	34	15	7
		%	86.17	8.40	3.70	1.73
17	Utilized ideas or concepts learned from other courses when accomplishing assignments and during online class discussions	<i>f</i>	237	111	52	5
		%	58.52	27.41	12.84	1.23
18	Prepared for an online class (studying, reading, writing, doing homework, analyzing data, and other academic activities)	<i>f</i>	293	101	11	-
		%	72.35	24.94	2.8	-

In an online instructional context, teachers have demonstrated resilience and creativity in responding to the limited resources and preparation (Mananay et al., 2022). These highly challenging conditions also have merit opportunities for teachers to maximize technological affordances in delivering content, which has also changed the way students consume and respond to these digital contents. The results of the study (see Table 2) show the high-level frequency of respondents in relation to their being engaged in creating class presentations (52.84%), consuming instructional videos (78.27%), integrating online sources in accomplishing academic tasks (62.22%), and engaging in other academic activities before online classes (72.35%). These activities highlight the respondents' high engagement with course content and activities online. As respondents mentioned, teachers encouraged them to become more independent, leaving the bulk of simplifying the lessons to them. However, they become mentally exhausted scavenging the internet for content and resources. With the plethora of materials

online, students spend most of their time looking for supplemental videos and other instructional content.

Limperos et al. (2015) highlighted different technological affordances, which include modality, agency, interactivity, and navigability. Modality affordances refer to how information is processed online through instructional content via multimedia formats such as video, audio, text, etc. Agency affordances suggest the source of information, whether it is provided by the instructor, user-generated content, or from discussion formats. Furthermore, interactivity affordances relate to tools such as online textbooks, real-time chat sessions, and the like. Lastly, navigability affordances refer to the online course flow or structure akin to students' ability to find and use information in a meaningful manner. Students' high level of engagement with course content and activities, in the context of this study, is highly linked to these various technological affordances, especially on modality. The way content is presented in online courses is vital to student learning (Limperos et al., 2015; Mayer & Moreno, 2002). Thus, to substantiate class lectures, teachers may incorporate online links to possible relevant instructional videos and materials. The study of Watson et al. (2023) revealed that students had a favorable opinion of video-recorded lectures with extra reading materials, and viewed classes that mainly relied on reading materials to be less effective. Prerecorded lectures, student response games such as Kahoots, and small-group digital activities were all cited by respondents as effective for online learning; they preferred self-selected groups over randomly assigned ones.

Although respondents were highly engaged in multimedia formats, it does not necessarily guarantee learning, as some of them also mentioned that looking for relevant materials online consumes most of their time. Students perceive courses offered fully online to be the least effective (Watson et al., 2023); thus, teachers' facilitation is vital. One of the primary tenets of instructional design and teaching is to ensure that students comprehend the information to improve the online learning environment.

Furthermore, according to Almendingen et al. (2021), during the pandemic, teachers who were proficient in face-to-face instruction but had limited experience with online instruction attempted to apply the same teaching strategies used in traditional classrooms. Additionally, some of the preservice teachers in this study also mentioned that they were not sure how much they had gained (in terms of learning outcomes) in the previous two years of doing the online class. Thus, there is a need to investigate students' perspectives, as these will provide insights on how to make online classes more engaging, as pure onsite and pure online modalities are different in so many ways. Ferri et al. (2020) emphasized that there is a need to redesign technologies and approaches to education and create innovations specifically designed for online teaching and learning.

In terms of technology utilization on the part of the respondents, Table 3 shows the results of their perceived instructional engagement with technology.

Table 3: Results of respondents' instructional engagement with technology

Statement			Very often	Often	Some-times	Never
Based on your experience for school years 2020–2021 and 2021–2022 at your institution, how often have you done each of the following?						
19	Utilized e-platforms and apps (Padlet, chat group, instant messaging, etc.) in completing tasks	<i>f</i> %	265 65.43	96 23.70	38 9.38	6 1.48
20	Used electronic media (Messenger or email) to communicate with professors	<i>f</i> %	363 89.63	33 8.15	9 2.22	- -
21	Answered quizzes/tests using varied assessment online tools	<i>f</i> %	287 70.86	112 27.65	6 1.48	- -
22	Used collaborative tools like Padlet, Jamboard, etc. during breakout sessions or online groupings	<i>f</i> %	98 24.20	120 29.63	185 45.68	2 .49
23	Explored new applications and tools with the help of the teachers	<i>f</i> %	10 2.47	79 19.51	291 71.85	25 6.17
24	Learned varied applications and tools on one's initiative	<i>f</i> %	363 89.63	40 9.88	8 1.98	- -

Any insights about teaching and learning online are inherently technology related. The impact of technology to improve educational outcomes have been well established by literature. The direction of most technology-related educational research now is on maximizing the affordances that technologies have offered in fostering and creating a well-designed classroom learning environment. Understanding how the best features of effective onsite instruction are applicable in online modality will create a strong foundation and understanding when creating a more relevant and effective online instructional delivery.

The findings reveal that the respondents learned different online applications and tools on their own (89.63%), with very little help from their teachers (2.47%). According to respondents, teachers also only occasionally use (45.68%) collaborative tools during breakout sessions or groupings during synchronous classes. As these respondents prepared for their student internship, they must have been exposed to various technological tools useful in their teaching demonstrations. Undeniably, the younger generation is more inclined to technology and anything related to it seems easier for them to manipulate. The respondents also mentioned that they are more engaged with technology than with instructors and classmates in online as compared to onsite classes. They said that onsite classes afford a deeper level of engagement than online classes as they can see reactions and gestures in real time.

As to their overall online learning experiences, a few respondents shared that their instructors sometimes only utilize presentation tools such as PowerPoint and Google Forms and seldom introduce other tools. In addition, the study of Alda et al. (2022) revealed that teachers believe that they are not very familiar with and are less skillful with the features of some ICT-based resources, nor have they utilized and integrated most of them in their classes. This has also supported

students' claim that in online classes, they are more engaged with technology than with their instructors. It was also emphasized in the previous discussion that content presentation in online classes is vital to student learning and online engagement. Given the research and theoretical frameworks on social presence and electronic proximity, modality-rich presentations (i.e., audio description and text) have a higher presence than similar presentations without the same functionality (i.e., text-only) are expected to promote (Limperos et al., 2015).

On the other hand, the respondents mentioned that during classroom topic presentations and reporting, in most cases, they utilized more new tools, such as Canva, Mentimeter, Padlet, Kahoot, Quizizz, Jamboard, and the like, than their instructors. The respondents had also utilized e-platforms and apps in completing tasks (65.43%) (Table 3). This gap in the utilization of technology, or commonly called the digital divide, between teachers and students may also be investigated. What has been imagined as a seamless integration of these technologies and their related tools during online classes may not be exactly what is happening in the real field. This becomes the scenario if the entirety of the shift from onsite to online becomes just a matter of modality. Dotterer et al. (2016) explained that unequal internet and device access in school and at home, varying funding across school districts and divisions, and teachers who do not know how to navigate and use digital tools severely limit student access to the benefits that technology offers. Thus, other than the gap in availability, there is also a need to investigate technological competence. Consequently, Limperos et al. (2015) purported that given the similarities between onsite and online, and the explosive growth of online courses, it remains important to understand how differences in online course teaching strategies and technical competencies affect student success.

5. Conclusion and Recommendations

The post-pandemic era ushers us to a new repertoire of practice, especially for teacher education institutions. The insights accumulated from the decades-long onsite teaching practices and brand-new online teaching opportunities afford promising futures to undergraduate students. This study has provided perspectives on instructional engagement among preservice teachers immersed in online classes during the pandemic. While this new online modality has provided them with opportunities to be technologically competent and engaged, it has somehow limited their instructional engagement with instructors and classmates. Although this study is somewhat limited in scope, the results still demonstrate relevant insights on how teachers can maximize technological affordances while maintaining human connections to facilitate a more engaging online classroom experience *with* instructors and students. Thus, universities may continue to be proactive in providing relevant technological and pedagogical training that is important to cater to onsite, online, and hybrid teaching modalities. It is also suggested that further studies may be conducted to better understand how to promote instructional engagement among students and the factors that matter most, especially in online and hybrid contexts.

6. References

- Alda, W. R., Elejorde, G. C., & Alda, R. C. (2022). Techmentoring program: A school-based ICT initiative for teachers. *Journal of Research, Policy & Practice of Teachers and Teacher Education*, 12(2), 82–97.
<https://doi.org/10.37134/jrpptte.vol12.2.6.2022>
- Almendingen, K., Morseth, M. S., Gjølstad, E., Brevik, A., & Tørris, C. (2021). Student's experiences with online teaching following COVID-19 lockdown: A mixed methods explorative study. *PLoS ONE*, 16(8).
<https://doi.org/10.1371/journal.pone.0250378>
- Ansong, D., Okumu, M., Bowen, G., Walker, A., & Eisensmith, S. (2017). The role of parent, classmate, and teacher support in student engagement: Evidence from Ghana. *International Journal of Educational Development*, 54, 51–58,
<https://doi.org/10.1016/j.ijedudev.2017.03.010>
- Archambault, I., Janosz, M., Fallu, J.-S., & Pagani, L. S. (2009). Student engagement and its relationship with early high school dropout. *Journal of Adolescence*, 32, 651–670. <https://doi.org/10.1016/j.adolescence.2008.06.007>
- Ayouni, S., Hajje, F., Maddeh, M., & Alotaibi, S. (2021). Innovations of materials for student engagement in online environment: An ontology. *Materials Today: Proceedings*. <https://doi.org/10.1016/j.matpr.2021.03.636>
- Bruce, S., & Young, M. A. (2011). Classroom community and student engagement in online courses. *Journal of Online Learning and Teaching*, 7(2), 219–230.
https://jolt.merlot.org/vol7no2/young_0611.pdf
- Cavinato, A. G., Hunter, R. A., Ott, L. S., & Robinson, J. K. (2021). *Promoting student interaction, engagement, and success in an online environment*. Springer.
<https://doi.org/10.1007/s00216-021-03178-x>
- Ciric, M., & Jovanovic, D. (2016). *Student engagement as a multidimensional concept* [Congress session]. World LUMEN Congress. European Proceedings of Social & Behavioral Sciences. <https://doi.org/10.15405/epsbs.2016>
- Clifton, R. A., Baldwin, W. G., & Wei, Y. (2012). Course structure, engagement, and the achievement of students in first-year chemistry. *Chemistry Education Research and Practice*, 13(1), 47–52. <https://doi.org/10.1039/C1RP90055B>
- Collie, R. J., Holliman, A. J., & Martin, A. J. (2017). Adaptability, engagement and academic achievement at university. *Educational Psychology*, 37(5), 632–647.
<https://psycnet.apa.org/doi/10.1080/01443410.2016.1231296>
- Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives*, 8(1), 1–44.
https://www.researchgate.net/publication/240273279_Teacher_Quality_and_Student_Achievement_A_Review_of_State_Policy_Evidence
- Dotterer, G., Hedges, A., & Parker, H. (2016). Fostering digital citizenship in the classroom. *Education Digest*, 82(3), 58.
- Favale, T., Soro, F., Trevisan, M., Drago, I., & Mellia, M. (2020). Campus traffic and e-learning during COVID-19 pandemic. *Computer Networks*, 176, 107290.
<https://doi.org/10.1016/j.comnet.2020.107290>
- Ferri, F., Grifoni, P., & Guzzo, T. (2020). Online learning and emergency remote teaching: Opportunities and challenges in emergency situations. *Societies*, 10(4).
<https://doi.org/10.3390/soc10040086>
- Francescucci, A., & Rohani, L. (2019). Exclusively synchronous online (VIRI) learning: The impact on student performance and engagement outcomes. *Journal of Marketing Education*, 41(1), 60–69. <https://doi.org/10.1177/0273475318818864>

- Fredricks, J. A. (2011). Engagement in school and out-of-school contexts: A multidimensional view of engagement. *Theory into Practice, 50*(4), 327–335. <https://doi.org/10.1080/00405841.2011.607401>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109. <http://www.jstor.org/stable/3516061>
- George, M. L. (2020). Effective teaching and examination strategies for undergraduate learning during COVID-19 school restrictions. *Journal of Educational Technology Systems, 49*(1), 23–48. <https://doi.org/10.1177/0047239520934017>
- Gordon, J., Ludlum, J., & Hoey, J. J. (2008). Validating NSSE against student outcomes: Are they related? *Research in Higher Education, 49*(1), 19–39. <http://dx.doi.org/10.1007/s11162-007-9061-8>
- Hooper, M., Mullis, I., & Martin, M. (2013). TIMSS 2015 context questionnaire framework. In I. V. S. Mullis, & M. O. Martin (Eds.), *TIMSS 2015 assessment frameworks* (Chapter 3). TIMSS & PIRLS International Study Center, Boston College.
- Klieme, E., Pauli, C., & Reusser, K. (2009). The Pythagoras study: Investigating effects of teaching and learning in Swiss and German mathematics classrooms. In T. Janik, & T. Seidel (Eds.), *The power of video studies in investigating teaching and learning in the classroom* (pp. 137–160). Waxmann Publishing Co.
- Konstantinidou, E., & Kyriakides, L. (2022). Instructional engagement and student learning outcomes: Direct and indirect effects based on country-specific contingencies. *Studies in Educational Evaluation, 73*, 101144. <https://doi.org/10.1016/j.stueduc.2022.101144>
- Korobova, N., & Starobin, S. S. (2015). A comparative study of student engagement, satisfaction, and academic success among international and American students. *Journal of International Students, 5*(1), 72–85. <https://doi.org/10.32674/jis.v5i1.444>
- Lam, S. F., Jimerson, S., Kikas, E., Cefai, C., Veiga, F. H., Nelson, B., & Zollneritsch, J. (2012). Do girls and boys perceive themselves as equally engaged in school? The results of an international study from 12 countries. *Journal of School Psychology, 50*(1), 77–94. <https://doi.org/10.1016/j.jsp.2011.07.004>
- Lederman, D. (2020). Most teaching is going remote. Will that help or hurt online learning? *Inside Higher Ed*, 1–24. <https://www.insidehighered.com/digitallearning/article/2020/03/18/most-teaching-going-remote-will-help-or-hurt-onlinelearning>
- Limperos, A., Buckner, M., Kaufmann, R., & Frisby, B. (2015). Online teaching and technological affordances: An experimental investigation into the impact of modality and clarity on perceived and actual learning. *Computers & Education, 83*, 1–9. <https://doi.org/10.1016/j.compedu.2014.12.015>
- Lipowsky, F., Rakoczy, K., Pauli, C., Drollinger-Vetter, B., Klieme, E., & Reusser, K. (2009). Quality of geometry instruction and its short-term impact on students' understanding of the Pythagorean theorem. *Learning and Instruction, 19*(6), 527–537. <https://doi.org/10.1016/j.learninstruc.2008.11.001>
- Mananay, J., Alda, R., & Delos Santos, M. S. (2022). Glimpses of teaching in the new normal: Changes, challenges, and chances. *International Journal of Learning, Teaching and Educational Research, 21*(4), 276–291. <https://doi.org/10.26803/ijlter.21.4.16>
- Mayer, R. E., & Moreno, R. (2002). Aids to computer-based multimedia learning. *Learning and Instruction, 12*, 107–119. [https://doi.org/10.1016/S0959-4752\(01\)00018-4](https://doi.org/10.1016/S0959-4752(01)00018-4)

- Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Educational Research Journal*, 37(1), 153–184. <https://doi.org/10.3102/00028312037001153>
- McKellar, S. E., & Wang, M.-T. (2023). Adolescents' daily sense of school connectedness and academic engagement: Intensive longitudinal mediation study of student differences by remote, hybrid, and in-person learning modality. *Learning and Instruction*, 83, 101659. <https://doi.org/10.1016/j.learninstruc.2022.101659>
- Oz, Y., & Boyaci, A. (2021). The role of student engagement in student outcomes in higher education: Implications from a developing country. *International Journal of Educational Research*, 110, 101880. <https://doi.org/10.1016/j.ijer.2021.101880>
- Panayiotou, A., Herbert, B., Sammons, P., & Kyriakides, L. (2021). Conceptualizing and exploring the quality of teaching using generic frameworks: A way forward. *Studies in Educational Evaluation*, 70, 101028. <https://doi.org/10.1016/j.stueduc.2021.101028>
- Reeve, J. (2002). Self-determination theory applied to educational settings. In E. L. Deci, & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 183–203). University of Rochester Press.
- Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology*, 105(3), 579–595. <https://doi.org/10.1037/a0032690>
- Scherer, R., & Gustafsson, J.-E. (2015). Student assessment of teaching as a source of information about aspects of teaching quality in multiple subject domains: An application of multilevel bifactor structural equation modeling. *Frontiers in Psychology*, 6, 1550. <https://doi.org/10.3389/fpsyg.2015.01550>
- Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, 100, 765–781. <https://doi.org/10.1037/a0012840>
- Thurmond, V., & Wambach, K. (2004). Understanding interactions in distance education: A review of literature. *International Journal of Instructional Technology & Distance Learning*. http://www.itdl.org/Journal/Jan_04/article02.htm
- Truta, C., Parv, L., & Topala, I. (2018). Academic engagement and intention to drop out: Levers for sustainability in higher education. *Sustainability*, 10(12), 4637. <https://doi.org/10.3390/su10124637>
- Vai, M., & Sosulski, K. (2016). *Essentials of online course design: A standards-based guide*. Routledge.
- Wang, M.-T., & Fredricks, J. A. (2014). The reciprocal links between school engagement, youth problem behaviors, and school dropout during adolescence. *Child Development*, 85, 722–737. <https://doi.org/10.1111/cdev.12138>
- Watson, C., Templet, T., Leigh, G., Broussard, L., & Gillis, L. (2023). Student and faculty perceptions of effectiveness of online teaching modalities. *Nurse Education Today*, 120, 105651. <https://doi.org/10.1016/j.nedt.2022.105651>
- World Bank. (2022). *The state of global learning poverty: 2022 update*. <https://www.worldbank.org/en/topic/education/publication/state-of-global-learning-poverty>