K-12 teachers' remote teaching self-efficacy during the pandemic

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Received 29 October 2020
Revised 6 January 2021
Accepted 6 January 2021

Abstract

Purpose – The purpose of this study was to examine the relationship between factors in the extended technology acceptance model (TAM) model and teachers' self-efficacy in remote teaching during the COVID-19 pandemic. In addition, the authors sought to listen to classroom teachers as they expressed their unbiased views of the advantages, disadvantages and challenges of teaching remotely during the COVID-19 pandemic.

Design/methodology/approach – A survey was employed to examine the relationship between factors in the extended TAM model and teachers' self-efficacy in remote teaching during the COVID-19 pandemic using the 49-item questionnaire. A multiple regression analysis using a stepwise procedure was used to examine the relationship between factors in the extended TAM model and teachers' self-efficacy. Three open-ended questions closely examined remote teaching during the pandemic, related to challenges, advantages and disadvantages.

Findings – Qualitative findings challenges included Internet connection, lack of interaction and communication and challenges with motivation and student engagement. Disadvantages included teachers' level of self-efficacy in using technology to teach, lack of support and resources to teach online and the struggle to motivate and engage students. Perceived benefits included flexibility for the teacher and differentiation, rich resources and a way to support learners when in-person instruction is not possible.

Research limitations/implications – The data suggest that instead, during COVID-19, many teachers were learning about the platforms simultaneously as they were instructing students.

Practical implications – To ensure quality remote instruction and that students receive the support to make instruction equitable, teachers need to perceive that their instructional technology needs are met to focus on teaching, learning and needs of their students.

Social implications – Teachers need opportunities to explore the platforms and to experience success in this environment before they are exposed to the high stakes of preparing students to meet K-12 standards.

Originality/value – Instructional delivery has not explored teacher motivational and instructional teaching self-efficacy related to satisfaction with the learning management system (LMS).

Keywords Learning environment, Instructional technology, Teacher teaching efficacy, Learning management system, Multiple Regression Analysis, Technology acceptance model

Paper type Research paper

The COVID-19 pandemic caused a significant shift in education, moving all teaching remotely in just days. This shift caused many teachers to face challenges in preparing and delivering quality content remotely during this pandemic. As teachers shifted their content delivery, they also shifted their pedagogical practices to support remote learning. Teachers had to consider several aspects during this shift: the need for the platform, features of the platform that fit the need, assessment, responsive learning and application and the customization of the learning management system (LMS).

The success of remote teaching and remote learning is impacted by the teachers' perceived teaching self-efficacy and attitude toward the remote LMS.

However, few studies have investigated this relationship. Vankatesh and Davis (2000) examined cognitive instrumental processes, asserting that there is a positive influence on

Journal of Research in Innovative Teaching & Learning
Vol. 14 No. 1, 2021
pp. 32-45
Emerald Publishing Limited
2397-7604
DOI 10.1108/JRIT-10-2020-0055

perceived usefulness and, ultimately, on an individual's intention to use an information system, and developed the extended technology acceptance model (TAM). We used this model to examine the relationship between perceived usefulness and teachers' remote teaching self-efficacy. Vankatesh and Davis (2000) examined how the perceived usefulness and usage intention construct changed with continued information system (IS) usage. This information was especially critical during the COVID-19 pandemic, when teachers were thrust into remote instruction without preparation, as they scrambled to use various remote learning platforms.

Extended technology acceptance model (TAM)

The extended (TAM (Vankatesh and Davis, 2000), which is an extension of the TAM (Davis, 1989), based on the theory of reasoned actions (Ajzen and Fishbein, 2004), has been widely used to predict the use of technology in technology acceptance research. According to the theory of reasoned actions, computer use is determined by human behavioral beliefs. The TAM is a framework that represents the interactions among one's beliefs, attitudes and intentions. The TAM model addresses how users accept and use technology (perceived usefulness and perceived ease of use). The model suggests that when users are presented with a particular technology such as an LMS system, several factors (perceived usefulness and perceived ease of use) influence one's decision of how and when to use the specific technology. The perceived usefulness and perceived ease of use represent the user's cognitive responses utilizing the technology. These cognitive responses then influence the user's attitudes toward technology. Collectively, these factors predict the user's actual usage of the LMS. Recent studies employing the TAM model have also shown the perceived usefulness and ease of use to be significant predictors of technology (Cheung and Huang, 2005; Teo *et al.*, 2008).

Remote teaching and teacher self-efficacy

Self-efficacy grew out of Bandura's work on social cognitive theory (1977, 1986, 1997). Bandura positioned human beings as being self-reflective and active contributors to their environment. He positioned these situations faced with their self-reflection and the likelihood of success. Self-efficacy emerged in 1977 as the individual belief about "their capabilities to organize and execute the course of action required to produce given attainment" (Bandura, 1977, p. 3).

Bandura theorized that self-efficacy beliefs mediated changes in behavior, and how individuals control and shape their environment. Teaching self-efficacy has been studied within the context of K-12 education setting (Bandura *et al.*, 1996; Goddard *et al.*, 2000; Humphries *et al.*, 2012; Klassen *et al.*, 2011; McCoach and Colbert, 2010; Naverez *et al.*, 2008; Skaalvik and Skaalvik, 2007), and the notable conclusion from these studies is that teachers with high self-efficacy perceived teaching efficacy to demonstrate positive correlations with desired outcomes that benefit student learning. These benefits include the desire for teachers to try new concepts (Gibson and Dembo, 1984) and display an increased commitment to the teaching profession.

Schechter (2013) found a significant relationship between teachers' comfort and proficiency in using technology and the degree to which they implement the technology. Additionally, high technology acceptance may be impacted by additional barriers, such as bandwidth, access and technology proficiency. Self-efficacy can influence teachers' perceptions of the interaction of classroom technologies.

Purpose of the study

The purpose of this study was to examine the relationship between factors in the extended TAM model and teachers' self-efficacy in remote teaching during the COVID-19 pandemic. In

addition, we sought to listen to classroom teachers as they expressed their unbiased views of the advantages, disadvantages and challenges of teaching remotely during the COVID-19 pandemic.

Methodology

Using a mixed-method approach, we sought to understand teachers' remote teaching self-efficacy, including motivational, instructional, engagement self-efficacy and outcome expectancy during the COVID-19 pandemic and their perceptions and attitudes toward using an LMS. Several factors were explored using the extended TAM: system quality of an LMS, facilitating conditions to support teachers in using an LMS, perceived usefulness, ease of use, attitudes toward use, intention to use and actual usage LMS. Teachers' teaching self-efficacy included four subscales in the study: motivation, instruction, engagement self-efficacy and outcome expectancy.

Participants

In total, 255 individuals participated in a remote survey. After a thorough review of each response, only 141 responses were useable, with at least 80% completion. The survey usability rate of 55.29% was achieved using a snowball sampling procedure in which a message was posted on social media; this allowed friends to share.

Demographic questionnaire

The participating teachers also answered demographic questions such as age, gender, ethnicity, education level, remote teaching experiences and private learning experiences. In addition, each participating teacher was asked if they used an LMS to teach remotely during the pandemic, and their frequency of use of the LMS.

The final participants were 141 in-service teachers aged between 22 and 72 years (M = 40.61, SD = 11.55). Among the final participants, 92.1% were female and 6.38% identified as male. A total of 131 (92.91%) participants were Caucasian, two (1.41%) were African American, three (2.13%) were Asian American and one (0.70%) was biracial. Among the participants, 51.06% are elementary teachers and 38.3% secondary teachers. Fifty-six percent of the participants had a master's degree, 28.37% a bachelor's degree and 11.35% had a degree higher than a master's level. Ninety percent of teachers surveyed stated schools provided a remote learning platform for them to use during remote teaching due to COVID-19. Collectively among the teachers, only 13 of teachers (9.22%) had remote teaching experiences. Upon further review, most teachers used Google Classroom as the LMS during the pandemic (n = 71, 50.53%), 32 teachers used Canvas (22.70%), ten teachers used Schoology (7.09%) and seven teachers used Microsoft Teams (4.96%). Sixty-three percent of the participants stated the school provided software applications for them to use in a virtual classroom ZOOM (42.42%), WebEx (13.33%) and Google Virtual (29.09%). Thirty-two percent of the participants stated they used the software five days a week. Whereas 47.14% stated they often used additional software applications (e.g., Flipgrid, Seesaw, Class Dojo, Kahoot, Poll everywhere or Education Galaxy) to deliver learning materials. Forty percent stated they used these tools five days per week to interact with their students.

Instruments

Teaching self-efficacy scale

Teaching self-efficacy scale by Yoon *et al.* (2012), (2014) was selected and modified. Yoon *et al.* (2012) conducted a literature review focused on teaching self-efficacy and summarized and

modified six teaching self-efficacy instruments into one instrument to measure K-12 teaching engineering self-efficacy scale (TESS). This survey originally included 128 six-point Likert-type scale items focused on five factors: knowledge, instruction, engagement, disciplinary and outcome expectancy. After validating the survey, the final TESS included knowledge, motivational, instructional, engagement, disciplinary and outcome expectancy. A sixth factor was added, and questions were consolidated or reduced to a total of 41 questions. The internal consistency reliability Cronbach's alpha for each factor was 0.98, 0.84, 0.92, 0.88, 0.94 and 0.88, respectively, in the original study.

After reviewing all subscales, four subscales were chosen intentionally: motivational, instructional, engagement and outcome expectancy, with a total of 18 questions. The questions were modified to fit the remote teaching settings without any specific subject. To reduce the survey's complexity for the participants to respond, the items were also changed into a seven-point Likert-type scale, ranging from 1 being "*Strongly Disagree*" to 7 being "*Strongly Agree*." This adjustment created more alignment and consistency with other measures in the survey. Cronbach's alpha internal consistency for the current study in those four subscales was as follows: motivational 0.82, instructional 0.74, engagement 0.83 and outcome expectancy 0.83, indicating strong reliability. Cronbach's alpha for the overall teaching self-efficacy scale was 0.91 (Table 1).

Extended TAM model measures

A total of 25 seven-point Likert-scale items were used to measure seven constructs in the extended TAM model: system quality, facilitating conditions, perceived self-efficacy, perceived ease of use, perceived usefulness, attitudes toward use and behavioral intention to use. Ratings on the seven-point Likert-scale questions ranged from "*Strongly Disagree*" (1) to "*Strongly Agree*" (7). The system quality ($n = 4$), perceived self-efficacy ($n = 3$) and behavioral intention to use ($n = 3$) measures were adapted from Liaw (2008). The overall internal consistency in Liaw's study was 0.97, while the Cronbach's alphas were 0.87, 0.93 and 0.90, respectively, in Fathema *et al.* (2013). In the current study, the Cronbach's alphas for those three constructs were 0.87, 0.94 and 0.91, respectively. The facilitating conditions ($n = 3$) and attitude toward use ($n = 4$) were adapted from Teo (2010) with reliability at 0.88 and 0.96, respectively. The Cronbach's alpha values were 0.88 and 0.93, respectively, in the current study. The measures for perceived usefulness ($n = 4$) and perceived ease of use ($n = 4$) were adaptive from Venkatesh and Davis' (1996, 2000) study with reliability at 0.96 and 0.93, while they were 0.90 and 0.88, respectively, in the current study.

Measure	Items	Adapted from	Literature	Current study
Teaching self-efficacy	18			0.91
Motivational	3		0.84	0.82
Instructional	5	Yoon *et al.* (2012)	0.92	0.74
Engagement	4		0.88	0.83
Outcome expectancy	6		0.88	0.83
System quality	4	Liaw (2008)	0.87	0.87
Perceived self-efficacy	3	Liaw (2008)	0.93	0.94
Facilitating condition	3	Teo (2010)	0.88	0.88
Perceived usefulness	4	Venkatesh and Davis' (1996)	0.96	0.90
Perceived ease of use	4	Venkatesh and Davis' (1996)	0.93	0.88
Attitude toward use	4	Teo (2010)	0.96	0.93
Behavioral intention to use	3	Liaw (2008)	0.90	0.91
Actual use	1	Researcher developed	–	–

Table 1. Reliability result for each measure (internal consistency Cronbach's alpha)

Open-ended survey questions

There were three open-ended survey questions to allow participating teachers the opportunity to reflect on the challenges, advantages and disadvantages of moving K-12 education to a remote setting.

(1) What challenges, advantage(s), disadvantage(s) did you have when you moved your class (es) from face-to-face to a remote learning environment?

(2) What did the remote learning environment have for K-12 education?

(3) What did the remote learning environment have for K-12 education?

Qualitative text data in the form of brief, open-ended survey responses are often elicited in research to "gather new information about an experience or topic, explain or clarify quantitative findings, and explore different dimensions of respondents' experiences" (Sproull, 1988, p. 307) . Research states that surveys are essential (Jackson and Trochim, 2002) as they often directly influence several aspects of data quality. We intentionally chose open-ended questions because we felt it allowed respondents the opportunity to express an opinion without being influenced by the researcher (Foddy, 1993). We postulated that through our open-ended questions, we might discover a much richer, more diversified set of answers related to teachers' teaching self-efficacy and the positive and negative associations surrounding remote learning implementation.

Phases of analysis

To establish trustworthiness, several phases of analysis were employed. First, we familiarized ourselves with the data that were derived from the open-ended question responses. Two researchers read the raw data multiple times, organizing the data into tables and charts. After a thorough review, we began to generate internal codes and searched for themes. Themes were then diagramed, drawing connections creating a hierarchy of concepts and themes. An additional team member vetted internal codes and themes, and we began to triangulate the data meeting briefly for peer debriefing and discussion. Descriptive content was given to the themes, defining and naming them throughout the production (see Table 2).

Results

Multiple regression results

Quantitative data were analyzed using SPSS 25. Descriptive statistics were used to describe the characteristics of the participants. Multiple regression analyses were used to examine the significant predictors in the extended TAM model to motivational, instructional, engagement and outcome expectancy variables.

Multiple regression analysis, a predictive analysis, was used to explain the relationship between one continuous dependent variable and two or more predictors. Multiple regression analyses with the stepwise procedure were used to investigate if any factors in the extended TAM model can predict the levels of K-12 teachers' motivational, instructional, engagement self-efficacy and outcome expectancy.

Results indicated that the levels of perceived usefulness and system quality significantly predict K-12 teachers' motivational self-efficacy in remote teaching, $F(2,138) = 24.24$, $p < 0.001$, $R^2 = 0.26$. In other words, teachers' perceived usefulness of the LMS and their perceptions of the remote teaching environment, such as the LMS functions and Internet speed, can predict their belief in their ability to motivate their students while teaching online.

In addition, K-12 teachers' levels of perceived usefulness, system quality and facilitating conditions can significantly predict their levels of instructional self-efficacy in remote

Theme	Definition	Quote or example to support	Frequency
Groups at risk	Young, disability, disadvantaged family, rural area, special education, ESOL		
	Younger	Teaching primary grades can be more difficult in a remote setting	14
		Younger students that need parent help with tech	
		My students are five. Engagement and attention	
		I teach PreK. It's hands-on, show-up-to-physical school stuff	
	English learner	Many of my students are English language learners, and many of the parents speak limited English. I have a significant number of students who struggle to read	2
		I am an ESOL teacher, and communication has become more difficult	
	Rural area	We live in a very rural area, so not everyone is able to have Internet in their homes	1
	Low income	Many of my students are low income and do not have access to technology	5
		Education is not necessarily my students' main concern right now. Not all parents are able to sit and work with their students	
		High poverty school means inequality in access	
	Special education struggling readers	I work with a small group of struggling readers. I miss the ability to listen to them read. The interaction is VITAL to helping strugglers	2
	Shy and conscious camera	I teach special education to self-contained students with severe disabilities	1
		Some of my students did not like to talk and answer questions on Zoom. They acted shy	

Table 2. Sample excerpt of our code book (challenges)

teaching, $F(3,137) = 44.09$, $p < 0.001$, $R^2 = 0.49$. K-12 teachers' perceived usefulness of the LMS, their perceptions of the remote teaching environment and the facilitating conditions their school/district provided, such as help and assistance for using remote teaching platforms, can predict their belief in the ability to facilitate students' learning in remote learning settings.

Moreover, teachers' levels of attitude toward use and the facilitating conditions can significantly predict their levels of engagement self-efficacy, $F(2,138) = 54.97$, $p < 0.001$, $R^2 = 0.44$. Their preference and belief in how valuable is the LMS and the facilitating conditions their school/district provided can predict their confidence in their ability to engage students in the remote learning setting during the COVID-19 pandemic. Using multiple regression analyses with the stepwise procedure, results indicated that teachers' perceived usefulness of the LMS and their perceptions of the remote teaching environment could positively predict their belief in their ability to motivate their students during remote teaching, $F(2,138) = 24.24$, $p < 0.001$, $R^2 = 0.26$. In addition, their perceptions of the usefulness of the LMS, their remote teaching environment and the support they received from the schools or districts can predict their belief in their ability to facilitate students' learning in remote learning settings, $F(3,137) = 44.09$, $p < 0.001$, $R^2 = 0.49$.

Finally, their levels of perceived usefulness, behavioral intend to use and facilitating conditions can significantly predict the levels of their outcome expectancy, $F(3,137) = 21.76$,

$p < 0.001$, $R^2 = 0.32$. K-12 teachers' perceptions of the LMS's usefulness, their intention to keep using the LMS in their remote teaching and the facilitating conditions their school/district provided can predict their belief on how effective their remote teaching is (Table 3).

Qualitative results-challenges

After reviewing all data, several themes and subthemes emerged within challenges. Participants listed many challenges from both teachers' and students' perspectives, which go beyond what they usually experience at school in face-to-face learning environments (see Table 4).

Student accesses and equity emerged as 23 participants listed this as a concern or challenge in the open-ended response (question 28, q28). Participants associated many elements of equity of access in their responses: "*some students do not have enough access to [a] device and Internet reliably during class time. And no technology support from family*" (q28). Many participants positioned this issue of equity under several umbrellas: not all of my students have Internet access or devices that they can use, conflicting priorities within households for device/Internet use, sharing technology with multiple school-age siblings or unreliable WIFI connections which impact audio and video needed for remote learning. Students without stable access to devices and/or the internet would not guarantee remote learning through remote teaching, thus creating an inequity.

Table 3. Multiple regression with stepwise procedure to predict each teaching self-efficacy subscale

	Model fit				Coefficients		
	R^2	F	df	p	β	SE	p
Motivation	0.26	24.24	2.138	<0.001			
Intercept					3.36	0.26	<0.001
Perceived usefulness					0.20	0.05	<0.001
System quality					0.19	0.06	0.002
Instruction	0.49	44.09	3.137	<0.001			
Intercept					2.58	0.22	<0.001
Perceived usefulness					0.23	0.04	<0.001
System quality					0.18	0.05	0.001
Facilitating condition					0.12	0,04	0.003
Engagement	0.44	54.97	2.138	<0.001			
Intercept					3.31	0.23	<0.001
Attitude to use					0.37	0.04	<0.001
Facilitating condition					0.10	0.04	0.01
Outcome expectancy	0.32	21.76	3.137	<0.001			
Intercept					3.14	0.26	<0.001
Perceived usefulness					0.14	0.05	0.006
Intend to use					0.17	0.06	0.008
Facilitating condition					0.10	0.04	0.010

Table 4. Challenges and frequency

Themes	Frequency
Access and equity	36
Emotional uncertainty	6
Interactions	48
At-risk learners	25
Teacher proficiency	17
Assessment and integrity	12

Technical support emerged as a subtheme within accessibility and equity under challenges. Teachers were also challenged by not having proficient computer knowledge and skills to teach and learn in a remote environment. Several teachers stated they *"do not have the confidence to adapt class materials to remote courses"* (13 participants). A primary concern was the notion of insufficient technical support for the classroom teacher, students and parents. One participant mentioned the *"students need help with signing on/utilizing some of the tools."* In contrast, another participant had concerns for *"students. . . learn[ing] how to submit work [online]"* and the notation that *"not everyone logs in [because] the tech[nology] does not always work"* (q28). Since there was no face-to-face interaction like they practiced in the classroom, it was more challenging to control *"class attendance and discipline, and organize effective group discussion when the students are taking the class remotely."*

The second theme under challenge is emotional uncertainty. The pandemic created challenges for students and teacher interaction under the circumstances of social distancing. The emotional toll was evident as participants reflected on the emotional uncertainty of students: *"students were not sure if they were going back to school, how they were being graded, and what their responsibilities were"* (q28). Teachers were doing everything in their power to connect through learning platforms such as ZOOM or WebEx. Still, teachers were losing tangible and timely opportunities to communicate with students, which hinders further instruction to ensure attainment.

The third theme which emerged under challenges was interactions. This was evident in phrases like *"emotional connections," "lack of peer interaction"* and *"insufficient peer interactions"* (q28). We defined interactions as the challenge of organizing tangible and effective interactions between teacher and student with no face-to-face situations. Forty-eight of the participants positioned this as a critical area in which teachers voiced concerns, such as *"not being able to see or hear real-time reactions or processes from students";* another teacher stated, *"I cannot see them, their body language, their facial expressions. I can only see the work they produce with a tool they are not proficient with"* (q28). Teachers postulated the need to *"communicate through the parents, so the parents have to pick up the phone to let us talk to the student or pass the message along"* (q28). A subtheme of interaction which emerged was the challenges of establishing a community stating that remote teaching has equated to a *"loss of relationships and rich classroom discussions"* (q28) and that it is "*too difficult to meet individual needs and intervene with those [that]are having trouble"* (q28).

The fourth theme which emerged under challenges was at-risk youth. Serval groups are at risk which may be impacted by the challenges more seriously. Generally speaking, those are students of a younger age (teaching primary grades can be more difficult in a remote setting, younger students need more help with technology from their parents and PreK is often hands-on learning), from disadvantaged families (lack of access to device or Internet, working parents, lack of support) and students with disabilities and/or a variety of learning difficulties (small group instruction, peer interaction is essential, self-contained classes). High-poverty schools where many students do not have access to technology, and it means inequities in access. *"Education is not necessarily my students' main concern right now. Not all parents are able to sit and work with their students"* (q28).

The fifth theme which emerged under challenges was teacher proficiency with technology. Thirteen teachers stated they had *"very limited training on how to use remote tools"* (q28). Many teachers were concerned, indicating *"they are not proficient in using technology,"* and hence, they had difficulties in *"setting up the remote learning platform for their students properly and could not help their students with experiences, which impacted their competency in using technology, technology support, motivating, and engaging students in the remote learning environment"* (q28).

The sixth and final theme that emerged under challenges was assessment and outcome integrity. We defined this within two parts: assessment-teachers assess students'

understanding of content, and academic integrity was described as a student's academic integrity. Many teachers had concern for student performance and the support and scaffolding needed to guide instruction *"in the classroom, I can make sure students have what they need to ensure success, but that's not possible while they are away from me"* (q28). Teachers cautioned that they had *"limited time to gauge"* and the *"need to revamp how I assess and check for understanding"* (q28). They were also very critical, stating that *"parents are completing student work for them,"* and several teachers mentioned that they are *"unsure [if] my students are the ones completing the work I provide online. There is no way to monitor"* (q28).

In conclusion, many challenges impacted remote emergency remote teaching, and teachers voiced their unbiased concerns related to the Internet and technology, not always working while teaching/learning remotely. They discussed the challenges of equity and the worry they had for social interaction and peer connection. Still, mostly they positioned this endeavor as a challenge they were willing to support student learning. They feared that students' motivation and engagement in the remote learning environment would be more challenging. One teacher indicated that *"being able to motivate my struggling learners who may or may not have reliable Internet access (is really challenging)"* (q28) but essentially realized they would need to create learning opportunities during these unprecedented circumstances for the good of the student.

Advantages

The answers to "advantages" are a little bit more divided (see Table 5). A significant theme with several subthemes that emerged is flexibility. Flexibility was mentioned 63 times as an advantage; the subthemes which emerged within flexibility were as follows: no time restriction, work at own pace, comfort, more options and customized learning. The overall analysis of the theme flexibility revealed that teachers and students could work at their own pace, creating more time to practice and less time to plan. One participant stated, *"working at a pace that works for each students' needs and is convenient for their family"* (q29) is an advantage as many families have very busy schedules, and not all learning takes place at the same pace. Several participants mentioned differentiation or customization of instruction as an added advantage as *"lessons can be differentiated for their needs more specifically," creating "different option[s] for practice and learning"* (q29). Overall, the most extensive statement echoed by many participants was that remote learning allowed for flexibility: flexibility to create customized learning, differentiated instruction and students' opportunities to work at their own pace with more time to practice.

No other theme generated the high response as flexibility did; many participants felt this was the number one advantage of moving all curriculum remote during remote learning.

Theme	Frequency
Flexibility	63
Student benefits/ growth	12
Rich resources	12
Being digital	5
For not being together	6
In favor of those specific subgroups	5
Better than no instruction	10
No advantages	6
Improved teacher skills	6

Table 5.
Advantages and frequency

Several different themes did emerge with a lower frequency. Students' benefits and growth and rich resources both had a frequency of 12 respondents. It is interesting to unpack the comments related to students' benefits and growth, as many were unidirectional. Participants felt students would benefit because students are motivated or self-disciplined. *"Motivated students with resources have time to explore their projects and learning"* (q29). Reviewing the responses, keywords jumped out, indicating that if students have the resources and are motivated, remote teaching provides time to explore their interests. They also stated that "*[self] motivated and self-disciplined students get work done quickly with the same quality and have more time to themselves for interest-based learning and activities"* (q29), again suggesting that the student should be self-motivated and self-directed. A positive reflection derived from students' benefits and growth is that remote teaching and learning create an atmosphere where *"students are becoming more independent and in charge of their learning*." Students are taking more *"responsibility and accountability for their work"* (q29). All of this comes at a price. Those with rich resources or equitable access will reap the benefits, while others will fall further behind. There are various resources, such as tools and material available, and the benefits of using them are evident in the independence many of the teachers noted. Teachers discussed the organization of Google classroom, the affordability of video recordings and the many tools readily available via technology. *"I have access to SO many tools. I can quickly adjust my instruction to my students' interests and questions"* (q29).

Several teachers indicated that remote learning was the only choice under the pandemic situation. It was better than nothing, "*Remote learning allowed us to continue teaching content instead of this semester being a wash*." They also found that many resources that were remote could motivate students' learning, and some platforms were beneficial to engage students' learning. Some teachers explicitly stated, "*motivated students with resources have time to explore their projects and learning*, and "*Google classroom is very organized and facilitator of information*." Some teachers also indicated that their technology competencies improved during the pandemic, "*it (was) forcing me to learn a lot about technology*."

A few other minor themes with low frequency emerged as well but are worthy of discussion. A few educators succumbed to the notion that anything is better than nothing: *"Keeps us safe and healthy"* and *"at the moment, the advantage is keeping us alive!"* (q29). Some felt it was a way to *"us finish the school year"* and *"allowed us to continue teaching content instead of this semester being a wash"* (q29).

Two themes that emerged that gave pause and consideration favored those specific subgroups and advantages for not being together. A few teachers spoke about the advantages of not being there and that it equated to reduced peer pressure, reduced stress and anxiety and fewer disciplinary issues. *"Behavior issues are not interrupting learning"* and *"more time to practice math instead of me dealing with discipline issues and management like attendance"* (q29). In favor of those specific subgroups was another theme that gave pause and reflection, as *"ESOL students, if they are familiar with technology, have more access to translation tools"* and "*advanced learners, saves the student and the teacher time" (no transition, no bathroom breaks as a class, etc.)* (q29). The managerial task seems to be adding additional pressures on classroom teachers.

Overall, teachers embraced remote teaching and learning and positioned the task to keep students and teachers safe. Teachers are flexible by nature; they take on additional requirements, assignments, tasks, just about anything thrown at them; and they stayed flexible throughout the pandemic and remote teaching. They did what was best for the student: flexible learning, differentiated instruction, creating more personalized learning. *"[We] have the opportunity for more one on one instruction and feedback"* (q29). Creating opportunities for students to emerge as learners, *"it is holding them responsible and accountable for their work"* and *"students are becoming more independent and in charge of their learning"* (q29).

Disadvantages

Disadvantages echoed several of the challenges illuminated above within challenges identified: inequity, interactions (motivation and engagement) and at-risk learners, further raising a broader issue related to remote teaching during COVID-19 of gaps in education (see Table 6).

Remote teaching by nature exacerbates the inequality gap in society without solving every student's access to devices/Internet and knowledge and skills, which can create broader gaps in instruction for at-risk youth. Participants often felt that students lack preparation for remote learning, as 35 participants stated that students often lack motivation and engagement. The issue is broader than simple motivation and/or engagement: *"[remote learning] requires a certain level of maturity, my younger students do not understand feedback and technology troubleshooting"* and *"some students do not function well in remote environments"* (q30). Not all educators believe remote learning environments provide the best setting for learning. *"Face to face communication is critically important to learning. Children are not built to learn in front of a screen. It isn't healthy"* (q30). Many teachers echoed this sentiment, feeling the lack of connection: *"not being right there with them to help them, not being able to assist them with things like correct letter formation physically. Not having direct eye contact with them or being able to give them that high five or pat on the back when they do a great job,"* or the lack of physical presence.

Inequities rose high on the frequency scale for disadvantages as many teachers felt there were vast inequities among students: *"there is a massive inequality among my students. Those with intact families and a financial buffer are at a huge advantage. Compare that student to a child with non-English speaking undocumented parents or parent, no Internet and also responsible for caring for younger siblings"* (q30). Many teachers made statements reverberating the need for equity, wondering if students can access remote learning platforms via the Internet. Teachers felt it was highly problematic *"that the poor are being left completely behind and no one wants to talk about it"* (q30). Many districts were scrambling to create hotspots in neighborhoods for Internet connections; schools signed out tablets, laptops or iPads for students to use remotely, whereas other districts could only send packets of required work for students to complete and return. Basically, *"whoever has the best Internet connection/ best technology gets an advantage in participation"* (q30). *"Access, bandwidth, lack of consistent at-home support" are all factors impeding the learning of our youth. In addition, some "students didn't know how to use these tools to learn"* (q30).

The most significant drawback of remote learning during the pandemic was the technology, "*access, bandwidth, lack of consistent at-home support. . .students didn't know how to use these tools to learn*." Another disadvantage was teachers' technology proficiency, "*there are many of us in this situation-none of us were prepared or trained on the tools. Platform/app wasn't vetted first*." In addition to teachers' technology skills, they also found it hard to foster and maintain students' motivation and engagement in learning: "*difficulty reaching students with low motivation*," and "*they are not as engaged remote as they are in person*." Teachers

Theme	Frequency
Inequity in technology	46
Student motivation and engagement	35
Assessing and connecting	28
Parental issues	13
Teacher proficiency	9
At-risk learners	9

Table 6.
Disadvantages and frequency

worried that students would *"lose their social development, which is important in the early years,"* making it very hard to deal with the *"social-emotional learning"* aspect of teaching.

Discussion

Using stepwise procedure results, multiple regression analysis indicated that teachers' satisfaction with the LMS influenced their motivational and instructional self-efficacy. The support they received to use the LMS impacted their instruction, engagement self-efficacy and outcome expectancy. They perceived how useful the LMS for remote teaching influenced their instructional self-efficacy and outcome expectancy. Finally, their attitude in using the LMS influenced their engagement self-efficacy, and their intent to use the LMS affected their outcome expectancy.

The qualitative data revealed that many challenges and disadvantages overlapped within the themes. Teachers indicated challenges they encountered: equity is among the top challenges and disadvantages noted in their responses. The inequities ranged from lack of resources such as device, Internet, parental support, disparities across districts and the disparities among subpopulations. Many teachers postulated notions about students at risk and positioning them in both advantages and disadvantages. Many teachers stated remote teaching and learning could be beneficial for subgroups as additional resources are available, such as translating tools. They also mentioned less peer pressure and fewer distractions.

As for the advantages of this transition and being safe and healthy, both teachers' and students' technology competencies improved while teaching and learning online. Several disadvantages indicated, which included teachers' level of self-efficacy in using technology to teach, lack of support and resources to teach online and the struggle to motivate and engage students in remote settings.

We know that results in teachers' perceived usefulness of the LMS and their perceptions of the remote teaching environment could positively predict their belief in their ability to motivate their students during remote teaching. Yet, as educators, we must also be mindful of the mediating factors that often impede their remote teaching environment. Support teachers from the schools or districts can predict their belief in their ability to facilitate students' learning in remote learning settings. This must also be explored through the lens of support teachers need to grapple with several of these challenges and disadvantages. Many teachers feel overwhelmed, underprepared and mentally exhausted as they are trying to navigate the new norm in the remote teaching environment successfully.

Scientific significance

This research is significant as it identifies factors that affect the use of an LMS and teachers' teaching self-efficacy by examining the relationship between teacher's beliefs, attitudes and intentions. This study emphasizes the need for teacher professional development in remote teaching and technology competencies to support and improve teachers' perceived self-efficacy and attitude toward an LMS. Teachers need opportunities to explore the platforms and to experience success in this environment before the high stakes of preparing students to meet K-12 standards. The data suggest that, instead, during COVID-19, many teachers were learning about the platforms simultaneously as they were instructing students. To ensure quality remote instruction and to ensure that students receive the support to make instruction equitable, teachers need to perceive that their instructional technology needs are met to focus on the teaching, learning and needs of their students.

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