

Online Teaching During COVID-19: Acceptance of Google Classroom by Higher Education Institution Faculty Members

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Abstract

Even before the unprecedented shift to online or flexible learning modes due to the current pandemic, technology had been used in the teaching-learning process. This study was designed to determine the acceptance of higher education institution faculty members towards the Google Classroom application as an internet-based online or flexible teaching tool, by utilising the modified Technology Acceptance Model. It was revealed that teachers only agreed with their perceived usefulness, ease of use, and behavioural intention to use Google Classroom. Meanwhile, the teachers are still undecided about their acceptance of Google Classroom, concerning their experience, attitude towards the internet, willingness to use Google Classroom, and their perceived complexity of using it. Further analysis showed that from a pool of ten (10) variables, three (3) independent variables had an impactful correlation to the teachers' acceptance, which included the age, the college where the faculty member belongs, and their employment status. Even though the overall result revealed non-significant individual relationships between the three identified independent variables and the constructs, a significant interaction effect was displayed between the constructs and both the age and status. This implies that age and status notably influence the variation in teachers' acceptance of the Google Classroom, which further explains the variations in the teachers' perception of the seven (7) constructs that comprise their overall acceptance of Google Classroom.

Keywords: educational technology, flexible education, online education, online platforms, Technology Acceptance Model, technology acceptance

1. Introduction

The World Wide Web significantly impacted almost all aspects of society's lives, reshaping the global economy, personal and professional networks, information sources, news, and learning (Nguyen, 2015). The COVID-19 pandemic has accelerated this process, causing rippling effects in our daily lives, particularly in the implementation of the education system. One such apparent adjustment is the shift from physical classes to online or flexible modes of education, which is now the new normal in education. Owing to this mode of learning as "new", both students and teachers are inevitably learning to manipulate, navigate, and adapt to this new normal. Currently, online education is proliferating, and its continued expansion is undeniable until it one day encompasses most of the higher education course offerings (Nash, 2015). With mandates from the Commission of Higher Education and the Department of Education (DepEd), educational institutions adapted online platforms for the delivery of teaching-learning, with the higher education institutions (HEIs) having the advantage of using platforms of their preference (Commission on Higher Education, 2020).

With the surge in online education, concerns emerged regarding whether the quality of higher education would be compromised by the new fast-tracked course of academia (Nash, 2015). Consequently, the rapid expansion of online learning platforms, such as Google Classroom, necessitates careful consideration of the frameworks and support mechanisms that underpin higher education. Furthermore, as education has shifted to online and flexible modes, it is vital to examine how faculty members, primarily the educators, perceive the platforms utilised for instructional delivery. There is, therefore, a need to look into how HEI faculties are adapting to online or flexible teaching-learning platforms such as Google Classroom, specifically by determining their perceptions, attitudes, and behaviour online. This study intends to assess HEI faculty members' acceptance of Google Classroom as a technology for online teaching, with the aim of exploring factors that influence their perceptions, attitudes, and behaviour in using Google Classroom. The findings of this study could subsequently be utilised as a basis for creating a training design for the educators on the application of Google Classroom in teaching and learning.

2. Literature Review

2.1. Education and Online Platforms

To maximise the benefits of an interactive online learning environment, educators must first develop a sufficient understanding of the underlying technological mechanism. They should also be aware of how the current trends can be incorporated to enhance the interactivity in the teaching environment (Singh et al., 2019). Organisations need to recognise the factors that affect adoption, both at the individual and environmental levels, prior to implementing online learning. Once the factors are identified and understood, the faculty and institutional stakeholders can more effectively ensure successful implementation (Panigrahi et al., 2018). Consequently, educators in the academia sector are placing significant efforts to adapt to the new normal set-up of education. In the Philippines, basic education through the DepEd is delivered in the modular mode, while the HEIs utilise the online or flexible mode. However, Wingo et al. (2017) reported frictions faced by HEI faculty members in adopting various modes of online teaching: the anxiety of change, worries about the reliability of technology, scepticism about learning outcomes in online learning environments, and workload issues, among other possible factors. Therefore, it is crucial to explore the current situations and issues with higher education online learning to provide a better context for how the user experience might be improved (Panigrahi et al., 2018).

2.2. Google Classroom as an Online Platform

With the shift to an online or flexible learning mode, all teachers must demonstrate their involvement in the virtual classroom (Iftakhar, 2016), where they either use the school's Learning Management System (LMS) or third-party LMSs such as Google Classroom. As a free web-based platform in the G Suite for Education package to facilitate teaching-learning online, Google Classroom features numerous functionalities such as assignment submission, grading, and sharing of documents (Google for Education, n.d.). A study by Heggart and Yoo (2018) indicated that Google Classroom improved classroom dynamics by increasing student engagement and learning. Furthermore, Abd. Syakur et al. (2020) reported that this application can profoundly aid teachers and students in carrying out a more effective learning process. Google Classroom was also recommended by Okmawati (2020) as a very valuable tool for enhancing students' academic discipline and ability levels.

Google Classroom can be used in different subject areas. Zuniga-Tonio (2021) reported that language students identified a number of advantages of Google Classroom as a tool to support flexible learning and teaching, including easy monitoring of tasks, assignments, projects, and announcements; accessible storage of learning materials; facilitation of students' time management; and motivation for the students to perform well. Moreover, the usage of Google Classroom as a medium of implementing the flipped classroom model for analytical geometry promoted an active learning environment (Suanse & Yuenyong, 2021). In a different context, Google Classroom was also found to be successful at advancing students' knowledge when applied as an online environment for problem-based learning (Bayarmaa & Lee, 2018). Overall, the literature suggests that Google Classroom is widely accepted by both teachers and students, while having a positive impact on student learning outcomes.

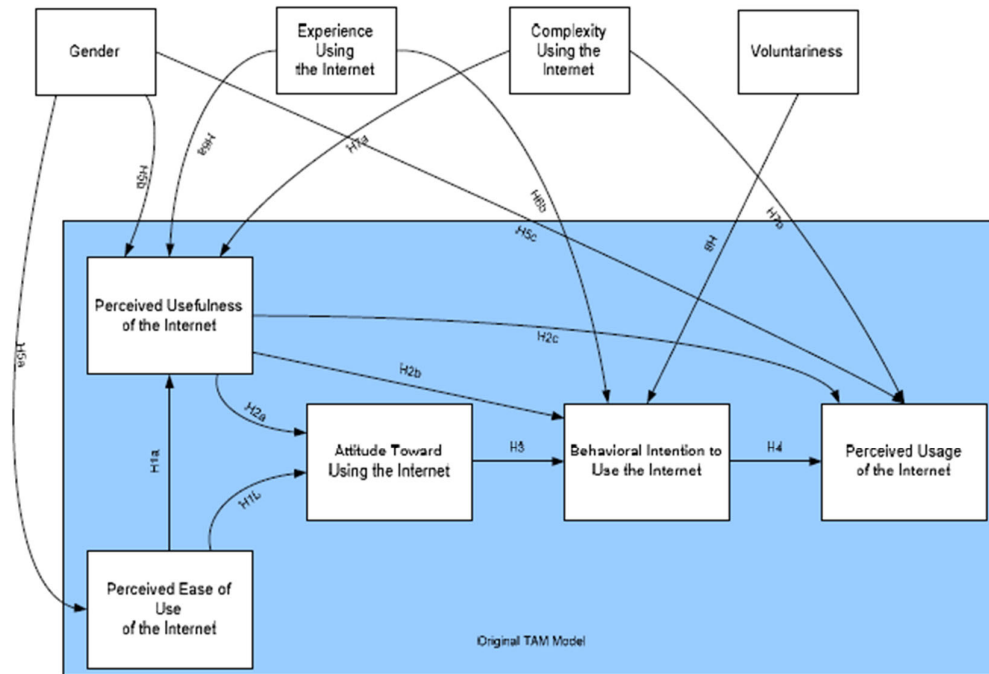
Deductively, the platform's user-friendly interface, collaborative features, and seamless integration with other Google products make it an effective tool for supporting remote and hybrid learning in addition to enhancing student engagement and motivation. Given the general positive perception of Google Classroom as a platform for online education, attributed to its offered features and functionalities, there is a need to investigate other factors that influence teachers' acceptance of the technology.

2.3. Technology Acceptance Model

This study utilised the modified Technology Acceptance Model (TAM) instrument by Gardner and Amoroso (2004) to explore consumers' acceptance of internet-based technologies and the variations in that acceptance. As an adaptation to the Theory of Reasoned Action, TAM was originally proposed by the author Davis back in 1989, and is currently one of the most adopted theories explaining how a technology is assimilated into society. The instrument, as shown in Figure 1, is comprised of seven (7) constructs, namely: Perceived Usefulness (PU); Perceived Ease of Use (PE); Attitude Towards Using the Internet (AT); Behavioural Intention to Use the Internet (BI); Perceived Complexity of Using the Internet (PC); Experience (EX); and Voluntariness on Using the Internet (VU). TAM may work better with some technologies than others in terms of overall compatibility (Gardner & Amoroso, 2004); therefore, depending on the technology being investigated, the correlations between constructs in TAM may differ.

Figure 1

Proposed Modified TAM Model for Internet-based Applications



Perceived usefulness and perceived ease of use are the two (2) fundamental constructs of TAM. Perceived usefulness is defined as the degree to which a person believes that using technology will improve her or his productivity, while perceived ease of use is defined as the degree to which a person believes that utilising technology would be effortless (Gardner & Amoroso, 2004). According to TAM, behavioural intention drives actual system use, while concurrently being influenced by both attitude and perceived utility. In other words, users must believe that the system is beneficial in order to use it, regardless of how simple or complicated it is to use. In earlier reviews of TAM, Mathieson (1991) compared the model to the Theory of Planned Behaviour (TPB), and it was concluded that TAM explained attitude much better than TPB. However, it was notable that while the TAM is quick and inexpensive, it only provides generic information, whereas the TPB holds more precise information.

Afterwards, Taylor and Todd (1995) modified the model to find that the relative influence of the determinants of usage varies significantly depending on experience. For inexperienced users, perceived usefulness was the strongest predictor of intention, whereas for experienced users, a significant relationship was discovered between behavioural intention and behaviour. Furthermore, in a study by Chau (1996), which also modified the TAM, it was revealed that the perceived near-term usefulness of a product was found to be influenced by its ease of use. This finding aligns with the original TAM, demonstrating that an individual's intention to use a technology is primarily determined by perceived usefulness, with ease of use exerting an indirect effect through perceived usefulness. Gefen and Straub (1997) later constructed a modified version of TAM that investigated gender differences of users. Gender-related differences in technology acceptance were observed, noting that women tended to place a higher emphasis on perceived usefulness than men.

Heijden (2000) then adapted TAM in the entertainment industry on the acceptance and usage of a website, adding perceived entertainment value and perceived presentation

attractiveness as new constructs. A similar concept to TAM was researched by Compeau et al. (1999), highlighting that self-efficacy and affective factors influence actual technology use. Likewise, Agarwal and Karahanna (2000), reported that self-efficacy shapes the perceptions of usefulness and ease of use, which subsequently impacts the intention to use technology. Together, these studies demonstrate the significant impacts of psychological and affective factors on the acceptance and usage of technology. Additionally, TAM has been successfully adapted into different contexts and for different objectives, supporting the hypothesis that it can also be implemented in the education sector, especially in the era of online learning.

The TAM has also been used to assess the level of acceptance of several different technologies, aiding organisations in understanding how internet initiatives are perceived and accepted by their users. Further building on the theory's application, this study seeks to elucidate the perception and acceptance of HEI faculty members of Google Classroom, another internet-based technology that is focused on education. This research was designed to assess the HEI faculty's overall acceptance of Google Classroom as an internet technology for online or flexible teaching. Based on the seven constructs of the modified TAM, as shown in Figure 1, the study specifically sought to identify factors that can be attributed to the variations in the acceptance of Google Classroom as a platform for online teaching.

3. Research Method

Adapted from Gardner and Amoroso (2004), the instrument is comprised of seven (7) constructs, namely: Perceived Usefulness; Perceived Ease of Use; Attitude Towards Using the Internet; Behavioural Intention to Use the Internet; Perceived Complexity of Using the Internet; Experience; and Voluntariness on Using the Internet.

With the approval of the Campus Director and the Research Chair, data gathering was conducted through an online questionnaire platform, Google Form. To assess respondents' acceptance of Google classroom, a five-point Likert scale was employed for each item across the seven constructs of the TAM instrument, enabling participants to indicate their level of agreement. The study utilised the seven (7) constructs of TAM as the dependent variables. Whereas age, the college where the faculty belongs, and their employment status were considered the independent variables. The questionnaires were collected over a one-month period, and a total of 101 responses were finalised from the HEI faculty members.

The data obtained was processed through a statistical software package to ensure reliability and accuracy. To ascertain the respondents' acceptance of Google Classroom, the weighted mean (Wm) for items in the TAM questionnaire was determined and then ranked accordingly. Then, to identify whether the independent variables significantly influence the dependent variables, and to know whether the independent variables had an interaction effect influencing the dependent variables, the Multivariate analysis of variance (MANOVA) was utilised. MANOVA is a statistical technique that can be used to simultaneously explore the relationship between several categorical independent variables and two or more metric dependent variables (Hair Jr. et al, 2019).

4. Findings and Discussion

4.1. General Description of the Respondents

Table 1 summarises the respondents' profiles. From the 101 respondents, a majority of 38 (37.6%) are aged 20-29 years old. This was followed by 33 (32.7%) aged 30-39 years, 18 (17.8%) aged 40-49 years, 9 (8.9%) aged 50-59 years, and 3 (2.9%) aged 60 years old and above. Not limited to a single HEI or specific college affiliations, 39 (38.6%) were from the College of Arts and Sciences (CAS), 37 (36.6%) from the College of Technology (COT), 12

(11.9%) from the College of Education (COEd), 7 (6.9%) from the College of Engineering (COEngg), and 6 (5.9%) from the College of Agriculture (COA). Furthermore, while all of the respondents were educators, 56 (55.4%) were non-resident instructors and 45 (44.6%) were resident (regular) instructors. Finally, the gender distribution displayed a slight predominance of females, with 57 (56.4%) compared to 44 (43.6%) males.

Table 1

Profile of the Respondents

Profile Description	Range	Percentage (%)
Age	20 - 29	37.6
	30 – 39	32.7
	40 - 49	17.8
	50 - 59	8.9
	60 and above	2.9
College	CAS	38.6
	COT	36.6
	COEd	11.9
	COEngg	6.9
	COA	5.9
Status of Employment	Resident	44.6
	Non-resident	55.4
Gender	Male	43.6
	Female	56.4

4.2. HEI Faculty Members' Acceptance of Google Classroom

To determine the respondents' acceptance of Google Classroom, the Wm for each item of the TAM was calculated based on the Likert scale of 1-5, with 1 indicating strong disagreement and 5 indicating strong agreement. Six (6) items were identified to be the least accepted aspect of the platform, as shown in Table 2. Of the 28 items in the TAM, respondents collectively disagreed with only one item, while remaining undecided on five items. Other than that, respondents agreed on the majority of sixteen items (57%) and strongly agreed on six items (21%).

Table 2

Least Accepted Aspect of the Technology

Item	Construct	Wm	Interpretation
27. I am not required to use Google Classroom for work/school.	VU	2.32	Disagree
16. Using Google Classroom bores me.	AT	2.63	Undecided
23. When I use Google Classroom, I find it difficult to integrate the results into my existing work.	PC	2.84	Undecided
22. Using Google Classroom can take up much of my time when performing many tasks.	PC	2.89	Undecided
28. While Google Classroom enhances effectiveness in completing tasks, it is not required that I use it.	VU	2.95	Undecided
24. Using Google Classroom exposes me to the vulnerability of computer breakdowns and loss of data.	PC	3.21	Undecided

Note. Voluntariness on Using Google Classroom = VU, Attitude Towards Using Google Classroom = AT, Perceived Complexity of Using Google Classroom = PC

The results revealed that the teachers are required to use Google Classroom at work. This finding may be influenced by the obligation to use LMS in the implementation of online learning, as highlighted by Iftakhar (2016). However, since the school's LMS had been put on pause due to a development project, the teachers' ideal selection was Google Classroom,

which was free to use for both the learners and educators (Google for Education, n.d.). Furthermore, the teachers being undecided on whether the use of Google Classroom is engaging may be influenced by the dilemma of having more access to interactive educational games through the online platform or experiencing instantaneous teacher-student interactive communication.

Then, while Google Classroom make file sharing between teachers and students easier (Zuniga-Tonio, 2021), it may involve a steep learning curve for educators unfamiliar with such applications. This could subsequently explain their indecisiveness regarding its ease of integration into their existing teaching practices. The same circumstance may also elaborate on their perception of the time consumption of Google Classroom, because even though it accelerates the process of information sharing, the teachers need to invest time to adapt and adjust to the new educational setup. However, with constant use, this barrier can be minimised after mastering the use of Google Classroom.

In terms of security, the teachers were also inconclusive on whether Google Classroom exposes them to the vulnerability of computer breakdowns and data loss. This result highlighted the need to train the educators on digital security and identifying safe links. Since not all websites have weaknesses (Bayarmaa & Lee, 2018), reinforcement on this aspect may prevent data loss or breakdowns. The teachers should also be provided with adequate tools to back up their files and protect their devices from malware. These efforts may improve the educators' confidence and acceptance in using Google Classroom or any other LMS in the future.

Other than that, it was worth noting that teachers consider the use of Google Classroom as a virtual classroom to be highly useful. They also acknowledged that the platform's other capabilities should be explored and utilised to enhance their professional development (Abd. Syakur et al., 2020). Moving the individual scores of the 28 items, the results were then consolidated into the seven (7) constructs of the TAM in order to provide a clearer overview of respondents' acceptance. Table 3 below presents the respondents' mean acceptance scores of each construct.

Table 3

HEI Faculty Acceptance of Google Classroom per Construct

TAM Construct	Mean	Interpretation
1. PU	4.27	Agree
2. PE	4.18	Agree
3. BI	4.11	Agree
4. EX	3.90	Undecided
5. AT	3.89	Undecided
6. VU	3.35	Undecided
7. PC	3.24	Undecided
Grand Mean	3.85	Undecided

Initially, ten (10) independent variables contributing to the variation of the respondents' acceptance of Google Classroom, comprised of the seven (7) constructs as dependent variables, were identified. Based on existing literature and the hypotheses of the researchers, the initial independent variables include respondents' gender, age, undergraduate degree, highest educational attainment, number of seminars and training related to ICT received, the college they belong to, the status of their employment, teaching load, teaching experience, and teaching preparation. Due to this considerable number, separate MANOVAs were conducted between each independent variable and the TAM constructs. The analysis narrowed the scope to three (3) independent variables that showed a significant correlation to the dependent variables, namely age, the college where the faculty member belongs, and their

employment status. Consequently, only these three (3) were retained as the independent variables for subsequent analysis.

To interpret these statistical findings, it is important to understand how the reported values work. The F-values presented in the results, for example, $F(9, 75) = 2.423$, indicate the ratio of variance explained by the independent variables compared to unexplained variance. A higher F-value suggests a stronger effect of the tested factor. The p-values (e.g., $p = 0.018$) show whether the observed differences are statistically significant, with values below 0.05 generally accepted as evidence that the effect is unlikely due to chance. For example, the result $F(9, 75) = 2.423$, $p = 0.018$ for the relationship between age, college, and perceived usefulness indicates that the variation in scores across groups is statistically meaningful. These numbers, therefore, provide the statistical justification for the narrative conclusions drawn in the following paragraphs.

The overall results indicated no significant individual effects of age, college affiliation, or employment status on the TAM constructs. This means that when each variable was examined separately, none was found to strongly predict faculty members' acceptance of Google Classroom. However, the analysis revealed a significant interaction between age and employment status, $F(21, 198.68) = 2.081$, $p = 0.005$. This suggests that the combined influence of these two (2) factors contributes to variations in respondents' acceptance, highlighting that the effect of age may differ depending on whether the faculty member is a resident or non-resident instructor. Such findings underscore the need to consider variables not in isolation but in interaction, as the acceptance of technology may be shaped by overlapping demographic and professional characteristics.

Further tests of between-subject effects uncovered several significant interactions. Age and college affiliation were linked to the respondents' Attitude Towards Using Google Classroom (AT), $F(9, 75) = 2.006$, $p = 0.050$; Perceived Usefulness of Google Classroom (PU), $F(9, 75) = 2.423$, $p = 0.018$; and Perceived Ease of Use of Google Classroom (PE), $F(9, 75) = 2.911$, $p = 0.005$. Similarly, age and employment status showed significant interactions with AT, $F(3, 75) = 6.538$, $p = 0.001$; PU, $F(3, 75) = 6.177$, $p = 0.001$, and PE, $F(3, 75) = 7.745$, $p = 0.000$. College affiliation and employment status were also significantly related to AT, $F(1, 75) = 4.129$, $p = 0.046$, and to PE, $F(1, 75) = 8.396$, $p = 0.005$. These patterns indicate that the institutional and demographic factors work together rather than in isolation to shape how they perceive and accept Google Classroom.

Post hoc analyses provided further insights into these interactions. Scheffe's test showed that respondents aged 60 years and above scored significantly lower than the younger groups, suggesting that older faculty members may face greater challenges in adopting online platforms. In terms of college affiliation, faculty members from the COA, followed by those from the COEd, had significantly lower scores compared to most other colleges. Tukey's HSD test supported these results, confirming the coherence of the findings across different statistical approaches. Additional analyses also showed noteworthy correlations that reinforced the role of institutional affiliation. Specifically, college affiliation was significantly associated with PU, $F(4, 75) = 3.245$, $p = 0.016$, and with PE, $F(4, 75) = 3.442$, $p = 0.012$.

This indicates that faculty members' perceptions of the usefulness and ease of use of Google Classroom varied considerably across colleges. Such variation may stem from differences in curricula, the extent to which digital tools are embedded in teaching, or the availability of institutional support. Technology-driven colleges may provide more structured exposure to digital platforms, thereby shaping stronger perceptions of usefulness and ease of use. In contrast, faculties in more traditional or practice-oriented fields may encounter fewer opportunities to integrate digital platforms into teaching. These outcomes highlight that both age and academic discipline can create barriers to technology adoption, pointing to vital areas for targeted support or training, while emphasising the importance of contextualising TAM

constructs within institutional environments rather than treating them as uniform across all academic settings.

Based on the mean scores, further distinctions were observed across age, college, and employment status. In terms of age group, those aged 60 years and above consistently reported the lowest scores across nearly all constructs, except for VU. Meanwhile, regarding college affiliation, respondents from the College of Technology showed the highest acceptance of PU, PE, AT, PC, and VU, suggesting a distinctive association between their academic field and the use of Google Classroom. Finally, when the status of the employment was considered, the resident instructors demonstrated greater acceptance of Google Classroom across all seven (7) TAM constructs compared to non-residents. This could reflect their deeper institutional integration and stronger sense of obligation to align with university teaching policies, further underscoring the role of organisational structures in shaping technology acceptance.

Based on the findings and analyses, several recommendations are proposed. Administrators of relevant faculties should consider these results when designing targeted training programmes on online learning implementation that account for educators' demographic and institutional backgrounds. By aligning training goals and procedures with factors that significantly influence TAM constructs and technology acceptance, the effectiveness and efficiency of such programmes can be enhanced. Other academic institutions are encouraged to validate these factors in their local contexts. Furthermore, future studies could replicate this research on a larger scale with a more balanced sample distribution, for example, across age groups and faculty affiliations. Investigating additional factors not covered in this study may also enrich the existing literature on internet technology acceptance and contribute to improving instructional delivery and the overall quality of education.

5. Conclusion

The study utilised the modified TAM to examine seven (7) constructs fundamental to the acceptance of Google Classroom among HEI faculty members as the medium for online and flexible learning. Overall, the results revealed that the respondents generally agree with the platform's usefulness and ease of use, both of which influence their behavioural intention to adopt Google Classroom. Teachers also demonstrated a favourable attitude towards using the platform, consistent with the findings that most respondents had positive experiences with it. However, despite these promising perceptions, lower levels of acceptance were shown in the voluntary use of the platform and perceived ease of integration into existing practices. Some respondents perceived the platform as complex and would only use it when required. Such responses may be attributed to the necessity of shifting to online or flexible learning under the new normal, which required substantial adjustment in terms of time and effort. This paper also established that demographic and institutional factors contributed to variations in acceptance. Age, employment status, and college affiliation were found to significantly influence the teachers' acceptance of Google Classroom across the seven (7) TAM constructs. These findings underscore that acceptance of Google Classroom is not uniform and varies according to specific backgrounds or use cases of the teaching workforce. Ultimately, the study concludes that while faculty members demonstrated a largely positive acceptance of Google Classroom, their responses also reflected ongoing adaptation to the demands of online teaching in higher education.

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