TEACHERS' ATTITUDES TOWARDS THE EMPLOYMENT OF LEARNING MANAGEMENT SYSTEM IN TEACHING GENERAL ENGLISH TO NON-ENGLISH MAJORS

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ARTICLE IN	FO ABSTRACT
Received:	30/5/2023 The success or failure of any Learning Management System (LMS) depends
Revised:	largely on teachers. Though the number of research on the attitudes of teachers towards LMS in the world is numerous, research related to the
Published:	30/6/2023 attitudes of teachers of English is limited. Therefore, the aim of this study is to explore the attitudes of teachers of English towards the employment of
KEYWORDS	LMS in teaching general English to non-English majors and to explore ——whether there is any correlation between teachers' attitudes and
Attitudes	demographic elements. The study was conducted at the University of
Employment	Science - Vietnam National University - Ho Chi Minh City with the
General English	participation of 30 lecturers. Quantitative and qualitative data were applied,
LMS	and descriptive statistics and content analysis were employed. The findings reveal that there were moderate attitudes towards system quality and service
Non-English Majors	quality, while perceived usefulness received negative attitudes. Besides, gender and LMS skills proficiency had no significant effect on attitudes. Age and experience of using LMS, on the other hand, had a strong connection with attitudes. Based on the findings, some recommendations are made for the university administrators so as to improve teachers' attitudes.

THÁI ĐỘ CỦA GIÁO VIÊN ĐỐI VỚI VIỆC ỨNG DỤNG HỆ THỐNG QUẢN LÝ HỌC TẬP VÀO VIỆC GIẢNG DẠY TIẾNG ANH TỔNG QUÁT CHO SINH VIÊN KHÔNG CHUYÊN TIẾNG ANH

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THÔNG TIN BÀI BÁO TÓM TẮT

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Ngày hoàn thiện:

Ngày đăng:

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Thái đô Úng dụng Tiếng Anh tổng quát Hệ thống quản lý học tập Sinh viên không chuyên tiếng Anh

30/5/2023 Sự thành công hay thất bại của bất cứ hệ thống quản lý học tập (LMS) nào phần lớn phụ thuộc vào giáo viên. Mặc dù số lượng những nghiên cứu về 30/6/2023 thái độ của giáo viên đối với LMS trên thế giới rất nhiều, các nghiên cứu 30/6/2023 liên quan đến thái độ của giáo viên tiếng Anh còn han chế. Do đó, mục đích của nghiên cứu này là khám phá thái độ của giáo viên tiếng Anh đối với việc sử dụng LMS trong việc giảng day tiếng Anh tổng quát cho sinh viên không chuyên tiếng Anh và khám phá xem liệu có bất kỳ mối tương quan nào giữa thái độ của giáo viên và các yếu tố nhân khẩu học hay không. Nghiên cứu được thực hiện tại Trường Đại học Khoa học Tư nhiên - Đại học Quốc gia Thành phố Hồ Chí Minh với sự tham gia của 30 giảng viên. Dữ liệu định lương và đinh tính đã được áp dụng, thống kê mô tả và phân tích nôi dụng đã được sử dụng. Kết quả cho thấy rằng giáo viên có thái độ vừa phải đối với chất lượng hệ thống và chất lượng dịch vụ, trong khi nhân thức về tính hữu ích nhận được thái độ tiêu cực. Bên cạnh đó, giới tính và trình độ kỹ năng LMS không có ảnh hưởng đáng kể đến thái độ. Trong khi đó, tuổi tác và kinh nghiệm sử dụng LMS có mối liên hệ chặt chẽ với thái độ. Dựa trên những phát hiện này, một vài đề xuất được đưa ra cho các nhà quản lý trường đại học để cải thiện thái độ của giáo viên.

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1. Introduction

The learner-centered approach has gradually replaced the traditional teacher-centered approach since the latter shows its limitation with a lack of communication between teachers and students and its substantial dependency on textbooks [1]. McCombs and Whisler [2] maintained that the learner-centered approach met the need of boosting motivation, learning, and academic achievement for a great number of students. As a result, in recent decades, the demand for technological means which can support the teaching and learning process is increasing significantly. Learning Management System (LMS) is introduced as a special software, providing a means for managing, and tracking student outcomes [3], [4]. Watson and Watson [5] indicated that LMS played an important role in education with a variety of benefits such as providing additional lectures to students besides class lectures, timely feedback, better monitoring of students, and a useful platform for teaching innovation [6].

In language teaching, the technological capacity of teachers is crucial to the success of any web-based learning system in higher education, and it is also essential for a language teacher to be able to deal with technical glitches [7], [8]. Selim [8] claimed that the success or failure of a web-based system lay primarily in teachers' attitudes towards the system. Wang and Wang [9] pointed out that the encouragement from educational institutions and their efforts in ensuring teachers' satisfaction contributed undoubtedly to the successful adoption of the system. However, studies on the attitudes of teachers of English, especially in the Vietnamese context are rare. Therefore, this study aims to fill this gap. The study attempted to address the following research questions:

- (1) What are the teachers' attitudes towards the employment of Learning Management System in teaching general English to non-English majors?
- (2) Is there any correlation between teachers' attitudes towards the employment of LMS and the demographic elements?

2. Research methodology

2.1. Research context and participants

The survey was conducted at the Center for Foreign Languages of the University of Science – Vietnam National University – Ho Chi Minh City. The LMS employed in teaching general English to non-English majors consists of Richmond and Google Classroom. The convenience sampling was adopted. Initially, the number of participants was 33 lecturers. In addition to omitting one lecturer who participated in the pilot study, the responses of two lecturers were excluded due to their unreliability, consequently reducing the sample size to 30 participants.

The number of female participants was 23 females (76.7%), while males were 7 (23.3%). The age groups consisted of those under 26 (3.3%), 26-30 (23.3%), 31-40 (56.7%), and above 40 (16.7%). As for participants' years of experience in using LMS, the percentages of 3-6 months, 1 year, 2 years, and above 2 years of experience were 23.3%, 6.7%, 16.7%, and 53.5% respectively. With regard to the current LMS proficiency, the majority of participants were in the intermediate group (76.7%) compared to 13.3% and 10% were the percentages of participants in the advanced and beginner group.

2.2. Research instrument

Questionnaire and semi-structured interview were conducted in order to obtain data. There are two sections in the questionnaire. The first section is to collect participants' demographic information including age, gender, level of LMS proficiency, and their years of experience in using LMS (Richmond and Google Classroom). Thirty question items were in section 2 aiming at dealing with teachers' attitudes towards the employment of LMS. These items were all adapted from Table A1 – List of survey items by the construct of Wang and Wang [9, p.772], presenting factors that explained and predicted the adoption of instructors towards a web-based learning

system. These items were classified into three main categories based on the ABC model – affective component, behavioral component, and cognitive component, followed by a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Cronbach's Alpha indexes of the questionnaire were at 0.75, indicating that the questionnaire was reliable. As for the semi-structured interview, this instrument was applied to corroborate the answers in the questionnaire since close-ended questions alone cannot get sufficient or greater in-depth information [10].

2.3. Procedures for data collection and analysis

The survey was conducted at the beginning of the second semester of the academic year 2022-2023. The questionnaire was printed out and distributed to participants in the third week of March 2023. After completing the questionnaire, the respondents returned it to the researcher, and ten of them were willing to take part in the interview.

The quantitative data collected from the questionnaire were converted into numbers and processed by applying Statistical Package for the Social Sciences (SPSS) version 22. Statistics on the mean score (M), standard deviation (SD), and multivariate linear regression were conducted. Thirty items in the second section asking participants about their affective component towards information quality (IQ), system quality (SQ), service quality (SEQ), and self-efficacy (SE); their behavior towards behavioral intention to use (BI), and actual system use (SU); their cognition of perceived ease of use (EOU), and perceived usefulness (PU). The criteria in the 5-point Likert scale were used to interpret the data including strongly disagree (M = 1.00 - 1.80), disagree (M = 1.81 - 2.60), neutral (M = 2.61 - 3.40), agree (M = 3.41 - 4.20), and strongly agree (M = 4.21 - 5.00).

As for the qualitative data, the process of analyzing data adhered to the process which was presented in [11, p. 87]. Based on the order of answering questions in the interview, interviewees were coded from T1 to T10. Interviewees' responses were encoded into codes and categorized into general themes.

3. Results and Discussion

3.1. Results

3.1.1. Teachers' attitudes towards the employment of LMS in teaching English

After analyzing the data obtained from questionnaire and semi-structured interview, the overall result was presented, followed by the detailed results. The detailed results were displayed based on the three attitudes components.

Overall, respondents' attitudes towards the system were not really high with the general mean score at just under 3.00. The dominant mean score belonged to the affective component (M = 2.95, SD = 0.64). The cognitive component accounted for the second position in the rank (M = 2.82, SD = 0.62), while the behavioral component received the lowest score (M = 2.74, SD = 0.73).

Affective component

Regarding "Information Quality", results from the quantitative data show that the mean score of "satisfaction with the sufficient information of LMS" was higher than that of "accurate information of LMS" with (M = 2.93, SD = 0.74) and (M = 2.77, SD = 0.68) respectively. The results indicate that respondents had moderate attitudes towards LMS information quality.

As for data collected from the questionnaire concerning teachers' affective attitudes towards "System Quality", the item "easy access" reached the highest rank (M = 3.23, SD = 0.77). The second highest belonged to "the flexibility of LMS regarding time and place" (M = 3.07, SD = 0.78). "Providing helpful functions" received third place in the rank (M = 2.97, SD = 0.72), followed closely by "the well-designed user interface" (M = 2.90, D = 0.80).

Concerning "Service Quality", the results received for five items were neither high nor low which showed the moderate attitudes of lecturers towards the service quality. "The helpfulness of IT staff in solving technical problems" accounted for the highest mean score (M = 3.37, SD = 1.00)

0.76). It was followed by "the satisfaction towards the training program in enhancing lecturers' ability to use LMS" (M = 3.10, SD = 0.76). Whereas, the differences in the mean scores between respondents' "satisfaction with IT staff' professional knowledge" and "satisfaction with IT staff' speed of fixing technical problems" was minimal with (M = 3.07, SD = 0.69) and (M = 3.03, SD = 0.81) respectively. "The contentment with the training in the operation of LMS which respondents had received" gained the lowest score (M = 2.90, SD = 0.84).

The last sub-variable was "Self-efficacy". The quantitative results reveal that respondents had average attitudes about "their confidence in integrating LMS functions into their teaching plans" (M = 3.00, SD = 0.83). This mean score was equivalent to "their confidence in having the adequate ability to operate LMS" (M = 3.00, SD = 0.79). It is possible that lecturers were not confident in "being able to use LMS if they had no prior experience in using it" (M = 2.70, SD = 0.95), or "being able to use LMS even if having only user manual for reference" (M = 2.67, SD = 0.84).

Behavioral component

Regarding "Behavioral Intention to Use", it is noticeable that the "intention of making more use of LMS to perform teaching-related activities" was dominant (M = 3.07, SD = 0.69), whereas "intention of communicating with students" accounted for the lowest mean score (M = 2.30, SD = 1.15). Additionally, having a high deviation of 1.15 implies that there was wide dispersion in the given answers towards the item. "The intention of increasing the frequency of using LMS" gained the second position (M = 2.67, SD = 0.80).

Concerning "Actual System Use" in the Behavioral Component, "using LMS to communicate with students" was the least preferred of lecturers when it came to their actual system use (M = 1.90, SD = 1.18). "Receiving students' assignments" (M = 3.33, SD = 0.71) and "using LMS to distribute course assignments" (M = 3.30, SD = 0.70) were the two items that received the highest mean scores. The mean score of "using LMS to grade students" (M = 2.87, SD = 1.04) and "using LMS to distribute course materials" (M = 2.60, SD = 1.07) were quite low. Noticeably, these two items received high standard deviations, implying the widespread out of data derived from respondents for these three items.

Cognitive component

Results from items related to "*Perceived Ease of Use*" show that respondents' attitudes towards (EOU) were low. "It is easy to become skilled at using LMS" had the highest mean score (M = 2.93, SD = 0.78), followed by item "integrating LMS functions into my teaching plan is easy" (M = 2.90, SD = 0.96), "It is easy to perform teaching-related tasks using LMS" (M = 2.83, M = 0.70), and "It is easy to recover from errors encountered while using LMS" (M = 2.30, M = 0.88).

As for "Perceived Usefulness", "using LMS enhances my interactions with students" received the lowest mean score (M = 2.60, SD = 1.00) compared to "using LMS can help students enhance their learning effectiveness" (M = 3.07, SD = 0.74) and "LMS helps improve my working efficiency" (M = 3.03, SD = 0.89). There is one interviewee expressing great satisfaction with the system: "I am satisfied with the current LMS since it supports my teaching practices significantly. The system contains bountiful studying and teaching resources. In addition to the material which is directly related to the textbook, there is also a variety of additional materials from other resources available on the system. It is extremely helpful for students who have high learning autonomy." (T1). Whereas, 6 out of 10 interviewees expressed moderate satisfaction towards the usefulness of the current LMS. Comments from some of these interviewees are: "I am quite satisfied with the current LMS, specifically the available closely lesson-related assignments. I find this really convenient for me." (T4); "I feel quite satisfied with this system. It helps me save a lot of time. To be more specific, in the past, I had to check students' answers and grade scores by hand instead of grading automatically with the help of the system. Additionally, checking the writing skills in printed paper form is a real time-consuming process. By showing the correction process in front of the whole class, LMS plays a role as an ideal solution for dealing with this issue." (T7); "I am quite satisfied with the present system because there are quite a lot of resources to choose from. I

suppose that the assignments on LMS are very relevant to the lesson content." (T8); "Compared with some other learning systems on the market, this LMS is less than perfect. Having said that, I think the current LMS is good enough to provide tools and functions for teaching practices." (T10).

The correlation between teachers' attitudes towards the employment of LMS and the demographic elements

Multivariate linear regression analysis was applied to measure the correlation between attitudes and demographic elements. The results are shown in Table 1.

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			P value of variable							
		IQ	SQ	SEQ	SE	BI	SU	EOU	PU	
Gender	Male	Referenc	e:e							
	Female	0.954	0.477	0.698	0.155	0.698	0.748	0.718	0.478	
Age	<26	Referenc	Reference							
	26-30	0.039	0.659	0.663	0.319	0.999	0.658	0.361	0.269	
	31-40	0.061	0.745	0.769	0.368	0.996	0.823	0.298	0.173	
	>40	0.293	0.398	0.648	0.322	0.303	0.829	0.356	0.548	
Experience	3-6 months	Referenc	Reference							
	1 year	0.579	0.549	0.587	0.886	0.404	0.754	0.319	0.758	
	2 years	0.364	0.458	0.779	0.847	0.244	0.033	0.847	0.921	
	>2 years	0.014	0.128	0.117	0.966	0.098	0.137	0.856	0.563	
Level	Beginner	Referenc	Reference							
	Intermediate	0.502	0.429	0.792	0.907	0.285	0.334	0.884	0.672	
	Advanced	0.884	0.944	0.942	0.679	0.975	0.888	0.741	0.682	

Table 1. Factors affecting variables of teachers' attitudes towards the employment of LMS

The results show that gender and LMS skills proficiency had no significant correlation with eight sub-variables of attitudes (p > 0.05). While IQ had a significant correlation with the 26-30 age group (p = 0.039). Figure 1 illustrates the distribution of IQ by age. It can be seen that the 26-30 aged group had the least positive attitudes towards IQ. The highest positive belonged to the youngest age group (below 26), followed by the highest one (above 40). With regard to experience, IQ was significantly linked with those with more than 2 years of experience (p = 0.014). Figure 2 shows the distribution of IQ by experience. There was a downward trend in the attitudes of respondents towards this factor. While 2-year experienced respondents had a significant correlation with SU (p = 0.033). Figure 3 shows the distribution of SU by experience. Compared with other groups of experience, respondents with 2 years of experience had the lowest mean score and had a significant correlation with SU.

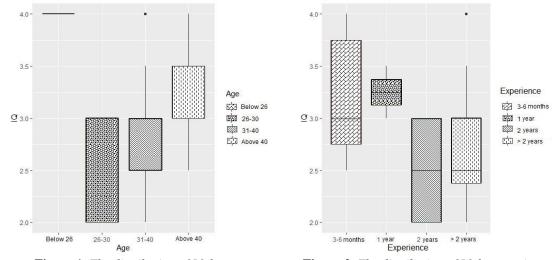


Figure 1. The distribution of IQ by age

Figure 2. The distribution of IQ by experience

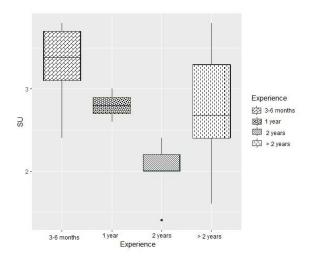


Figure 3. The distribution of SU by experience

3.2. Discussion

Generally, teachers did not have positive attitudes towards the employment of LMS despite the fact that most participants in the interview expressed their satisfaction towards the system in facilitating their teaching performance. This finding was consistent with the finding of [12] and [13].

Regarding the affective component, the results from the questionnaire indicate that lecturers had moderate attitudes towards SQ and SEQ. Though SEQ did not receive any comments from interviewees, the moderate attitudes towards SQ are in line with the responses in the semi-structured interview. The interviewees' satisfaction ranged from quite satisfied to very satisfied with the teaching and learning resources (T1, T8), the assignments (T2, T4, T6), and the LMS interface design (T10). However, the questionnaire showed interviewees' dissatisfaction with IQ and SE. As for SE, none of the interviewees mentioned this factor while IQ received different opinions. Some expressed their contentment with the closely lesson-related assignments (T4, T8), while some were dissatisfied with the difficult tasks (T3, T7) or limited in-class activities (T4, T9, T10). The findings of [14] showed different results. They stated that teachers felt excited about the adoption of LMS in their universities and felt comfortable with using the system in their teaching.

With respect to the behavioral component, the results from the questionnaire imply that most participants were not willing to use LMS more often in the future. This finding was different from [13] and [14]. However, the answers of most interviewees in the semi-structured interview supported the quantitative results with 7 out of 10 showing their unwilling attitudes when being asked whether they intended to use LMS more often in the future or not. Four interviewees refused to use the system more in the future (T4, T6, T9, T10). They asserted that they had deployed enough tools and functions of LMS in their teaching. While three interviewees were reluctant to try more LMS functions that they had never used (T1, T3, T5).

Concerning the cognitive component, lecturers did not hold positive attitudes towards PU. This finding is not in line with the data collected from the semi-structured interview and previous studies such as [14], [12], and [13]. When being asked about whether the current LMS facilitated participants in teaching English, 6 out of 10 interviewees (T1, T2, T4, T5, T7, T8) shared the same ideas that LMS saved them time in grading students as well as preparing lessons. While some interviewees believed that LMS made managing classes much easier (T3, T9) in addition to having bountiful learning and teaching resource (T7, T8, T9). Similarly, (EOU) received negative attitudes from lecturers. This result is dissimilar from [12] showing that instructors held positive attitudes towards EOU and became more confident after being trained on how to use the system.

Besides, age was found to be a factor influencing teachers' attitudes in relation to IQ. Young teachers tended to evaluate the system higher than the older ones, while teachers aged over 40 also had fairly positive attitudes. This indicates that the old generation whose technology skills were often lower than the younger generation seemed to have positive attitudes towards the system in terms of IQ. This was also true for teachers who were new to the system and tended to carry out high evaluations. This result was in line with [13] and [15].

Finally, experience was found to have a significant correlation with two sub-variables of attitudes, namely IQ and SU. There was a downward trend in teachers' attitudes in terms of IQ and SU. The result was in contradiction with [16]. Teo [16] claimed that there was a positive correlation between teachers' years of experience in using the computer and their attitudes.

4. Conclusion

The overall results were just under the average which indicates that there were moderate attitudes among teachers. The interview showed that the majority of the lecturers were satisfied with the convenience of the current LMS in terms of various assignments and tests as well as the automatic grading function, though there were still some differences in lecturers' opinions towards the activities and resources provided by the system.

Encouragingly, several lecturers showed their willingness in using the system more often in the future and expressed their concern for more training sessions. Despite the fact that most lecturers appreciated the current LMS in facilitating their teaching, the overall attitudes towards the system were quite low. This finding requires further research to have a more persuasive explanation.

Gender and LMS skills proficiency had no significant effect on their attitudes towards the employment of LMS in teaching English; whereas, age and experience of using LMS had a strong connection with attitudes. Young teachers (under 26) and teachers over 40 held higher attitudes towards IQ. Similarly, teachers who were new to the system (3-6 months) and those who were in the highest experienced group (> 2 years) had more positive attitudes compared with 1 or 2-year-experienced teachers who showed a significant decrease in their attitudes towards SU.

Surprisingly, there was no significant correlation between cognitive component including EOU and PU and the demographic elements. The result was in contradiction to previous studies conducted by [12] and [15]. This could be because these studies were different from the current research in terms of participants' characteristics, time and place conducting the research.

Based on the study findings, several recommendations are made to improve teachers' attitudes. First of all, in addition to lacking sufficient insights about the LMS tools and functions, some teachers possess opposing views about the appropriateness of quiz tests or tasks and the reliability of the grading system. Therefore, it is recommended that by providing training sessions on a regular basis, teachers would spend more time exposed to various tools and functions available on the system and gradually improve their attitudes towards the system. Secondly, it is suggested that collecting teachers' feedback on quality-related issues, the encountered problems while using the system, and teachers' recommendations for the system improvement can help improve teachers' attitudes accordingly. It is also expected that raising teachers' attitudes might result in encouraging student's learning motivation and improving students' learning performance. Finally, the study reveals some limitations. The survey was conducted at only one English center with a relatively small sample size. As a result, the generalization of the findings may be diminished. For future studies, it is necessary to enlarge the sample size and conduct at multiple language centers.

REFERENCES

- [1] R. Darbhamulla and P. Lawhead, "Paving the way towards an efficient learning management system," *Proceedings of the 42nd annual Southeast regional conference*, 2004.
- [2] B. L. McCombs and J. S. Whisler, *The Learner-Centered Classroom and School: Strategies for Increasing Student Motivation and Achievement*. Jossey-Bass Publisher: San Francisco, 1997.

http://jst.tnu.edu.vn 21 Email: jst@tnu.edu.vn

- [3] N. Cavus, H. Uzunboylu, and D. Ibrahim, "Assessing the success rate of students using a learning management system together with a collaborative tool in web-based teaching of programming languages," *Journal of Educational Computing Research*, vol. 36, no. 3, pp. 301-321, 2007.
- [4] N. Cavus, "The evaluation of learning management systems using an artificial intelligence fuzzy logic algorithm," *Advances in Engineering Software*, vol. 41, no. 2, pp. 248-254, 2010.
- [5] W. R. Watson and S. L. Watson, "An argument for clarity: What are learning management systems, what are they not, and what should they become?," *TechTrends*, vol. 51, no. 2, pp. 28-34, 2007.
- [6] S. Iqbal and I. A. Qureshi, "Learning management systems (LMS): Inside matters," *Information Management and Business Review*, vol. 3, no. 4, pp. 206-216, 2011.
- [7] B. Godwin-Jones, "Technology for prospective language teachers," *Language Learning & Technology*, vol. 6, no. 3, pp. 10-14, 2002.
- [8] H. M. Selim, "Critical success factors for e-learning acceptance: Confirmatory factor models," *Computers & Education*, vol. 49, no. 2, pp. 396-413, 2007.
- [9] W. T. Wang and C. C. Wang, "An empirical study of instructor adoption of web-based learning systems," *Computers & Education*, vol. 53, no. 3, pp. 761-774, 2009.
- [10] L. Cohen, L. Manion, and K. Morrison, Research Methods in Education, 6th ed. Routledge, 2007.
- [11] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101, 2006.
- [12] S. Wichadee, "Factors Related to Faculty Members' Attitude and Adoption of a Learning Management System," *Turkish Online Journal of Educational Technology-TOJET*, vol. 14, no. 4, pp. 53-61, 2015.
- [13] S. R. Alghamdi and A. Bayaga, "Use and attitude towards learning management systems (LMS) in Saudi Arabian universities," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 12, no. 9, pp. 2309-2330, 2016.
- [14] M. Asiri, R. Mahmud, K. A. Bakar, and A. F. M. Ayub, "Role of Attitude in Utilization of Jusur LMS in Saudi Arabian Universities," *Procedia Social and Behavioral Sciences*, vol. 64, pp. 525-534, 2012.
- [15] T. K. Bui, M. H. Nguyen, V. H. N. Tran, and H. B. Nguyen, "Lecturers' adoption to use the online learning management system (LMS): Empirical evidence from TAM2 model for Vietnam," *Ho Chi Minh City Open University Journal of Science*, vol. 10, no. 1, pp. 3-17, 2020.
- [16] T. Teo, "Pre-service teachers' attitudes towards computer use: A Singapore survey," *Australasian Journal of Educational Technology*, vol. 24, no. 4, 2008, Doi: 10.14742/ajet.1201.