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Drivers of Agricultural Instructors' Continuation of Using Computerized Learning Management System (CLMS): A Causal Analysis

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ABSTRACT

Drastically concerned about no longer continuation of instructors to use the computerized Learning Management System (CLMS) in the post COVID-19, the ministerial and academic authorities in Iran are inclined to figure out about the determinants of instructors' continuation of making use of the CLMS and how to incorporate the CLMS into the face-to-face education. Therefore, this research aimed to analyze drivers of agricultural instructors' continuation of using CLMS. The instructors' learning patterns as a knowledge gap, the present causal study surveyed 102 faculty members of two universities in Northwest Iran. To establish a theoretical framework, Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), and the Vermunt's Theory of Learning Model (VTLM) were used, and the items of the questionnaire were designed accordingly. The results revealed that the model had a good fit with the data set, the Perceived Usefulness (PU) of the CLMS had an impact on the attitude towards the CLMS and intention to continue using the CLMS (Behavioral Intention: BI). The Application-Oriented Learning Pattern (AOLP) affects the Perceived Behavioral Control (PBC) positively. Other predictor variables that directly impinge upon instructors' BI to continue applying the CLMS include attitude, Perceived Usefulness (PU), AOLP, and Perceived Student Readiness (PSR). The estimated multiple correlation coefficients for the PBC, attitude, and BI were 0.17, 0.51, and 0.46, respectively. The results of the research can be useful and effective for agricultural higher education decision makers in using and replacing CLMS in specific situations instead of face-to-face education.

Keywords: Behavioral intention, Path analysis, Post COVID-19, Sustainability of education.

INTRODUCTION

In the recent time of higher education, the state of instructors' continuance, for a long time and without stopping, to use electronic learning technologies like Computerized Learning Management System (CLMS) in post COVID-19 pandemic is a crucial research issue. Universities drastically face the dilemma of how to handle effective continuing online education in the post-epidemic and whether online education attracts or discourages more students (Szopiński and Bachnik, 2022). The covid-19 pandemic has affected all aspects of education by widely disrupting the way

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traditional higher education institutions offer courses. The virtual education implemented during the COVID-19 pandemic has several consequences for learners, affecting their learning and well-being in the short, medium, and long term (Mok et al., 2021). Psychologically, many students have experienced increased depressive symptoms, anxiety, and sleep disorders. Economically, there have been shifts in employment status, with instructors facing new demands due to increased hours, pace, and variety of their work (Noori, 2021). Inevitably, challenges in the Covid-19 era were created for learners and teachers, obviously, these professionals have been affected financially, emotionally and motivationally. However, the effective development of e-learning without considering the attitudes of teachers and students towards the use of technology would not be successful and applicable (Seyde Naghavi, 2007).

Intuitively perceived, instructors are in trouble with the CLMS due to rigidly communicating with the artificial space without human emotions and previous internalized habits from attending face-to-face teaching courses. Compared to the large body of literature that is inclined to the acceptance of e-learning (Sanayei and Salimian, 2013), perspectives on e-learning (Seyde Naghavi, 2007), the use of distance learning, combined education, offering e-learning through virtual networks (Heidari *et al*., 2016), and online training, fewer studies have been done on instructors' continuation of being stuck with the use of CLMS after covid-19 pandemic. However, many researchers have developed Technology Acceptance Model (TAM) for studying e-learning acceptance (Chang *et al*., 2017). The novelty of the study is developing a more comprehensive theoretical model than TAM that accounts for the acceptance of e-learning by instructors in the long run, and has a key role in developing knowledge in this area and filling the knowledge gap.

THEORETICAL BACKGROUND

The present study combines Theory of Pplanned Behavior (TPB), Technology Acceptance Model (TAM), and Vermunt's Learning Model (VLM) to examine the factors affecting the intention of faculty members of Tabriz and Maragheh Universities in the continuation of the use of the CLMS in the teaching-learning process as follows:

- To investigate the impact of constructs of the TPB (e.g., attitudes towards the CLMS, subjective norms (SNs), and perceived behavioral control (PBC) on instructors' BI to continue using the CLMS;
- To examine the effect of constructs of TAM, which include Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU) on the intention of instructors in continuing the use of CLMS;
- To explore the effect of Vermunt's Theory of Learning Model (VTLM) (e.g., semantic-oriented, problematic-oriented, and Application-Oriented Learning Pattern (AOLP) on instructors' intentions in continuing to use the CLMS;
- To investigate the effect of instructors' and students' readiness on instructors' intentions to continue the use of the CLMS.

Theory of Planned Behavior (TPB)

According to TPB, behavior is treated as a rational decision accounted for by intention, itself is influenced by a positive or negative assessment of the outcome to a situation, namely, attitude, subjective norm, and PBC (Abadi and Kelboro, 2021).

Attitudes towards the CLMS

Understanding the attitudes and motivations of users, especially instructors, about e-learning and technology-based education can create a good learning environment for education, where planners and administrators struggle with the challenge of effective acceptance and

deployment (Seyde Naghavi, 2007; Akbari *et al*., 2023b).

H1(γ_1): Attitude towards the CLMS has a positive effect on the BI of teachers in continuing to use the CLMS.

SNs

The SNs mean the perceived social pressure to perform the behavior, in the case of this study, indicating how much one's trusted and respected persons encourage him/her to use the CLMS. Evidence suggests that social effects affect perceived benefits and, in turn, perceived benefits affect students' willingness and behavioral willingness to use e-learning (Sanayei and Salimian, 2013).

H2(γ_2): SNs have a positive effect on intention to continue using the CLMS.

PBC

The PBC is defined as the degree of mastery and control of the individual to participate in virtual training, which includes two groups of individual competencies and abilities and favorable environmental conditions. For example, a challenge for teachers and instructors is to find out to what extent student absenteeism or delays in submitting homework and exams ordered during the course are beyond the control of students for some reason, or whether technical problems are just an excuse In part, this may be for reasons beyond their control, similar to the latter, as reported by Belarusian students, with technical problems exacerbated by restrictions and internet outages in Belarus by 2020 (Szopiński and Bachnik, 2022).

H3 (γ_3): PBC has a positive effect on the BI to continue the use of the CLMS.

Technology Acceptance Model (TAM)

The TAM was first proposed by Davis in 1986 based on the theory of causal action theorized by Ajzan and Fishbin as a framework for explaining technology acceptance (Khorasani *et al*., 2012). According to this model, the behavior and behavioral intention of technology application are influenced by attitudes, SNs, PBC, the PEOU, and PU. The reason for using this model in this study is that this model predicts the intention to accept e-learning well, and shows more predictive power compared to other theories (e.g., TPB) (Ndubisi, 2006).

The Perceived Ease of Use (PEOU) of the CLMS

The PEOU of e-learning programs is a predictor of the BI (Masrom, 2007). Heidari *et al*. (2016) concluded that perceived PEOU of online social networks directly affects students' willingness to use these networks as a virtual learning network. Khorasani *et al*. (2012) provide evidence that the mental perception variable of the PEOU of e-learning has a positive effect on the acceptance and use of e-learning among medical students. In general, when learners show strong expectations for using e-learning, their attitude toward it becomes fundamental. Understanding perceived ease of use (PEOU) and perceived usefulness (PU) is important, as these factors significantly shape their attitude. Notably, the attitude toward e-learning is more strongly influenced by perceived ease of use than by perceived usefulness.

H4a(γ_{4a}): The PEOU of CLMS has a positive effect on attitudes towards the CLMS.

H4b(γ_{4b}): The PEOU of CLMS has a positive effect on PBC.

H4c(γ_{4c}): The PEOU of CLMS has a positive effect on BI to continue using the CLMS.

The PU of CLMS

The PU is one of the determinants of the BI to use technology (Jan and Contreras, 2011). In the field of e-learning programs, there is evidence that PU predicts the behavioral intention of using e-learning programs (Masrom, 2007). In this regard, the comparative advantage of using online education has a direct effect on the willingness to use online education by faculty members (Jan and Contreras, 2011).

H5a(γ_{5a}): The PU of the use of e-learning has a positive effect on attitudes towards the CLMS.

H5b(γ_{5b}): The PU of the use of e-learning has a positive effect on BI to continue to use the CLMS.

Vermunt's Theory of Learning Pattern (VTLM)

Learning patterns are one of the most popular research fields in learners' cognition and learning. These patterns are similar to learning patterns. In this regard, in 1984, David Kolb introduced the theory of experiential learning and Vermunt and their colleagues introduced the theory of learning model. David Kolb believed that individual learning patterns are developed due to genetic factors, life experiences and environmental demands. As each teacher uses his/her own method in using teaching tools in teaching, how to use new technologies in teaching and how to combine them in teaching depends on the experience and attitude of teachers and can be at different levels and types. (Khorasani *et al.*, 2012)).

Semantic-Oriented Learning Pattern (SOLP)

Teachers learn with a meaning-based learning pattern to teach, and they do so by doing without the specific goals they should pursue, leaving little room for learning. Such instructors want to improve their performance and are less interested in creating a reference framework for teaching. They improve their performance by gaining a better understanding of the underlying teaching and learning processes. These people can be divided into two groups of meaning-based learners and independent meaning-based learners (Benes, 2013).

H6(γ_6): SOLP has a positive effect on attitudes towards the CLMS.

Problematic-Oriented Learning Pattern (POLP)

Yew and Goh (2016) provided an overview of the problem-based learning process and studies that examined the effectiveness of problem-based learning. They discussed a number of natural and experimental studies that show what is the problem-based learning process and how do its various components affect learners' learning. They conclude that comparative studies are the relative effectiveness of problem-based learning in demonstrating its superior effectiveness in maintaining long-term knowledge and in applying knowledge consistently.

H7(γ_7): POLP has a positive effect on attitude towards the CLMS .

Application-Oriented Learning Pattern (AOLP)

The AOLP is based on experimental and activity-based work methods, where the focus is on learners' active participation and learning and is done through the use of active learning education (Cosner *et al*., 2018). In other words, applied learning focuses on conceptual thinking and thinking about how to use it in practice, while indirect learning refers to learners who do not really know how to learn, which means that they have multiple problems. (Cheng *et al*., 2016).

H8a(γ_{8a}): AOLP has a positive effect on attitudes towards the CLMS.

H8b(γ_{8b}): AOLP has a positive effect on PBC.

H8c(γ_{8c}): AOLP has a positive effect on instructors' BI to continue using the CLMS.

Instructors and Students' Readiness

The readiness of instructors and students in accepting the use of educational technologies and the use of the CLMS is a crucial theme and contributes to responding to this question whether it is possible for instructors to continue using this system in the long run. If they are mentally and physically fit, the adoption of these technologies will be facilitated. Learning readiness and self-efficacy studies of learners to participate in live online learning during the coronavirus outbreak examined and reported that technology readiness is more effective in determining students live online learning readiness than conventional online/internet self-efficacy (Tang *et al*., 2021; Akbari *et al*., 2023a).

H9(γ_9): Professor readiness has a positive effect on instructors' BI to continue using the CLMS.

H10(γ_{10}): Student readiness has a positive effect on instructors' BI to continue using the CLMS.

Barriers and Obstacles of Using Technology in Virtual Education

Virtual training has challenges and barriers that can negatively affect the BI of continuing to use these trainings. Part of the barriers to e-learning are related to the physical infrastructure of e-learning, which, when these infrastructures are available, can increase the quality and effectiveness of education or, conversely, reduce the quality of education. For example, the research results show that e-learning environment infrastructures such as information quality, service quality and system quality have a direct impact on the PU of e-learning and PEOU, which leads to the formation of desirable behavioral intentions in using e-learning. (Shah *et al*., 2013).

H11(γ_{11}): There is a significant difference between the views of instructors of respective two universities about the obstacles and challenges of the CLMS.

Figure 1 manifests the hypothetical model of the study.

MATERIALS AND METHODS

Study Site

Based on the correlational research design, this study comprised a cross-sectional analysis of survey data from a population-based sample of instructors from two universities of Tabriz and Maragheh. The rationale behind choosing these two sites was related to the nature of the research objectives of this study and its assumption was that the instructors in these two universities, the former as a leading university and the latter as a developing university, would be different from each other in terms of conceptual indicators, including BI to continue using the CLMS and perceived challenges.

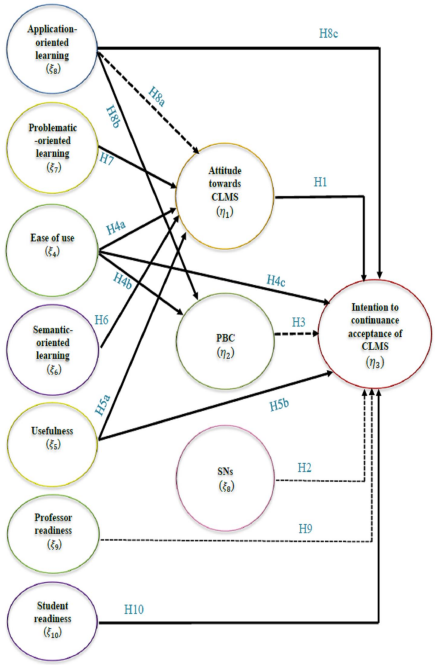

Figure 1. Conceptual framework of the research (relationships and study hypotheses).

Population Size and Sampling Method

The study population was all agricultural faculty members at University of Tabriz (N_{Tabriz}= 124) as leading university and University of Maragheh ($N_{Maragheh}$= 43), as developing (N_{Total}=167). The random sampling method was simple. The sample size (n= 115) was estimated based on Krejcie and Morgan's table (Krejcie and Morgan, 1970). Finally, 102 questionnaires were returned completely (the return rate was 88.7%, which is promising).

Table 1 shows the distribution of respondents in Tabriz and Maragheh Universities. The sampling strategy was proportionally stratified sampling, which were selected and surveyed according to the number of faculty members in each specialized field (classes).

Validity and Reliability of Questionnaire

The data collection tool in this study was a questionnaire that included attitude-perceptual and numerical questions. Attitude questions were multiple choice. In order to confirm the validity of the questionnaire, it was given to the instructors of the Department of Agricultural Extension and Education of Sari University of Agricultural Sciences and Natural Resources and Zabol University. The questionnaire was modified to ensure a logical number of questions, address the specificity of the questions rather than their generality, correct any one-sidedness, and confirm the appropriate number of items for each index and concept.

Statistical and Software Analysis Methods

In this study, quantitative data analysis was performed using $AMOS_{22}$ software. The statistical methods and models used to analyze the quantitative data included mean, median, standard deviation, and frequency percentage, Pearson correlation test, linear regression, and path analysis.

RESULTS

Descriptive Statistics

Demographic and occupational characteristics

As shown in Table 2, what stands out from the descriptive statistics of the respondents is that there were 97 male faculty members, which constitute 95.1% of the study sample, and only 5 female faculty members (4.91%) participated in the study sample. The average age of the respondents was 46.73 (standard deviation of 9.24), which indicates that the case sample was adult. Respondents were employed in a variety of agricultural disciplines. According to the statistics, most of the respondents were from plant disciplines and plant genetics, water engineering, soil science and engineering, breeding and plant biotechnology, and

Table 1. Frequency and percentage of respondents surveyed and number of questionnaires received.

	Questionnaire frequency	Percent
University of Tabriz	70	68.6
University of Maragheh	32	31.4
Sum	102	100

Table 2. Weighted distributions of demographic and professional feature of the respondents (n= 102).

Variable [a]	Value		Mean	SD	Frequency	Percent
Gender	Male				97	95.1
	Female				5	4.91
Age			46.73	9.24		
University/ Specialty	University of Tabriz	Water engineering			9	8.82
		Agricultural Economics			4	3.92
		Horticultural sciences			4	3.92
		Soil Science and Engineering			8	7.84
		Plant ecophysiology			6	5.88
		Breeding and plant biotechnology			8	7.84
		Animal Science			8	7.84
		Food Science and Technology			6	5.88
		Green space engineering			4	3.92
		Plant protection			4	3.92
		Extension and Rural development			5	4.90
		Biosystem mechanical engineering			4	3.92
	University of Maragheh	Plant production and genetics			12	11.76
		Horticultural sciences			7	6.86
		Soil Engineering Sciences			4	3.92
		Plant protection			5	4.90
		Biosystem mechanical engineering			4	3.92
Academic rank	Lecturer				1	0.98
	Assistant Professor				28	27.45
	Associate Professor				42	41.17
	Professor				31	30.40
Type of employment	Contractual				1	0.98
	[b] Above-contractual				4	3.92
	Formal - Experimental				26	25.49
	Definitive official				71	69.61

[a] For features with the numerical measure (or scale), mean and standard deviation have been reported; while, frequency and percent for variables with categorical or nominal scale. [b] is an academic recruitment ranking in the employment system of Universities in Iran.

animal sciences. The average service history of the respondents was 15.61 years, with a standard deviation of 8.98. In addition, most respondents had an associate's academic rank (42 people, 4.2%). In terms of type of employment, the highest frequency of the category was related to the faculty members who had definite formal employment (71 people, 70.3%).

Table 3 displays indices and indicators used to measure dependent and independent variables.

Inferential Statistics

Data Assessment for the Path Analysis:

Correlation analysis, multiple collinearity and singularity effect

In this section, the results of correlation analysis is discussed and the correlation coefficients and their significance level are reported. According to table 4, BI has a significant correlation with the variables like attitude (ρ_{Atti}= 0.57; P< 0.01), SNs (ρ_{SNs}= 0.42; P< 0.01), PBC (ρ_{PBC}= 0.21; P< 0.05), PEOU (ρ_{PEOU}= 0.25; P< 0.01), PU (ρ_{PU}= 0.60; P< 0.01), AOLP (ρ_{AOLS}= 0.31; P< 0.01), Professor Readiness (ρ_{PR}< 0.29; P< 0.01), and Student Readiness (ρ_{SR}= 0.23, P< 0.05). The effect size of each coefficient was also calculated. Therefore, a correlation coefficient of 0.10 can explain one percent

Table 3. Indicator and latent variables.

	Mean±SD	Cronbach's Alpha
Attitudes towards the CLMS	3.16±0.82	0.82
Teaching through the CLMS is a pleasant experience for me.		
Teaching through the CLMS is one of my advantages over instructors at neighboring universities.		
Using the CLMS for teaching is a wise idea.		
Teaching practical and laboratory units through a CLMS simulator is a logical task		
SNs	2.89±0.92	0.76
Most of the people who are important to me (group leader, educational assistant, group colleagues, etc.) agree to use the CLMS for teaching.		
Most people who are important to me (department head, vice chancellor, teammates, etc.) think that using a CLMS is useful for university courses.		
I think my students will approve the use of the CLMS for future teaching courses.		
PBC	4.03±0.68	0.91
I have enough knowledge to work with the CLMS (knowledge about the operation of different parts of the system).		
I have sufficient skills to work with the CLMS (the ability to work with parts of the system without the need for operator assistance).		
I have enough time to work with the CLMS.		
I have enough confidence to work with the CLMS.		
SOLP	3.96±0.50	0.79
I inquire, study and analyze why some students do not learn my class content.		
I think about how different subjects relate to each other.		
I try to understand why some teaching methods are more effective than others.		
I try to understand and search for how students learn.		
POLP	2.46±0.79	0.84
I just want to learn things that I can immediately use in my teaching.		
I do not know how to teach my lessons in a different way than I used to.		
I feel dissatisfied with my teaching because it is not problem-oriented (society's problems).		
I see university courses as separate entities.		
AOLP	4.09±0.62	0.93
I want to apply new ideas of teaching methods in my teaching.		
I learn more from my own practical experiences.		
I want to get some tips on how to improve my classroom teaching.		
I want to know which teaching methods are effective.		
BI	3.81±0.79	0.87
In the future, I plan to teach through the CLMS, in addition to teaching in-class.		
I plan to develop and update the content of the courses in the CLMS in the next 6 months.		
I intend to participate in instructors' orientation classes to develop and update the content of courses in the CLMS.		
My attempt is to establish a good interaction with the CLMS.		
PEOU	3.26±0.96	0.79
The CLMS is easy to use.		
Students have easy access to course materials with the CLMS.		
The CLMS works easily.		
PU	3.11±0.98	0.76
Using CLMS improves our ability to learn.		
The e CLMS allows me to do my teaching faster.		
The CLMS allows me to teach more efficiently.		

Table 2 continued…

Continued Table 3. Indicator and latent variables.

	Mean±SD	Cronbach's Alpha
Professor readiness	2.80±0.85	0.88
Instructors are in favor of using the CLMS in their teaching.		
Instructors consider the CLMS as a useful teaching tool in teaching.		
Instructors have sufficient technical skills to use the CLMS.		
Student readiness	2.78±0.91	0.84
Students are in favor of using a CLMS for their teaching.		
Students consider the CLMS as a useful educational tool in teaching.		
Students have sufficient technical skills to use the CLMS.		

of the variance in the dependent variable, indicating a small effect size. Furthermore, a correlation of 0.30 could explain 9% of the changes in the dependent variable (mean effect size) and a correlation of 0.50 could explain 25% of the variance in this variable (Field, 2013). According to the results of correlation analysis, the variables have a small to medium impact size. Running the linear regression indicates the absence of multi-collinearity effect (see Table 4).

Goodness-of-Fit Criteria

A key point in performing path analysis is to ensure that the model fits the criteria. In fact, appropriate values for these criteria indicate that the conceptual model fits well with the survey data and that the model fits well. As the values of the fit criteria show, the measurement model shows the fit of the model well. The values of fitting criteria are as follows: Chi-square index [$\chi^2(21)$= 32.030 (21), P= 0.06], Chi-square ratio to degree of freedom (χ^2/df= 1.525), Relative Fit Index [RFI($\rho 1$)= 0.78], Normative Fit Index [NFI($\Delta 1$)= 0.93], Comparative Fit Index (CFI= 0.97), Incremental Fit Index [IFI($\Delta 2$)= 0.97], Tucker-Lewis Index [TLI($\rho 2$)= 0.91], and the root mean square error of estimation is less than 0.08, P-close 0.22 (RMSEA= 0.07, P-close= 0.22).

Path Analysis (PA)

Table 5 shows the results of hypothesis-testing, which has been under-explored by the path analysis. As shown in this table, the PU of the CLMS plays a notable role in shaping the attitude towards the CLMS ($\beta_{PU\rightarrow Atti}$= 0.64, SE= 0.06, P= 0.001, CI= 95%). The high regression coefficient indicates the strength of the relationship and the effect of the PU variable on the attitude. The PU is the mental expectation of a user of a technology that the use of that particular technology will improve his performance. The PU includes respondents' perception of improving the ability to learn through the CLMS, increase the speed of teaching using the CLMS, and make teaching efficient.

The PEOU is also another predictor variable that directly and significantly affects the PBC of instructors ($\beta_{PEOU\rightarrow PBC}$= 0.35, SE= 0.06, P= 0.001). The regression coefficient of this variable is also significant and shows a significant effect. As argued by Eftekhari Sinjani *et al*. (2021), the PEOU indicates how much one expects the technology to be effortless and easy to use: The evidence indicates that the PU of a technology is affected by its PEOU because the easier it is for a person to use a technology, the more useful that technology is to the individual. In addition, the AOLP affects PBC ($\beta_{AOLS\rightarrow PBC}$= 0.23, SE= 0.09, P< 0.01). Other predictor variables that directly affect instructors' BI to continue using the CLMS are attitude ($\beta_{Atti\rightarrow BI}$= 0.33, SE= 0.10, P= 0.001), PU ($\beta_{PU\rightarrow BI}$= 0.42, SE= 0.09, P= 0.001), AOLP ($\beta_{AOLS\rightarrow BI}$= 0.17, SE= 0.09, P< 0.05), and

Table 4. The results of correlation analysis.[a]

	VIF	INT	ATT	SNs	PBC	PEOU	USEFUL	SOLP	POLP	AOLP	PR	SR
INT		1										
ATT	2.521	0.575**	1									
SNs	2.517	0.427**	0.630**	1								
PBC	1.313	0.215*	0.341**	0.266**	1							
PEOU	1.767	0.256**	0.416**	0.509**	0.376**	1						
USEFUL	2.384	0.597**	0.710**	0.583**	0.323**	0.434**	1					
SOLP	1.371	0.192	0.223*	0.359**	0.227*	0.203*	0.254**	1				
POLP	1.261	0.095	0.070	-0.010	0.009	-0.073	0.124	-0.242*	1			
AOLP	1.262	0.312**	0.207*	0.182	0.280**	0.126	0.187	0.244*	0.232*	1		
Professor Readiness	2.236	0.294**	0.579**	0.577**	0.278**	0.493**	0.572**	0.224*	0.010	0.083	1	
Student Readiness	2.838	0.235*	0.556**	0.679**	0.247*	0.594**	0.540**	0.215*	-0.104	0.060	0.688**	1

[a] Variance Inflation Factor (VIF) is useful when it is intended to make sure that there is no high correlation between independent variables, plausible value for the VIF should be less than 10. Tolerance index is the reverse of the VIF (Tolerance $= \frac{1}{VIF}$.), with the acceptable measure higher than 0.20. SOLP: Semantic-Oriented Learning Pattern, POLP: Problematic-Oriented Learning pattern, AOLP: Application-Oriented Learning Pattern.

* P< .05, ** P< .01.

Table 5. Estimates for effects of exogenous variables on endogenous variables.[a]

			Estimate (β)	SE	CR ($S\Delta$)	P	Confirmed Hypothesis
AOLP	→	ATT	0.07	0.09	0.97	0.33(ns)	—
POL	→	ATT	–0.01	0.08	–0.18	0.85(ns)	—
SOL	→	ATT	0.01	0.12	0.18	0.85(ns)	—
PEOU	→	ATT	0.12	0.06	1.62	0.10(ns)	—
PU	→	ATT	0.64	0.06	8.11	0.001	H5a
PEOU	→	PBC	0.35	0.06	3.87	0.001	H4b
AOLP	→	PBC	0.23	0.09	2.64	0.008	H8b
ATT	→	INT	0.33	0.10	3.17	0.001	H1
SNs	→	INT	0.14	0.09	1.37	0.17(ns)	—
PBC	→	INT	–0.05	0.09	–0.67	0.50(ns)	—
PU	→	INT	0.42	0.09	3.60	0.001	H5b
AOLP	→	INT	0.17	0.09	2.25	0.02	H8c
PEOU	→	INT	0.04	0.08	0.45	0.64(ns)	—
Professor Readiness	→	INT	–0.07	0.09	–0.73	0.46(ns)	—
Student Readiness	→	INT	–0.24	0.10	–2.05	0.04	H10

[a] [$\chi^2(21)$= 32.030 (21), P= 0.06], RFI ($\rho 1$)= 0.78, NFI ($\Delta 1$)= 0.93, Comparative Fit Index (CFI= 0.97), IFI ($\Delta 2$)= 0.97, TLI ($\rho 2$)= 0.91, RMSEA= 0.07, P-close= 0.22. R^2_{PBC}= 0.17, $R^2_{Attitude}$= 0.17, R^2_{BI}= 0.46.
Note: Confirmed hypotheses are in bold. (ns): Non-significant

student readiness ($\beta_{SR \to BI}$= –0.24, SE= 0.10, P<0.05). The coefficient of determination (R^2) was used to assess the variance estimated by the conceptual model, showing such a value was 0.017 for PBC 0.17 (R^2_{PBC}= 0.17), attitude 0.51 (R^2_{Atti}= 0.17),) and BI 0.46 (R^2_{BI}= 0.46). Overall, the tested model explained 46.8% of the variance in the BI.

Tested Model

Figures 2 and 3 manifest the empirical model of the study.

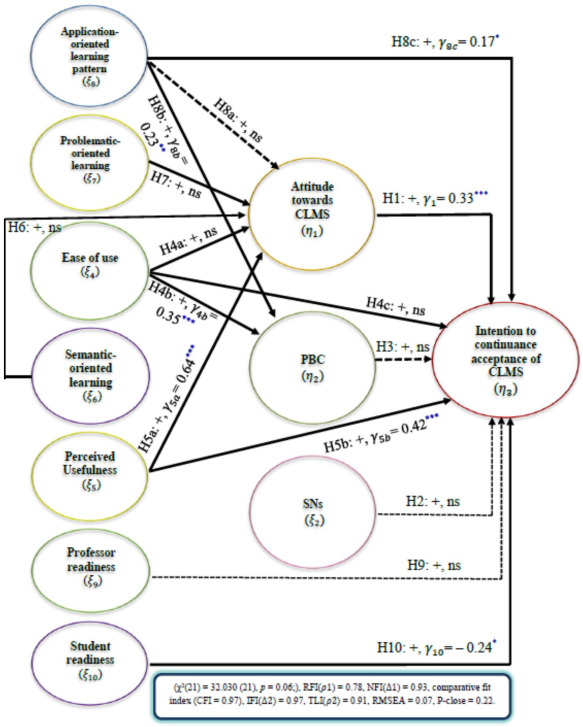

Figure 2. The causal model of the research.

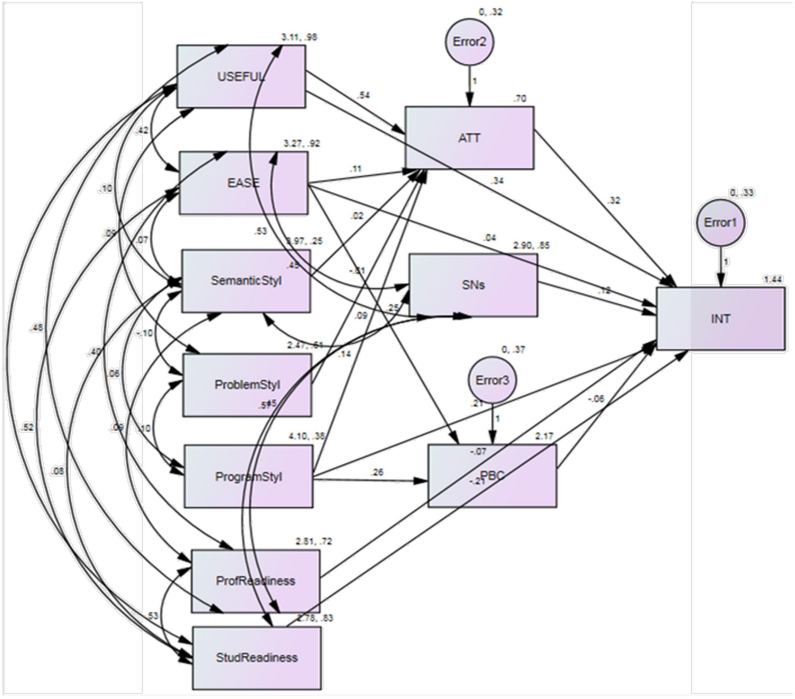

Figure 3. Model in the interface of $AMOS_{24}$.

Obstacle Analysis

The comparison of respondents' views on obstacles of the use of the CLMS has been displayed in Table 6, regarding the frequency and percentage of the CLMS barriers. The most frequencies on the scale of "strongly agree" are with the items such as "student fraud", "lack of training facilities and equipment for teaching practical and laboratory units", and "slow internet speeds".

DISCUSSION

The findings obtained from this study provided hints that show that original associations in the TPB or TAM might not be a suitable standalone foundation for predicting the BI. The PU of the CLMS has a positive and significant effect on the BI to continue using the CLMS. As seen in the earlier section, the path coefficient of 0.64 for the association of the PU with the BI is considerable. The instructors who

Table 6. Frequency and percentage of problems and obstacles of virtual education.

	Likert's five-point scale[a]				
	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Lack of a determined place for the CLMS in the university	5 (4.9%)	30 (29.4%)	15 (14.7%)	39 (38.2%)	13 (13.7%)
Lack of in-service training on how to use the CLMS	2 (2%)	26 (26.3%)	18 (18.2%)	42 (42.4%)	11 (11.1%)
Lack of an academic monitoring and evaluation unit to get instructors' feedback on the challenges of the CLMS	1 (1%)	10 (9.8%)	18 (17.6%)	52 (51%)	21 (20.6%)
Lack of familiarity of instructors with the way of teaching in cyberspace (reading booklets and books, inflexible lectures, slides with inappropriate perspective, etc.)	1 (1%)	24 (23.8%)	25 (24.8%)	42 (41.6%)	9 (8.9%)
Lack of pre-study and instructors' readiness for the CLMS	2 (2%)	27 (27.3%)	29 (29.3%)	32 (32.3%)	9 (9.1%)
Lack of pre-study and students' readiness for the CLMS	2 (2%)	13 (12.7%)	12 (11.8%)	53 (52%)	22 (21.6%)
Satisfaction of instructors with old course contents and low desire to develop and update course content	3 (2.9%)	23 (22.5%)	32 (31.4%)	36 (35.3%)	8 (7.8%)
Instructors do not have access to the required hardware (e.g., laptop, webcam and microphone)	7 (6.9%)	24 (24.5%)	16 (15.7%)	36 (35.3%)	18 (17.6%)
Low internet speed	1 (1%)	3 (2.9%)	5 (4.9%)	38 (37.3%)	55 (53.9%)
Low student access to the internet and its infrastructure	1 (1%)	5 (4.9%)	7 (6.9%)	46 (45.1%)	43 (42.2%)
High cost of internet shopping for students	2 (2%)	5 (5%)	11 (10.9%)	43 (42.6%)	40 (39.6%)
Lack of educational facilities and equipment for teaching practical and laboratory units	0 (0%)	2 (2%)	1 (1%)	42 (41.2%)	57 (55.9%)
Lack of two-way and live interaction between instructors and students while teaching (live or online teaching)	0 (0%)	11 (10.8%)	6 (5.9%)	43 (42.2%)	42 (41.2%)
Cheating by students	0 (0%)	2 (2%)	5 (4.9%)	32 (31.4%)	63 (61.8%)

[a] Likert's five-point scale includes "strongly disagree" (1) to "strongly agree" (5).

participated in this study showed that they understood the PU of the CLMS and this variable affects their BI to continue making use of the CLMS. Hence, they consider this technology has the potential to make adjustments to students' learning and make their teaching performance substantially efficient.

This is significant, given the special circumstances of universities and higher education institutions during the Corona restrictions, as it is not possible to provide face-to-face education with the closure of universities. Therefore, instructors consider the CLMS as an efficient tool in meeting their teaching and learning goals, which is very useful, at least in the specific conditions of covid-19. The PU includes respondents' perception of improving the ability to learn through the CLMS, increase the speed of teaching using the CLMS, and make teaching efficient. This finding is consistent with the findings of some studies (Masrom, 2007; Jan and Contreras, 2011; Khorasani *et al*., 2012; Heidari *et al*., 2016). For example, the results of the study showed that the PU of learning is positively correlated with the BI. Also, Heidari *et al*. (2016) and Khorasani *et al*. (2012) provided evidence that the mental perception of the PU of e-learning and e-learning as an effective factor on the acceptance and use of e-learning has a positive effect on the acceptance and use of e-learning among students.

Contrary to the previous documents that provided evidence on the linkage of the PU and PEOU with the BI to use e-learning programs and technologies (Masrom, 2007; Khorasani *et al*., 2012; Heidari *et al*., 2016), this study identified two variables as the significant predictors of attitude towards the CLMS and PBC.

The findings showed that PU has a positive and significant effect on the PBC and BI of instructors in the continuation of the use of CLMS. Therefore, the educational administrators of Tabriz and Maragheh universities are suggested to describe and explain the PU of using the CLMS by holding explanatory workshops and to provide the necessary information to the faculty members. In fact, informing and familiarizing with the desirability of learning through the CLMS for faculty members should be transparent and understandable to better understand its desirability, benefits, and advantages.

The PEOU is another variable that affects PBC, this finding can be a basis for increasing faculty members' understanding of the ability to work with the CLMS. In this regard, it is suggested that by holding orientation workshops, different parts of the system that are most used in teaching activities can be taught to faculty members.

Here, the research findings showed that the applied learning-based model is the only dominant and influential model on the BI of faculty members. It is suggested that the nature of this learning model be considered in educational planning and policy-making. Content and curriculum should be planned according to the nature of this template. According to this model, classroom teaching is done with the participation of students and teaching-learning models are taken out of traditional forms and become dynamic and participatory. In this regard, the existence of expert person and specialized facilities and space for holding online classes is the main need of teachers and learners. Also, Szopiński and Bachnik (2022) argue that not only should the focus be on the context, in which online courses are conducted and how programs are designed exclusively for the online space, but also on the characteristics of learners. They suggest that learners' data and profiles are as important as their specific learning preferences. Therefore, according to the design of curricula and their adaptation to the AOLP, the evaluation criteria of teaching and classroom education will change and will be formed from non-objective criteria to objective criteria based on students' actual learning. Thus, evaluations will be done formatively and throughout the semester. In terms of how to present the course content, this learning model will emphasize the centrality of

students' handicrafts and science. Therefore, it is necessary for instructors and students to participate together in interactive and participatory activities in the teaching and learning process. This is significant, given the practical nature of many agricultural disciplines. Accordingly, university administrators are advised to exclude the field of agriculture from holding theoretical classes and to encourage instructors and students to hold classes in farms, gardens, and greenhouses. Evaluation can be based on the definition of agricultural production projects. While the teacher and students work together and learn from the project process, the quality of the product produced can be a yardstick for evaluating teaching. This way, the CLMS can be used as a complementary tool for face-to-face classes. However, before any action, it is necessary to examine the relationship between student preparation and instructors' intellectual intelligence for a more comprehensive understanding.

Attitude towards the CLMS also showed a positive and significant effect on the BI of teachers in the continuity of the CLMS. This finding shows that the more favorable the instructors have about the system, the more they intend to use the CLMS. To this end, it is necessary to have a full-time expert on board members to manage the problems and challenges of working with the system for them. This can be in the form of the presence of an expert in the instructors' room or in a special room for online classes. These areas will foster a positive faculty attitude.

The research findings showed that the less the students are ready to use and learn from the CLMS, the more the teachers' BI to continue using the CLMS. This finding is a promising point for the expansion of virtual learning through the CLMS. Therefore, the support and assistance of instructors by the technology management of Tabriz and Maragheh Universities has an important role in continuing the use of the CLMS in classroom teaching.

CONCLUSIONS

This study aimed to understand instructors' behavioral intentions (BI) to keep using the CLMS, based on survey data. It also sought to identify key factors that influence the relationships between external (exogenous) and internal (endogenous) variables. The research produced results in the form of a model that can be used to conceptualize CLMS in academic centers. In this research, with a logical approach and the use of TPB, TAM, and VTLM the proposed model was examined and presented; It is possible to use ethical approaches and other theories in the future for other research. Also, for future research, it is suggested that more components of the education system and curriculum (curriculum content, curriculum, schedule, subject matter, teaching method) be examined and evaluated in the covid-19 admissions period. The study examined only agricultural instructors. In addition, the surveys were in one department and these results could not be generalized to other instructors and teachers in other departments. Also, this research was done in the form of quantitative research. Of course, this issue can be done with different mixed or qualitative methods at different population levels to compare the results. The results of this research can be useful and effective for higher education decision makers in using and replacing CLMS in specific situations instead of face-to-face education.

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تداوم استفاده از سامانه مدیریت یادگیری رایانه‌ای (CLMS) توسط آموزشگران کشاورزی: یک تحلیل علّی

شاپور ظریفیان، بیژن ابدی، و مسعود بیژنی

چکیده

مسئولان و تصمیم‌سازان دولتی و دانشگاهی در ایران به شدت نگران عدم ادامه استفاده آموزشگران از سامانه مدیریت یادگیری رایانه‌ای (CLMS) در دوران پسا کرونا (کووید ـ۱۹) هستند تا عوامل تعیین‌کننده تداوم استفاده آموزشگران از CLMS و نحوه ادغام آن در آموزش حضوری را دریابند. بنابراین، این تحقیق با هدف تحلیل پیش‌ران‌های ادامه استفاده از CLMS توسط آموزشگران کشاورزی انجام شد. پژوهش علّی حاضر در پی این شکاف دانشی الگوهای یادگیری آموزشگران ، ۱۰۲ نفر از اعضای هیأت علمی دو دانشگاه در شمال غرب ایران را مورد بررسی قرار داد. برای ایجاد چارچوب نظری، از نظریه رفتار برنامه‌ریزی شده (TBP)، مدل پذیرش فناوری (TAM) و نظریه یادگیری مدل ورمونت (VTLM) استفاده و گویه های پرسشنامه بر این اساس طراحی شدند. نتایج نشان داد که مدل ارائه شده، تناسب خوبی با مجموعه داده دارد. سودمندی درک‌شده CLMS (PU) بر نگرش نسبت به CLMS و نیت ادامه استفاده از CLMS (BI) تأثیر دارد. الگوی یادگیری کاربردی‌گرا (AOLP) بر PBCتأثیر مثبت می‌گذارد. سایر متغیرهای پیش‌بینی‌کننده که مستقیماً بر نیت رفتاری مربیان (BI) برای ادامه استفاده از CLMS تأثیر می‌گذارند، عبارتند از نگرش، PU، AOLP، و آمادگی درک‌شده دانش‌آموز (PSR). ضریب همبستگی چندگانه برآورد شده برای PBC، نگرش و BI به ترتیب ۰/۱۷، ۰/۵۱ و ۰/٤٦ بود. نتایج این پژوهش می‌تواند برای تصمیم گیرندگان آموزش عالی کشاورزی در استفاده و جایگزینی CLMS در شرایط خاص به جای آموزش حضوری مفید و مؤثر باشد.