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Predicting the Behavioral Intention of Greek University Faculty Members to Use Moodle

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Abstract: An emerging area of research is the study of factors that influence the use of e-learning systems in higher education. Previous studies have mainly focused on the factors that influence the adoption of learning management systems (LMS) from the student's point of view, and rarely from the point of view of the university lecturers. Moodle is an open-source LMS that has been used increasingly by the higher education community worldwide in the past few years. The purpose of this study is to investigate the factors that explain the acceptance of Moodle by academic personnel (faculty members) in the Greek higher education system. The convenience sample consists of 85 lecturers from different universities in Greece. All of them reported having used Moodle. Using the technology acceptance model, the correlations between the six latent variables (perceived ease of use, perceived usefulness, behavioral intention to use, perceived self-efficacy, subjective norms, and technology complexity) were examined. Five of the eight hypotheses were supported by variance base structural equation modelling. The total explained variance of the faculty members' behavioral intention to use Moodle was estimated to be 68.3%. Perceived usefulness and perceived ease of use had a high overall effect. Subjective norms, self-efficacy, and technological complexity influenced the teachers' intentions to adopt Moodle. This study recommends training as well as technical support for academic personnel. In addition, stakeholders should address these factors to increase usability, awareness of new opportunities for the educational community, accessibility, and the general dissemination of the benefits of learning management systems in education.

Keywords: learning management system; subjective norms; perceived self-efficacy; technological complexity; teachers; academical personnel; Moodle

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1. Introduction

In recent years, there has been an increase in the use of e-learning systems worldwide due to the time and space constraints mainly associated with the traditional form of education [1,2]. Commonly used e-learning systems include learning management systems (LMS), learning content management systems (LCMS), learning design systems (LDS), and learning support systems (LSS) [3]. An LMS is a robust web-based system that facilitates teaching and learning [1,4]. It is an environment that is free and fully customizable (e.g., Moodle), and that can contribute to the sustainability of education. With the utilization of such environments by the community of faculty members, a policy concerning the utilization of open-source applications has been formed which is diffused both in the academic community and among the students who are the future of education. In addition, the enormous adaptability of these environments enables the highlighting of certain challenges involved in supporting the educational process. LMSs are used by teachers for multiple purposes, including delivering and managing learning content, assessing learning through assignments and quizzes, managing learning content resources, preparation, content creation, and organizing study groups [5]. Many learning management

systems (LMSs) have been on the market. Some are commercial software (e.g., Blackboard), while others are open-source applications (e.g., Moodle) [6]. They are also widely used in higher education [1,7]. Using such innovative technology ensures that the learning process continues progressing, regardless of where and when it takes place [6]. One of the advantages of using these platforms is that they enhance the educational process and increases the effectiveness of the management of the entire educational process [8]. These systems focus on the delivery of online learning, both asynchronous and synchronous, and offer features such as the organization of digital learning materials, instant messages, publications, assignments, student progress tracking, and blogging services. Although all LMSs share standard functionality, some offer more specific, flexible, and comprehensive functionality, including identifying roles, assigning functions, and managing chats [6].

Moodle (modular object-oriented dynamic learning environment) is an open-source learning management system. In recent years, it has been increasingly used worldwide at all levels of education [9]. It is described as a fully customizable online learning management system on its official website. New users are joining the Moodle e-learning course management system every day. In 2022, it will be used in 243 countries by 350 million users for 43 million courses, according to its official website (https://stats.moodle.org/, accessed on 14 January 2023). The Moodle platform is mainly used in STEM disciplines at universities, according to a recent systematic review of trends in the use of Moodle for teaching and learning [4]. Previous research has shown that Moodle helps students to perform and engage [10]. Moodle is increasingly used as a platform for collaborative learning and improving online assessment [4]. There are two leading platforms used in higher education in Greece [2]. The first is eClass, an LMS that is free to use. The technical department of each educational institution officially supports it. Moodle, on the other hand, is an environment that most educational institutions do not officially support. Teachers who use it configure it according to their needs and at their own expense.

This platform is useful for capturing the rich data generated in educational settings and practices. These data can be further analyzed computationally through diverse data mining approaches to provide meaningful recommendations and trigger insights for the stakeholders in the settings under consideration [11]. For instance, the output of this analysis can be exploited by learners to more effectively organize their learning activities. Educators can also profit by obtaining an informative overview of their learners' progress and learning paths, enabling them to plan corrective actions whenever needed. Other stakeholders, such as parents and educational policymakers, can also obtain valuable information to augment the quality of their decision-making processes [12]. The above approach has been adopted in a recently started research and innovation project, augMENTOR [13]. The anticipated resolution will be bolstered by an open access AI-improved toolkit that takes advantage of big data and learning analytics to give various stakeholders intelligible proposals for effectively finding and recognizing educational resources, as well as for creating customized learning profiles that take into consideration individual actors' qualities, needs, and inclinations.

In this regard, an important and emerging area of research is the use of e-learning systems in higher education, and the factors that might explain it [2]. Previous studies [1] have mainly examined the factors that influence the adoption of LMSs by students, and they have focused less on the perspectives of teaching and research staff (faculty), even though teachers are considered a critical factor affecting students' acceptance of technology and its effective adoption in academic practices [14]. In this way, the present study uses the technology acceptance model (TAM) to investigate the influence of specific external factors on the intention of Greek faculty to use Moodle.

2. Literature Review

Several studies have investigated the model of acceptance of LMSs in general [15,16], and for the Moodle platform specifically [5,6,17], from the student's perspective. Only a few studies have been conducted to investigate the acceptance model of LMSs from

the perspective of a faculty member. These studies do not focus on specific systems or platforms [2,18–20]. Furthermore, there are references to the acceptance models of another platforms, such as Canvas [21], and very few works explicitly refer to the acceptance model of Moodle from the perspective of faculty members [6,22,23]. In addition, these previous studies mainly examine the role of the primary factors of the TAM (such as perceived usefulness and perceived ease of use) on behavioral intention (BI), and other external factors are considered only to a lesser extent.

Analytically, [23] surveyed 62 teachers from a private university in Thailand who began using Moodle after participating in the relevant training. It was found that the perceived ease of use (PEU) and perceived usefulness (PU) of Moodle had a significant positive correlation with their attitude towards the use of Moodle. However, these factors were also found to have a negative effect on their adoption of Moodle. The PEU and the PU were not found to correlate with the actual use of Moodle. Similarly, [5] found that PEU was a more significant predictor of Moodle adoption through a survey and semi-structured interviews with 69 faculty members. [22] investigated factors influencing Moodle platform use in teaching at Ahmadu Bello University, Zaria, using a qualitative approach. Their findings, based on the feedback of ten participants from the Faculty of Education, Ahmadu Bello University, revealed that the factors influencing the use of the Moodle platform by the lecturers include the need for more technical support and a lack of awareness. Lastly, [6], following a similar research approach, investigated the acceptance of Moodle as a teaching and learning platform by the Information Sciences Faculties in Oman. They conducted semi-structured interviews with nine faculty members using the unified theory of acceptance and the use of technology model. Their results showed that performance expectancy (the equivalent of PU), effort expectancy (the equivalent of PEU), social influence, and facilitators explained the intention to use Moodle.

The TAM is considered the most reliable instrument for studying the acceptance of information systems technology in various settings, and it is the most commonly used [2,24,25]. The TAM is widely used across many technologies and domains [26] because of its adaptability and good predictive power of user behavior. The TAM has been used extensively in investigating the intention to use educational technology [18,19,21]. Moreover, according to a systematic review by Al-Nuaimi and Al-Emran [1], the TAM is the most theoretical model used to study LMS acceptance in higher education institutions (TAM: 38 works out of 89; other more modern models: 10 out of 89). Therefore, for the reasons mentioned above, we decided to use the TAM to investigate the behavioral intention of faculty members to use Moodle.

Regarding the TAM [25], PEU and PU are the main factors on which user acceptance of technology is based (see Figure 1). PEU refers to the belief that the computer system will improve one's ability to work. PEU also indicates the degree to which the user believes that working with the computer system will be possible without much effort [24]. In this model, PEU explains PU. The direct effects of the PU and PEU constructs on behavioral intention (BI) [5] to use technology (e.g., Moodle) are supported by a modification of the TAM version [25] by [26]. In this version (TAM2), several external factors (Figure 1) influence PU and BI [26].

Subjective norms (SNs) represent an external factor of interest to researchers. SNs indicate the degree to which an individual perceives that using a certain technology (e.g., Moodle) is acceptable to the larger community to which they belong [24]. Therefore, SNs lead users to realize the technology's usefulness and adopt or reject it [2,19,24].

Among the various external factors influencing technology use intention, one prominent factor is the user's perceived self-efficacy (PSE) regarding system interaction [2,14,19]. PSE refers to personal beliefs about the ability to perform certain functions with a particular technology, such as Moodle.

In addition, several researchers [2,14] have explored technical factors, such as the technological complexity (TC) of a computing system, that may be related to the ease of use of the technology and subsequently determine the intention to use the technology in an

educational context [14,22]. Technological complexity is the degree to which an innovation (e.g., Moodle) is considered relatively complex in terms of its use [27].

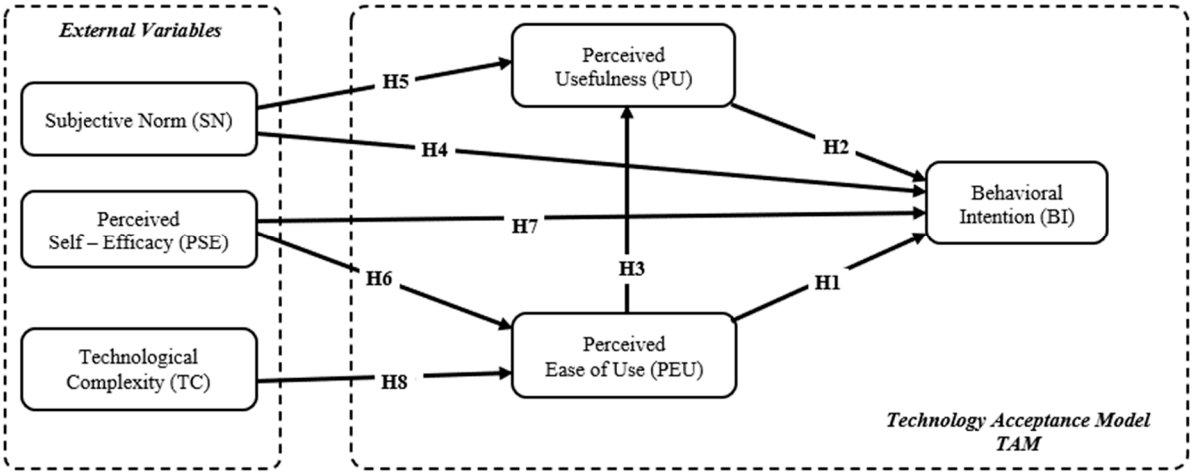

Figure 1. The hypothesized model of the research.

Considering the above, this study will investigate the factors explaining the acceptance of Moodle by Greek higher education teachers. The TAM investigates correlations between the following six constructs: (a) perceived ease of use (PEU); (b) perceived usefulness (PU); (c) behavioral intent to use (BI); (d) perceived self-efficacy (PSE); (e) subjective norms (SNs); and (f) technical complexity (TC). Eight research hypotheses (one-direction arrows) regarding the direct effect between the constructs (see Figure 1) were formulated. These research hypotheses are as follows.

Hypothesis 1 (H1). *Faculty members' PEU regarding Moodle positively affects their BI.*

Hypothesis 2 (H2). *Faculty members' PU of Moodle positively affects their BI.*

Hypothesis 3 (H3). *Faculty members' PEU regarding Moodle positively affects their PU.*

Hypothesis 4 (H4). *Faculty members' perceived SNs regarding Moodle positively affect their BI.*

Hypothesis 5 (H5). *Faculty members' perceived SNs regarding Moodle positively affect their PU.*

Hypothesis 6 (H6). *Faculty members' PSE regarding Moodle positively affects their PEU.*

Hypothesis 7 (H7). *Faculty members' PSE regarding Moodle positively affects their BI.*

Hypothesis 8 (H8). *Faculty members' perceived TC of Moodle negatively affects their PEU.*

3. Method

A cross-sectional quantitative research methodology was used in this study [28]. Data were collected using an online questionnaire. The framework for conducting online research described in [29] was used to conduct the survey. This study was approved by the ethical committee appointed by the "Department of Educational Sciences and Early Childhood Education" of the University of Patras (6/17-1-2023). The sample was selected following a non-probability strategy. It utilized the convenience sampling method since the academic community is considered a complicated sample to approach [2]. Previous studies have been conducted with low faculty member samples [6,22,23].

Specifically, faculty members were invited by e-mail to participate in the web survey voluntarily. The e-mail was accompanied by a cover letter in which the participants were asked to consent to the research. A SurveyMonkey form was used as the online

survey tool. Participants were given approximately seven minutes to complete the web questionnaire. Finally, twenty days after the first administration of the questionnaire, the academic personnel received a reminder.

3.1. Research Tool

The web-based questionnaire was made up of two parts. The first part contained three items relating to demographic variables (gender, age, and weekly use of Moodle). The second part contained seventeen items (see Appendix A), which were the main items relating to the six constructs used in the TAM. A 7-point Likert scale was used for each item, ranging from strongly disagree to strongly agree, and the middle option was labelled as neither agree nor disagree. These choice options had been used in previous studies concerning the general acceptance of information systems. We used PEU and PU items by Davis [24], BI items by Lavidas et al. [2], PSE items by Compeau and Higgins [30], SN items by Lavidas et al. [2] and Venkatesh and Davis [26], and TC (negatively worded items) items by Teo [14]. We asked faculty members to declare their degree of agreement or disagreement regarding these seventeen statements (see Appendix A). Before conducting the primary research, the questionnaire was administered to a pilot sample of five faculty members who were excluded from the final sample. Their responses to the open-ended questions on item quality suggested that no changes to the questionnaire were necessary.

3.2. Sample

The convenience sample comprised 85 lecturers who declared that they utilized Moodle for their teaching process (Figure 1). Of these, 63.5% were male, the majority (52.9%) were aged up to 50 years old, and they were from different Greek universities. These were the Aristotle University of Thessaloniki (44.7%), the University of Crete (16.5%), the Polytechnic of Alexandria (10.6%), the University of the Aegean (8.2%), the University of Ioannina (7.1%), and the University of Patras (4.8%). Other universities made up the final 8.1%. The weekly use of Moodle for our sample is shown in Figure 2.

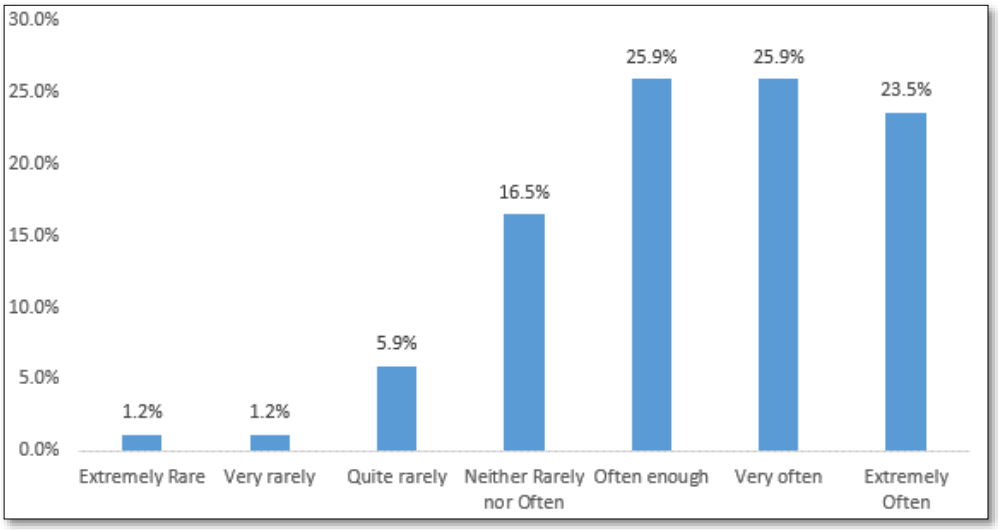

Figure 2. Lecturers' weekly use of Moodle (N = 85).

3.3. Data Analysis Strategy

The multivariate method of partial least squares structural equation modeling (PLS-SEM) was used [31,32]. According to Hair et al. [31], PLS-SEM generally achieves high levels of statistical power with small sample sizes and is quite robust to skewness. Some items do not appear to follow a normal distribution according to the skewness and kurtosis of the items (Table 1). Therefore, according to Hair et al., the deviation of some items from the norm and the small sample size (85 participants) is sufficient [31], supporting the use of PLS-SEM for this multivariate analysis.

Table 1. Measurement model: reliability and validity coefficients for each construct and descriptive statistics for each item.

	Mean (SD)	(Skewness) − (Kurtosis)	λ	α	AVE
1. Behavioural Intention to Use (BI)				0.86	0.78
BI1	6.48 (0.65)	(−1.11) − (1.18)	0.84		
BI2	5.93 (0.95)	(−0.69) − (−0.04)	0.89		
BI3	6.31 (0.83)	(−0.98) − (0.13)	0.92		
2. Perceived Ease of Use (PEU)				0.91	0.77
PEU1	5.47 (1.10)	(−1.10) − (1.27)	0.90		
PEU2	5.84 (0.94)	(−0.62) − (−0.07)	0.86		
PEU3	5.52 (1.02)	(−0.88) − (1.01)	0.86		
PEU4	5.42 (1.11)	(−0.88) − (0.84)	0.91		
3. Perceived Usefulness (PU)				0.90	0.78
PU1	5.52 (1.24)	(−0.78) − (0.08)	0.93		
PU2	5.02 (1.31)	(−0.42) − (−0.57)	0.84		
PU3	5.65 (1.07)	(−0.61) − (0.32)	0.92		
PU4	6.20 (0.78)	(−0.65) − (−0.26)	0.80		
4. Perceived Self-Efficacy (PSE)				0.77	0.81
PSE1	5.04 (1.27)	(−0.55) − (−0.25)	0.91		
PSE2	4.85 (1.61)	(−0.54) − (−0.59)	0.89		
5. Subjective Norms (SNs)				0.83	0.85
SN1	4.65 (1.21)	(−0.14) − (−0.13)	0.95		
SN2	4.73 (1.17)	(0.09) − (−0.36)	0.89		
6 Technological Complexity (TC)				0.80	0.83
TC1	2.82 (1.51)	(0.83) − (−0.05)	0.91		
TC2	3.25 (1.47)	(0.42) − (−0.99)	0.91		

AVE: average variance extracted; λ: loadings; α: Cronbach's alpha.

Analyses were performed in R [33], the corresponding package being plspm [32]. The first step was evaluating the measurement model (which describes the relationships between the constructs and their indicators), and the second was evaluating the structural model (which describes the relationships among the constructs). In the structural model, the direct path coefficients (hypotheses) and the total path coefficients between the constructs were evaluated [31,32].

4. Results

4.1. Measurement Model

Descriptive statistics for each item and reliability and validity coefficients for each construct are presented in Table 1. An eigenvalue analysis showed that the items are in a unidimensional space for each construct. In addition, there is support for the convergent validity and reliability of the six constructs. The fact that all the corresponding loadings were more significant than 0.7, and that each construct's average variance extracted (AVE) was above the threshold of 0.5, supports the convergent validity of the six constructs [31]. Regarding the reliability of the six constructs, the Cronbach's alpha (α) coefficient exceeded the threshold of 0.7, indicating high internal consistency reliability for all the constructs [31].

The product-moment correlation coefficients between the six constructs and the square root of the AVE for each construct are presented in Table 2. Except for TC and SN ($p > 0.05$), all the constructs correlated with each other ($p < 0.05$). In addition, the discriminant validity of the constructs was established. Following the Fornell–Larcker criterion, all correlations between the constructs should be less than the square root of each construct's AVE (see diagonal of the table) to establish discriminant validity [34].

Table 2. Matrix of the discriminant validity (Fornell–Larcker criterion).

Construct	1	2	3	4	5	6
1. BI	0.885					
2. PEU	0.607 *	0.875				
3. PU	0.822 *	0.662 *	0.883			
4 TH PSE	0.365 *	0.632 *	0.393 *	0.901		
5. SN	0.419 *	0.261 *	0.487 *	0.153 *	0.923	
6. TC	−0.451 *	−0.534 *	−0.395 *	−0.381 *	−0.039	0.912

Notes: * $p < 0.05$. Correlation coefficients between constructs for the product moment. The square root of the AVE (average variance extracted) for each construct is plotted on the diagonal.

4.2. Structural Model

For the evaluation of the structural model, the path coefficients between the constructs and the R-square were examined [31]. R-square is a statistical coefficient that indicates the part of the variance of the exogenous construct (BI, PU, and PEU) that is explained by the endogenous construct (PSE, SN, TC, PU, and PEU) in the model. Table 3 shows the standardized direct path coefficients (β) between the constructs, according to the hypothesized research model (see Figure 1), and the 95% confidence intervals of these coefficients. These 95% confidence intervals were calculated using a bootstrapping resampling procedure. This involved generating 2000 samples by replacing the original dataset [32]. To test the hypotheses (i.e., whether the β coefficient is statistically significant), we checked whether zero was between the upper and lower confidence endpoints. Thus, coefficient β, whose 95% confidence interval does not include zero, is considered statistically significant. Therefore, out of the eight hypotheses, only five could be confirmed.

Table 3. Bootstrapped path coefficients (β) and 95% confidence intervals of β (2000 samples).

		Direct Effect (β)	95% CI of β		Result
H1	PEU → BI	0.114	−0.120	0.352	Not confirmed
H2	PU → BI	0.729	0.564	0.901	Confirmed
H3	PEU → PU	0.575	0.423	0.721	Confirmed
H4	SN → BI	0.034	−0.099	0.143	Not confirmed
H5	SN → PU	0.337	0.165	0.502	Confirmed
H6	PSE → PEU	0.502	0.270	0.697	Confirmed
H7	PSE → BI	0.002	−0.194	0.183	Not confirmed
H8	TC → PEU	−0.343	−0.569	−0.138	Confirmed

Finally, as the corresponding 95% confidence interval is not zero (see Table 4), the total standardized coefficients between the constructs are statistically significant. In addition, most of the path coefficients are in the range of moderate to high [31,32]. Furthermore, the proportion of variance accounted for by the endogenous constructs, particularly the teachers' behavioral intention to use Moodle (R-squared = 68.3%), is satisfactory.

Table 4. Total standardized coefficients.

	Total Effect (β)	95% CI of β	
PU → BI	0.729	0.564	0.901
PEOU → BI	0.533	0.341	0.737
SN → BI	0.280	0.086	0.430
PSE → BI	0.269	0.078	0.451
TC → BI	−0.183	−0.372	−0.057
PEOU → PU	0.575	0.423	0.721
SN → PU	0.337	0.165	0.502
PSE → PU	0.288	0.148	0.429
TC → PU	−0.197	−0.366	−0.071
PSE → PEOU	0.502	0.270	0.697
TC → PEOU	−0.343	−0.569	−0.139

Notes: R-squared of BI = 68.3%, PU = 54.5%, and PEU = 50%.

5. Discussion

In order to facilitate distance learning opportunities for students, educational policies worldwide are now vigorously promoting the integration of technology. The outbreak of the COVID-19 pandemic [35] has made this initiative by governments and higher education institutions necessary. However, scholars have indicated the complexity and difficulty of utilizing LMSs for faculty members in higher education institutions [35]. Because teachers are considered a crucial factor that affects the acceptance of technology by students and its effective adoption in academic practices [14], the findings of this study are significant.

This study investigated the factors that explain the acceptance of Moodle by university teachers in Greek higher education. The TAM was used to investigate the effects of the following five constructs on the behavioral intention of teachers to use Moodle: (a) perceived usability; (b) perceived usefulness; (c) perceived self-efficacy; (d) subjective norms; and (e) technological complexity. These factors were used to estimate the variance of faculty behavioral intention to use Moodle at 68.3%, which is considered remarkably high [31,32].

This quantitative study provides further insight into the appropriateness of using the TAM to explain Greek teachers' behavioral intentions towards the Moodle platform. These study findings are consistent with those of Saleem et al. [6], i.e., they indicate that to increase the number of academic personnel adopting Moodle, a helpful strategy would be to explore faculty attitudes and perceptions. Moreover, in line with the findings of other studies, our findings highlight the need for developers to establish a solid understanding of the factors that predict user acceptance of Moodle [3]. Perceived usefulness ($\beta = 0.729$) and perceived usability ($\beta = 0.533$) have a high combined effect on faculty intention to use Moodle. In other words, if teachers find Moodle useful for their teaching, they are more likely to use it in the future. This study, like [8], argues that the adoption and acceptance of Moodle can improve the performance and effectiveness of universities. Teachers are also more likely to use Moodle in the future if they perceive it to be easy to use.

It should be noted, however, that there was no confirmation of the direct effect of PEU on BI, meaning that PU mediates the overall high effect of PEU on BI. These two constructs, PU and PEU, have been mentioned as the main factors explaining behavioral intention to use Moodle in other studies [5,6,23], as well as in other works investigating behavioral intention to use other LMSs [2,21].

Subjective norms ($\beta = 0.280$), perceived self-efficacy ($\beta = 0.269$), and technological complexity ($\beta = -0.183$) have moderate to minor overall effects on faculty members' behavioral intention to use Moodle. Our analysis shows that when others (e.g., colleagues) suggest using Moodle as a helpful technology for the teaching process, faculty members are more likely to use it in the future. This finding aligns with those of previous studies that mainly support the contributions of SNs to faculty members' BI to use LMSs [2,19]. However, this indirect effect of SN on BI via PU does not agree with the results of a study by Kaewsaiha and Chanchalor [20].

Furthermore, teachers are more likely to use Moodle in the future when they perceive that they can use Moodle competently. The effect of PSE on BI is explained via PEU and PU. Similarly, previous studies [2,19] have mentioned the contribution of PSE to faculty members' BI to use LMSs in general.

Finally, if Moodle is perceived as a complex technology, it is less likely to be used in the future. The effect of TC on BI is explained via PEU and PU. Similarly, previous studies [19,22] have mentioned this direct effect of TC on faculty members' BI to use LMSs.

6. Implications and Limitations

The above findings significantly contribute to theory and practice regarding technology acceptance and use processes used in online learning. These external factors extended the original TAM. SN, PSE, and TC seem to explain direct or/and indirect Greek faculty members' BI to use Moodle in the teaching process. This work is also significant because, to the best of our knowledge, this is the first time that Greek faculty members' BI to use Moodle in the teaching process has been studied.

Beyond the theoretical contribution, the research model suggests critical practical implications for higher education institutions for increasing faculty members' behavioral intention to use Moodle. University services could improve faculty members' behavioral intention to use Moodle. It is sometimes complicated for faculty members to use the Moodle platform because not all of them have the necessary technological skills [5,35]. In this way, the technical support services could provide help and practical guidance for faculty members who wish to use Moodle. Similarly, the designers of Moodle should focus on user-friendly desktop and command menus, as this may motivate faculty members to use Moodle.

Furthermore, suitable professional development programs could be created to make the educational community aware of any new features of Moodle, improve accessibility, and promote the benefits of learning management systems in general [2]. Thus, a training program should highlight the value of this platform for increasing productivity [2,15,29]. These programs could address the personal concerns of faculty members, such as their uncertainty about the demands of Moodle and their roles in its use [35], supporting them to adopt it, even after the COVID-19 pandemic [36].

The main limitations of this study are the convenience sample and the sampling bias. Some population members who did not use the platform or chose not to participate in the study were excluded from the sample [28]. In addition, another limitation is the fact that the study uses self-reports, which carry the risks of socially desirable responses and measurement bias [37]. In future research, the hypotheses used here should be investigated with a representative sample, such as a stratified random sample or a systematic sample, to ensure that the results are generalizable to all university teachers in Greece, or in other countries. Furthermore, other studies could explore additional factors that may impact the acceptance of Moodle, such as attitudes towards technology and prior experience with technology-based distance learning [36]. In this way, another more modern model could be utilized, such as the unified theory of acceptance and use of technology model, which may be a more appropriate choice as it provides a broader perspective on the factors that influence technology acceptance and can help to address some of the limitations of the TAM [38]. In addition, future studies could investigate why teachers do not use Moodle. It is thus possible to use other research approaches, such as qualitative methods [28], which could give us a deeper insight into teachers' Moodle behavioral intentions.

As a final note, we argue that the work presented in this paper will influence the design of the recently launched augMENTOR project, which aims to develop an innovative educational framework that examines pedagogical and learning design in an integrated context and promotes essential 21st-century skills by integrating new technologies. Specifically, augMENTOR intends to enhance the features of Moodle in order to make the educational practices of faculty members more effective and enable a rich collaboration between all actors in the chain, from students to teachers and policymakers, by integrating pedagogical approaches with AI-based software solutions. The ultimate aim is to guide stakeholders in how to address potential underlying educational difficulties, design individual learning pathways, and recognize gifted students so that they can reach their full potential.

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Appendix A

1. Behavioral Intention to Use (BI)

BI1. "I intend to use the functions and content of Moodle to assist in my academic activities".
BI2. "I intend to use the functions and content of Moodle as often as possible".
BI3. "I intend to use the functions and content of Moodle in the future".

2. Perceived Ease of Use (PEU)

PEU1. "My interaction with Moodle would be clear and understandable".
PEU2. "It would be easy for me to become skilful at using Moodle".
PEU3. "I find it easy to get Moodle to do what I want".
PEU4. "Moodle is easy to use".

3. Perceived Usefulness (PU)

PU1. "Using Moodle in my job would increase my productivity".
PU2. "Moodle is useful in my job".
PU3. "Using Moodle would enhance my effectiveness on the job".
PU4. "Using Moodle would improve my job performance".

4. Perceived Self-Efficacy (PSE)

PSE1. "I could complete the job using Moodle if I had only the Moodle manuals for reference".
PSE2. "I could complete the job using Moodle if I could call someone for help if I got stuck".

5. Subjective Norms (SNs)

SN1. "People who are important to me should use Moodle".
SN2. "People whose opinions I value will encourage me to use Moodle".

6. Technological Complexity (TC)

TC1. "It takes too long to learn Moodle to make it worthwhile".
TC2. "Using Moodle takes too much time from my regular duties".

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