Why Do Accounting and Business Lecturers Accept Digital Game-Based Learning?

Tan Ming Kuang[1] Hanny[2] Santy Setiawan[3]

Accounting Study Program, Faculty of Business, Universitas Kristen Maranatha, Bandung, Indonesia.

Abstrak

Tujuan Utama – Penelitian ini bertujuan untuk memodifikasi *Technology Acceptance Model* (TAM) dan menguji kemampuannya untuk memprediksi niat dosen Akuntansi dan Bisnis untuk menerima pembelajaran berbasis permainan digital.

Metode – Penelitian kuantitatif ini menggunakan metoda survei. Kuesioner didistribusikan ke dosen Akuntansi dan Bisnis melalui media sosial menggunakan Google form. Berdasarkan data terkumpul dari 258 dosen, model penelitian dianalisis dengan pendekatan PLS-SEM menggunakan program SmartPLS versi 3.2.

Temuan Utama - Hasil penelitian menunjukkan bahwa niat dosen mengadopsi pembelajaran berbasis permainan digital dipengaruhi langsung beberapa faktor: kebermanfaatan, norma subjektif, dan *personal innovativeness*. Meski pengaruh kurikulum tidak ditemukan, dampak kurikulum dimediasi secara penuh oleh kebermanfaatan. Penelitian ini tidak menemukan pengaruh langsung dan tidak langsung *critical mass* terhadap niat dosen mengadopsi pembelajaran berbasis permainan digital.

Implikasi Teori dan Kebijakan – Studi ini menggarisbawahi pentingnya kebermanfaatan, kesempatan belajar, norma subjektif, kurikulum, dan *personal innovativeness* baik langsung dan/atau tidak langsung terhadap penerimaan permainan digital oleh dosen sekolah bisnis. Studi ini juga berimplikasi pada perlunya dukungan sosial, keterlibatan siswa dan desainer kurikulum dalam pengembangan permainan, dan program pelatihan yang berfokus pada manfaat dan kesempatan belajar yang diperoleh siswa ketika belajar menggunakan permainan untuk meningkatkan kecenderungan dosen menerima pembelajaran berbasis permainan digital.

Kebaruan Penelitian –Penelitian ini mungkin yang pertama yang menyertakan *critical mass*, kesempatan belajar, norma subjektif, kurikulum, dan *personal innovativeness* sebagai prediktor yang mempengaruhi niat dosen mengadopsi permainan digital untuk akuntansi dan bisnis di Pendidikan tinggi.

Abstract

Main Purpose - *This study aims to modify Technology Acceptance Model (TAM) and examine its efficacy to predict the intention of accounting and business lecturers to accept digital game-based learning (DGBL).*

Method –*This quantitative study applies survey method. Questionnaires was distributed to accounting and business lecturers through various social media using a Google form. Based on data gathered from 258 lecturers, the research model is analyzed with PLS-SEM approach using the SmartPLS version 3.2 program.*

Main Findings - *The results show that lecturers' intention for adopting DGBL in the classroom is affected directly by several factors: usefulness, subjective norm, and personal innovativeness. Although curriculum effects are not found, its effects appear to be fully mediated by usefulness. This study does not find direct and indirect impact of critical mass on lectures' intention for adopting DGBL.*

Theory and Practical Implications – *This study underlines the importance of usefulness, learning opportunities, subjective norms, curriculum, and personal innovativeness direct and/or indirectly on acceptance of digital games by business school lecturers. This study also has implications for the significance of social support, the involvement of students and curriculum designers in game development, and training programs that focus on the benefits and learning opportunities students gain when using games for learning to increase lecturers' inclination to accept DGBL.*

Novelty - *This study may be the first to include critical mass, learning opportunities, subjective norms, curriculum, and personal innovativeness as predictors that affect lectures intention to adopt digital game for accounting and business in higher education.*

Keywords: accounting and business education; digital game-based learning; modified TAM model.

INTRODUCTION

The use of digital games for accounting and business learning has attracted the attention of many researchers and practitioners. Recent review studies (Boyle et al., 2016; Carenys & Moya, 2016; Clark et al., 2016) found that game based learning can support the achievement of accounting, business and non-business learning objectives. Particularly, digital games in the form of role playing, strategy and business simulations are believed to be able to increase the skills needed in the industrial era 4.0 (Almeida & Simoes, 2019), such as innovation, creativity, critical thinking, and complex problem solving (World Economic Forum, 2020) With all these advantages, the game approach may help teachers to overcome the low learning outcomes of Accounting students (Kuang et al., 2021). It is therefore studies examining teachers' acceptance on this method have been performed extensively. In contrast to previous studies, this study uses a modified TAM to examine factors affecting the intention of accounting and business lecturers to accept digital game-based learning.

Although a number of studies have found the benefits of game-based learning in building future competencies, its formal use in the classroom is still very limited (Almeida & Simoes, 2019). Therefore, several studies have attempted to identify factors that hinder and encourage the adoption of digital games in formal education both at the organizational and individual (students and teachers) levels (Kaimara et al., 2021; Luo et al., 2021; Sánchez-Mena & Martí-Parreño, 2017a). Although institutional support is important, this research focuses on teachers (at the higher education level) because they are the actual decision makers in adopting new learning methods in the classroom (Sánchez-Mena & Martí-Parreño, 2017b). The literature also shows that teacher behavior in accepting and integrating innovative teaching is more influenced by individual than environmental factors (Teo et al., 2016; Thurlings et al., 2015). Therefore, understanding what drives teachers to accept digital game-based learning is important for educational institution managers to develop appropriate development programs to help teachers adopt digital game-based learning in their classrooms.

Research on the acceptance of teachers adopting digital game-based learning has relatively been done. Sánchez-Mena & Martí-Parreño (2017b) analyzed 11 of the 6248 papers on the Web of Science and Scopus and discussed the adoption of digital games by teachers. Apart from factors influencing acceptance of digital games, they found that no study has explored teacher acceptance at the university level. With the exception of a recent study conducted by Sánchez-Mena et al., (2019), to the best of the researcher's knowledge, research that focuses on teachers at the higher education level, especially business education, is still scarce. In fact, the attitude of teachers who teach at the primary and secondary education levels towards teaching innovation is possibly different from the attitudes of teachers at the higher education level.

In contrast to previous studies, this study attempts to fill the literature gap by examining the factors that influence the acceptance of digital game-based learning by accounting and business teachers at the university level. This study also uses Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM) (Davis, 1989) which were modified as conceptual frameworks because digital game-based learning is a technological innovation and has been widely used in acceptance research. teaching innovation (e.g., Blume, 2020; Bourgonjon et al., 2013; Dele-Ajayi et al., 2017; Jeong & Kim, 2017; Mazman Akar, 2019; Sánchez-Mena et al., 2019).

This study aims to examine the modified TAM as a model to predict the intention of accounting and business lecturers to accept digital game-based learning. Thus, the contribution of the current study to the field of accounting education are as follows. First, this study examines a modified model of acceptance of an instructional method for teaching accounting and business topics at university level. The original TAM is modified by integrating critical mass, learning opportunities, subjective norms, curriculum, and personal innovativeness into the model. Second, this study provides insights for game developer about the significance of the involvement of students and curriculum designers in game development. Finally, this study provides insights for accounting and business study program manager about the significance of social support and training programs to increase lecturers' inclination to accept digital game-based learning.

METHOD

Research method in this study used a survey as a data collection method. According to Creswell & Guetterman (2021), some of the features of the survey inherent in this research are: First, this research is intended to describe trends in attitudes of accounting and business lecturers. Specifically, attitudes toward the use of digital games in their courses. Second, the data obtained is subjective because it is collected from lecturers at the business faculty (Accounting, Management, and Entrepreneurship) as research participants. Third, not all populations are used as research objects, but only samples will be taken where the research results will be generalized to the entire population.

The electronic survey was distributed using a Google form to fellow business faculty lecturers through various social media groups (WhatsApp, Line, Telegram), such as the Heads of Accounting Study Programs throughout Indonesia and the Deans of the Business Faculty in Indonesia. Through the social media group, they were asked to fill out a survey and disseminate the survey link to all

education staff in their Faculty. A total of 258 out of 264 samples were retained after excluding respondents who did not understand digital game-based learning. Respondents consisted of men (37%) and women: 63%), came from public (24%) and private universities (76%), and taught in accounting courses (56%), management (41%), and entrepreneurship (3%).

Instrument

To ensure construct validity, this study uses an instrument with a scale that has been validated and used in the context of acceptance of teaching technology in previous studies. Measurement of behavioral intention, usefulness, and learning opportunities using a scale adapted from De Grove et al. (2012). Critical mass uses a scale adapted from Lou et al. (2000) and Hsu & Lu, (2004), while subjective norms from Hsu & Lu (2004). All constructs were measured using a Likert scale (1-5) with a range from strongly disagree to strongly agree. In addition, the questionnaire also asked respondents' demographics, namely gender, age, teaching experience in business programs, type of university (public or private), province of origin, study program, education level, academic position and experience using digital games. Before filling out the questionnaire, respondents were given explanations and examples of digital game-based learning both used in Accounting and Business.

Instrument Validation

Instrument validation is done by analyzing the reliability and validity. Reliability analysis was carried out through standardized loading. Validity analysis includes convergent and discriminant validity. Convergent validity is verified through the composite reliability index (CR) and average variance extracted (AVE).

Descriptive statistics

Descriptive statistics is applied to describe the characteristics of the research variables. This study employs means to measure central tendency. Additionally, this study uses standard deviation, median, minimum and

maximum to measure variability for each variable.

Structural Equation modeling

The research model was tested using the PLS-SEM method. This technique was used because of the research focus on prediction and exploration and the lack of normality in the sample distribution. The testing process is carried out with the SmartPLS version 3.2 program.

RESULTS AND DISCUSSION
Instrument Validation

As shown in Table 1. Although the PI3 items must be eliminated, the remaining items score significantly above 0.70; the generally accepted lower limit to ensure the reliability of an instrument.

Validity analysis includes convergent and discriminant validity. Convergent validity is verified through the composite reliability index (CR) and average variance extracted (AVE). Table 2 shows all scores above 0.70 for CR and 0.50 for AVE which are the minimum thresholds. Regarding discriminant validity, Table 2 shows that the correlation between variables is always lower with the AVE square root and the HTMT ratio lower than 0.85. Based on these findings, it can be concluded that the instrument used meets the elements of reliability and validity.

Descriptive Statistics

Table 3 displays the mean, standard deviation, minimum and maximum agreement scores for each variable. Except for critical mass, all variables show a level of agreement above neutral (mean > 3). Learning opportunities (LO), usefulness (U), and behavioral intentions (BI) generally received high levels of approval from respondents. The relatively small standard deviation value indicates that the responses between respondents tend to be uniform.

Structural Equation modeling of Hypotheses Testing

Figure 1 shows the proposed model explains 53.3% of the variance of the lecturers' behavioral intention. It also explains 68.3% of perceived usefulness through the influence of critical mass, learning opportunities, subjective norms, curriculum, and personal innovativeness.

To establish the predictive relevance of the model, the present study performed Stone-Geisser test, obtaining a Q^2 are positive in all the constructs, therefore confirming the predictive capability of the model.

Furthermore, figure 1 suggests the path coefficient value of each relational hypothesis. The strongest relationships are the one proposed between learning opportunities and usefulness (H5), and between subjective norm and learning opportunities (H7). On the other hand, the weakest relationship occurs between critical mass and usefulness (H2), between critical mass and learning opportunities (H3), and between critical mass and behavioral intentions (H4).

Of the twelve hypotheses proposed, eight were confirmed based on the T value of the path coefficient and the f^2 statistic. Table 4 shows that all hypothesized variable relationships in the research model are supported with a significance level of 0.001, 0.01, or 0.05, except for H2, H3, H4 and H12. The impact of usefulness (H1; $\beta = 0.334$, t = 4.572, p < 0.001), subjective norm (H8; $\beta = 0.197$, t = 3.216, p < 0.01), and personal innovativeness (H10; $\beta = 0.233$, t = 2.893, p < 0.01) on behavioral intention are significant. Learning opportunities (H5; $\beta = 0.435$, t = 6.468, p < 0.001), curriculum (H11; $\beta = 0.239$, t = 4.570, p < 0.001), subjective norm (H6; $\beta = 0.124$, t = 2.010, p < 0.05), and personal innovativeness (H9; $\beta = 0.219$, t = 4.047, p < 0.001) significantly influence lecturers' perceived usefulness. Subjective norm also significantly influences lecturers' perceived learning opportunities (H7; $\beta = 0.504$, t = 9.378, p < 0.001).

Table 1. Reliability and convergent validity

Variabel	Item	Loading	*t*-value	CR	AVE
Critical Mass	CM1	0,972	27,53*	0,976	0,953
	CM2	0,980	26,3*		
Usefulness	U1	0,868	73,65*	0,938	0,752
	U2	0,844	66,33*		
	U3	0,895	68,56*		
	U4	0,858	73,47*		
	U5	0,870	78,34*		
Learning	LO1	0,831	96,49	0,913	0,637
Opportunities	LO2	0,750	68,68*		
	LO3	0,799	92,57*		
	LO4	0,801	84,69*		
	LO5	0,798	88,47*		
	LO6	0,808	79,90*		
Curriculum	Cu1	0,961	61,43*	0,963	0,928
	Cu2	0,966	63,22*		
Behavioral	BI1	0,956	67,56*	0,955	0,914
Intention	BI2	0,956	75,30*		
	SN1	0,914	49,48	0,936	0,829
Subjectif Norm	SN2	0,914	52,85*		
	SN3	0,903	55,33*		
Personal	PI1	0,912	67,47	0,838	0,722
Innovativeness	PI2	0,782	35,14*		

Source: Data processing results
Note: CR = Composite Reliability; AVE = Average Variance Extracted.
Significant at *$p < .01$.

Table 2. Discriminant Validity

Variabel	V1	V2	V3	V4	V5	V6	V7
V1. Critical Mass	0,976	0,276	0,233	0,267	0,287	0,497	0,376
V2. Usefulness	0,260	0,867	0,835	0,708	0,726	0,606	0,771
V3. Learning Opportunities	0,216	0,754	0,798	0,684	0,679	0,549	0,656
V4. Curriculum	0,251	0,652	0,621	0,963	0,570	0,479	0,517
V5. Behavioral Intention	0,268	0,663	0,609	0,521	0,956	0,616	0,754
V6. Subjective Norm	0,453	0,558	0,498	0,438	0,562	0,910	0,689
V7. Personal Innovativeness	0,270	0,604	0,513	0,414	0,591	0,537	0,850

Source: Data processing results
Note: Diagonal: AVE square root; Bottom of the triangle area: variable correlation; The upper area of the triangle: HTMT ratio.

Table 3. Descriptive Statistics of the Variables of the Modified TAM Model

	N	Minimum	Maximum	Mean	Std. Deviation
Learning Opportunities	258	3.00	5.00	4.2674	.54098

Critical Mass	258	1.00	5.00	2.6298	1.12437
Subjectif Norm	258	1.00	5.00	3.7106	.83883
Curriculum	258	2.00	5.00	3.8915	.79262
Usefulness	258	2.20	5.00	4.0822	.65523
Behavioral Intention	258	2.00	5.00	4.1008	.73246
Personal Innovativeness	258	1.00	5.00	3.6880	.84989

Source: Output results from IBM SPSS Statistics

On the contrary, the impact of critical mass on usefulness (H2; β = -0.010, t = 0.295, p = 0.768), learning opportunities (H3; β = -0.013, t = 0.225, p = 0.822), and behavioral intention (H4; β = -0.001, t = 0.020, p = 0.984) is insignificant. Similarly, curriculum does not cause intention to use digital game for learning (H12; β = 0.121, t = 1.810, p = 0.071).

The results of statistical significance are supported by effect size analysis for each relationship between variables. The relationship H2, H3, H4, and H12 has a marginal effect size so that it can be excluded from the model (f^2 < 0.02). On the other hand, Hypotheses 1, 6, 8, 9, 10, 11, and 12 had a small effect size (0.02 < f^2 < 0.15) and hypotheses 5 and 7 had an intermediate effect size (0.15 < f^2 < 0.35).

Structural Equation modeling of Mediation Analysis
The results of mediation analysis on the behavioral intention reveals that teacher's perceived of usefulness and learning opportunities mediate the association with their behavioral intention. Table 5 shows that the total effect of SN (β = 0.312, t = 4.680, p < 0.001), PI (β = 0.306, t = 3.960, p < 0.001), and CU (β = 0.201, t = 3.351, p < 0.01) on BI is significant. With the inclusion of the mediating variables (U), the impact of SN (β = 0.197, t = 3.216, p < 0.01), and PI (β = 0.233, t = 2.893, p < 0.01) on BI are significant. The indirect effect of SN (β = 0.041, t = 2.036, p < 0.05) and

PI (β = 0.073, t = 2.903, p < 0.01) on BI through U is found significant. This indicates that the relationship between SN, PI and BI is partially mediated by U. The similar results are observed in the relationship between SN and BI through LO (see table 5).

Furthermore, with the inclusion of the mediating variables (U), the impact of Cu on BI became insignificant (β = 0.121, t = 1.810, p = 0.071). The indirect effect of Cu through U is found significant (β = 0.080, t = 3.113, p < 0.01). This indicates that the relationship between Cu and BI is fully mediated by U.

In contrast, the total effect of CM on BI is insignificant (β = -0.006, t = 0.132, p = 0.895). With the inclusion of the mediating variable (U), the effect of CM on BI become insignificant (β = -0.001, t = 0.020, p = 0.984). The indirect effect of CM on BI through U is also insignificant (β = -0.003, t = 0.298, p = 0.766). This suggest that the U does not mediate the relationship between CM and BI.

According to structural equation modelling analysis, this study revealed that usefulness, subjective norms, and personal innovativeness have a direct and positive relationship with behavioral intention. In terms of usefulness, the more lecturers believe that digital games are useful in helping students learn, the more they are inclined to use digital games in the classroom.

Figure 1. Results of the Research Model.
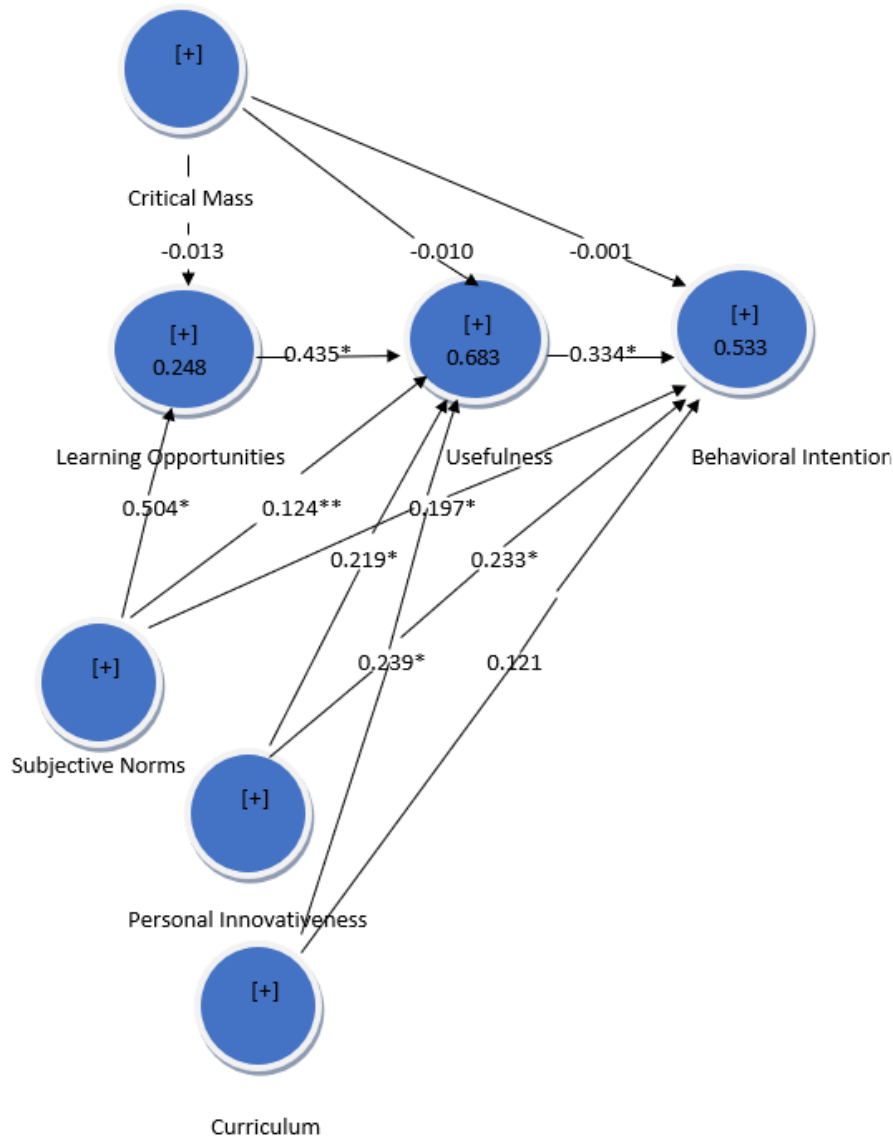
Source: Authors
Significant at *p < 0.001 **p < 0.01 ***p < 0.05

Table 4. Result of T and f^2

	Path coeff.	T Values	f^2	Results
Critical Mass -> Usefulness H2	-0.010	0.295	0.000	No Supported
Critical Mass -> Learning Opportunities H3	-0.013	0.225	0.000	No Supported
Critical Mass -> Behavioral Intention H4	-0.001	0.020	0.000	No Supported
Usefulness -> Behavioral Intention H1	0.334*	4.572	0.099	Supported
Learning Opportunities -> Usefulness H5	0.435*	6.468	0.307	Supported
Curriculum -> Usefulnes H11	0.239*	4.570	0.105	Supported
Curriculum -> Behavioral Intention H12	0.121	1.810	0.018	No Supported
Subjectif Norm -> Usefulness H6	0.124***	2.010	0.027	Supported
Subjectif Norm -> Learning Opportunities H7	0.504*	9.378	0.268	Supported
Subjectif Norm -> Behavioral Intention H8	0.197**	3.216	0.045	Supported
Personal Innovativeness -> Usefulness H9	0.219*	4.047	0.094	Supported
Personal Innovativeness -> Behavioral Intention H10	0.233*	2.893	0.067	Supported

Source: Data processing results

Significant at *p < 0.001 **p < 0.01 ***p < 0.05

Table 5. Mediation Analysis

	Total effect		Direct effect		Indirect effect	Coeff.	SD	T value	P values
	Coeff.	p-values	Coeff.	p-values					
CM→BI	-0.006	0.895	-0.010	0.984	CM→U→BI	-0.003	0.012	0.298	0.766
					CM→LO→U→BI	-0.002	0.009	0.220	0.826
SN→BI	0.312	0.000	0.197	0.001	SN→U→BI	0.041	0.020	2.036	0.042
					SN→LO→U→BI	0.073	0.022	3.277	0.001
PI→BI	0.306	0.000	0.233	0.004	PI→U→BI	0.073	0.025	2.903	0.004
Cu→BI	0.201	0.001	0.121	0.071	Cu→U→BI	0.080	0.026	3.113	0.002

Source: Data processing results
Note: CM = Critical Mass; BI = Behavioral Intention; SN: Subjective Norm; PI: Personal Innovativeness; Cu: Curriculum.

These results are in line with the arguments and previous studies that found usefulness (Jeong & Kim, 2017; Mazman Akar, 2019; Sánchez-Mena et al., 2019), subjective norms (Jeong & Kim, 2017; Mazman Akar, 2019) and personal innovativeness (Yorulmaz et al., 2017) as a predictor for the adoption of a technology in education.

Furthermore, learning opportunities, curriculum, subjective norm, and personal innovativeness significantly influence lecturers' perceived usefulness. These results are in line with the arguments and previous studies that found participants who believe that new technologies relate to a high quality learning experience (Bourgonjon et al., 2013; De Grove et al., 2012), learning materials taught, social pressure (Calisir et al., 2014; Sánchez-Prieto et al., 2016; Wong, 2015), and an attitude of openness and curiosity toward an innovative teaching technology (Mazman Akar, 2019) are more likely to adopt them. This study also found that subjective norm significantly influences lecturers' perceived learning opportunities.

However, this study did not find a relationship either directly or indirectly between critical mass and behavioral intentions. This finding is inconsistent with previous study investigating the relationship of critical mass with acceptance of digital game-based learning

(e.g., Bourgonjon et al., 2013; Hsu & Lu, 2004). This may be due to the relatively low level of use of digital games in Indonesian universities. The result of this research reveals that only 11% of respondents are accustomed to use digital games for teaching. Therefore, the lecturer's decision to adopt digital games is still personal rather than environmental.

Although the curriculum does not directly affect the behavioral intention, the curriculum indirectly influences the attitude of the teacher through usefulness. This result means that lecturers do not necessarily have a positive attitude towards digital games just because they perceive digital games to be in line with the learning material, but lecturers must also perceive digital games to be useful in teaching the material before having a positive attitude and then adopting it (De Grove et al., 2012; Dele-Ajayi et al., 2017).

Additionally, the present study found that usefulness partially mediates the relationship between subjective norm, personal innovativeness and behavioral intention, and fully mediates the relationship between curriculum and behavioral intention. Dele-Ajayi et al. (2017) posits that teachers who believe that digital games are useful to help them meet curriculum goals, the intention to adopt digital games for learning increases.

The present study has theory and practical implications. This study implies that usefulness, learning opportunities, subjective norms, curriculum, and personal innovativeness play critical role direct and/or indirectly in explaining lecturers' intention to adopt digital-game based learning for teaching accounting and business. Regarding practice, this study underlines the significance of the lecturer development program. To increase lecturers' positive attitude towards digital games, training programs should focus on training materials on the benefits and learning opportunities experienced by students when lecturers use digital games in their accounting classes. Secondly, the importance of supportive environment for applying digital game-based learning. This study found that in addition to personality factors (personal innovativeness), environmental factors (subjective norms) such as support from leaders, colleagues, and students will increase lecturers' desire to adopt digital games. Finally, the involvement of stakeholders in the design of educational games. To be perceived as useful, a game must be in line with the learning objectives. Therefore, game designers need to involve students also accounting and business of curriculum designers in making an educational game.

CONCLUSION

This study expands on previous research which generally analyzed TAM and digital educational games in other educational levels (e.g., secondary level) (Sánchez-Mena & Martí-Parreño, 2017b). This study also contributes to the literature as the first research to analyze the role of accounting and business lecturers' perception of critical mass, learning opportunities, subjective norms, curriculum, and personal innovativeness in their behavioral intentions to use digital games in their courses. One of the main findings of this study is that lecturers' perceptions of usefulness, subjective norms, and personal innovativeness have a direct effect on lecturers' intentions to adopt digital games in their courses while curriculum and learning opportunities have indirect effects. Specifically, this study revealed that

curriculum and learning opportunities affect behavioral intention through usefulness.

The research finding that was beyond expectation was that there was no direct or indirect effect of critical mass on the lecturer's intention to use digital games. The low experience of lecturers using digital games for accounting and business learning in Indonesia could be a factor in not confirming this hypothesis.

Overall, the modified TAM proposed in this study is supported significantly, with R^2 for the lecturers' behavioral intention variable being 53.3%.

ACKNOWLEDGEMENT

REFERENCES

Almeida, F., & Simoes, J. (2019). The role of serious games, gamification and industry 4.0 tools in the education 4.0 paradigm. *Contemporary Educational Technology*, *10*(2), 120–136.

Blume, C. (2020). Games people (don't) play: An analysis of pre-service EFL teachers' behaviors and beliefs regarding digital game-based language learning. *Computer Assisted Language Learning*, *33*(1–2), 109–132.

Bourgonjon, J., De Grove, F., De Smet, C., Van Looy, J., Soetaert, R., & Valcke, M. (2013). Acceptance of game-based learning by secondary school teachers. *Computers and Education*, *67*, 21–35.

Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T.,

Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers and Education*, *94*, 178–192.

Calisir, F., Altin Gumussoy, C., Bayraktaroglu, A. E., & Karaali, D. (2014). Predicting the intention to use a web? based learning system: Perceived content quality, anxiety, perceived system quality, image, and the technology acceptance model. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *24*(5), 515–531.

Carenys, J., & Moya, S. (2016). Digital game-based learning in accounting and business education. *Accounting Education*, *25*(6), 598–651.

Clark, D. B., Tanner-Smith, E. E., & Killingsworth, S. S. (2016). Digital games, design, and learning: A systematic review and meta-analysis. *Review of Educational Research*, *86*(1), 79–122.

Creswell, J. W., & Guetterman, T. C. (2021). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (6th ed.). Pearson Education Limited.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339.

De Grove, F., Bourgonjon, J., & Van Looy, J. (2012). Digital games in the classroom? A contextual approach to teachers' adoption intention of digital games in formal education. *Computers in Human Behavior*, *28*(6), 2023–2033.

Dele-Ajayi, O., Strachan, R., Sanderson, J., & Pickard, A. (2017). A modified TAM for predicting acceptance of digital educational games by teachers. *IEEE Global Engineering Education Conference, EDUCON*, *April*, 961–968.

Hsu, C. L., & Lu, H. P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information and Management*, *41*(7), 853–868.

Jeong, H. I., & Kim, Y. (2017). The acceptance of computer technology by teachers in early childhood education. *Interactive Learning Environments*, *25*(4), 496–512.

Kaimara, P., Fokides, E., Oikonomou, A., & Deliyannis, I. (2021). Potential Barriers to the Implementation of Digital Game-Based Learning in the Classroom: Pre-service Teachers' Views. *Technology, Knowledge and Learning*, *26*(4), 825–844.

Kuang, T. M., Adler, R. W., & Pandey, R. (2021). Creating a Modified Monopoly Game for Promoting Students' Higher-Order Thinking Skills and Knowledge Retention. *Issues in Accounting Education*, *36*(3).

Lou, H., Luo, W., & Strong, D. (2000). Perceived critical mass effect on groupware acceptance. *European Journal of Information Systems*, *9*(2), 91–103.

Luo, Z., Brown, C., & O'Steen, B. (2021). Factors contributing to teachers'

acceptance intention of gamified learning tools in secondary schools: An exploratory study. *Education and Information Technologies*, *26*(5), 6337–6363.

Mazman Akar, S. G. (2019). Does it matter being innovative: Teachers' technology acceptance. *Education and Information Technologies*, *24*(6), 3415–3432.

Sánchez-Mena, A., & Martí-Parreño, J. (2017a). Drivers and barriers to adopting gamification: Teachers' perspectives. *Electronic Journal of E-Learning*, *15*(5), 434–443.

Sánchez-Mena, A., & Martí-Parreño, J. (2017b). Teachers´ acceptance of educational video games: A comprehensive literature review. *Journal of E-Learning and Knowledge Society*, *13*(2), 47–63.

Sánchez-Mena, A., Martí-Parreño, J., & Aldás-Manzano, J. (2019). Teachers' intention to use educational video games: The moderating role of gender and age. *Innovations in Education and Teaching International*, *56*(3), 318–329.

Sánchez-Prieto, J. C., Olmos-Migueláñez, S., & García-Peñalvo, F. J. (2016). Informal tools in formal contexts: Development of a model to assess the acceptance of mobile technologies among teachers. *Computers in Human Behavior*, *55*, 519–528.

Teo, T., Milutinović, V., & Zhou, M. (2016). Modelling Serbian pre-service teachers' attitudes towards computer use: A SEM and MIMIC approach. *Computers and Education*, *94*, 77–88.

Thurlings, M., Evers, A. T., & Vermeulen, M. (2015). Toward a Model of Explaining Teachers' Innovative Behavior: A Literature Review. *Review of Educational Research*, *85*(3), 430–471.

Wong, G. K. (2015). Understanding technology acceptance in pre-service teachers of primary mathematics in Hong Kong. *Australasian Journal of Educational Technology*, *31*(6).

Yorulmaz, A., Çokçalişkan, H., & Önal, H. (2017). Determination of Classroom Pre-Service Teachers' State of Personal Innovativeness. *Journal of Education and Training Studies*, *5*(1), 28–34.