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The effect of learner-generated digital materials on learners' deep learning approach and self-efficacy

Enas Mohammad Alwafi

Department of Curriculum and Instruction, College of Education, Umm Al-Qura University, Makkah, Saudi Arabia.
Email: emwafi@uqu.edu.sa

Abstract

This study aimed to explore the effect of learner-generated digital materials on students' deep learning approach and self-efficacy. A quasi-experimental design that involves a pre-test, a post-test, a control group and an experiment group was used in this study which involved 51 students (25 students participated in the control group and 26 students participated in the experiment group). A questionnaire was used to measure students' deep learning approach and self-efficacy. The study found that students in the experimental group improved their deep learning approach and self-efficacy more than students in the control group. Learner-generated digital materials can enhance students' learning experiences. This study contributes new knowledge about the methods by which learner-generated digital material can be used as a learning approach. It also provides insight on how digital tools can be used to support students learning. This study provides recommendations for employing learner-generated digital materials to engage students in the learning experience.

Keywords: Deep learning, Digital materials, Digital tools, Learner-generated materials, Learning approach, Self-efficacy.

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Contents

Contribution of this paper to the literature
The study contributes new knowledge about the methods by which learner-generated digital material can be used as a learning approach. It also provides insight on how digital tools can be used to enhance students' deep learning approach and self-efficacy.

1. Introduction

Higher education has recently made investments in using technology in teaching and learning to provide high-quality learning opportunities and instructional strategies. Many researchers emphasised the significance of supporting the introduction of learner-generated content and the transformation of the learner from a mere consumer to a potential creator (Schuck & Kearney, 2008). Learner-generated digital materials refer to artefacts created by students through digital tools that allow students to enhance their ability to understand information and demonstrate their learning (Reyna, Meier, Geronimo, & Rodgers, 2016). Studies found that learner-generated digital materials can enhance students' learning outcomes (Huynh, Lin, & Hwang, 2022), satisfaction (Moon, 2020), a sense of joy, positive attitudes towards the learning experiences and active learning (Bakla, 2018).

Previous studies showed the positive effect of learner-generated digital materials on students' learning experiences but did not consider the impact of learner-generated digital materials on students' deep learning and self-efficacy. They also found that a deep learning approach and self-efficacy can significantly engage students in the learning process and provide an effective learning experience (Zakariya, Nilsen, Goodchild, & Bjørkestøl, 2022). Learning activities can provide various opportunities to engage students in the learning process by offering an authentic and meaningful environment by using technology (Vos, Van Der Meijden, & Denessen, 2011) and enhancing students' self-efficacy (Han & Geng, 2023). Several recent studies recommended that future researchers examine the impact of learner-generated digital materials on engaging students in the process of active learning and higher-order learning skills (Bakla, 2018; Reyna, Hanham, Vlachopoulos, & Meier, 2021). Huynh et al. (2022) recommended that future studies investigate the responses of students to learner-generated digital materials. Therefore, this study aimed to investigate the effect of learner-generated digital materials on students' learning and self-efficacy.

2. Literature Review

2.1. Deep Learning Approach

Students' approaches to learning can be defined as the methods that students employ when working on a learning task (Marton & Säljö, 1976). Research has identified two ways of learning: deep and surface learning (Marton & Säljö, 1976). According to Biggs, Kember, and Leung (2001), the learning approach involves students' motives and strategies. The deep learning approach means that students critically analyse new ideas and connect them to previously understood concepts and principles which promotes meaningful learning while the surface learning approach means that students accept information and attempt to memorise the information in isolation (Biggs, 1999; Houghton, 2004). The research found that students who use the deep learning approach perform and retain information better than those using the surface learning approach (Nelson Laird, Shoup, Kuh, & Schwarz, 2008). Studies on the deep learning approach found that learning activities are crucial in order to engage students in the learning process (Biggs et al., 2001; Hamilton & Tee, 2010). For example, Alwafi, Downey, and Kinchin (2020) state that learning activities that require students to construct ideas and knowledge can provide various opportunities to engage students in the learning process which can offer an authentic and meaningful environment. Vos et al. (2011) propose that providing a constructive learning environment can engage students in a deep learning approach to reinforce students' deep learning strategies by allowing them to connect ideas and construct knowledge.

2.2. Self-Efficacy for Learning

Self-efficacy for learning can be defined as a learner's belief in their ability to perform a learning task successfully (Pajares, 2008). Self-efficacy in learning can affect students' achievement, performance and use of learning strategies (Sardegna, Lee, & Kusey, 2018). In addition, self-efficacy has also been found to engage students cognitively in the learning process. For example, studies found that self-efficacy is linked with students' higher levels of task value (Bong, Cho, Ahn, & Kim, 2012) and cognitive and metacognitive strategy use (Sungur & Kahraman, 2011). Sökmen (2021) found that giving students control over the tasks can enhance students' self-efficacy for learning. Zakariya et al. (2022) found that students with high self-efficacy in learning employed a deep learning approach. Studies found that the type of learning task can affect students' self-efficacy for learning. According to Wang, Stebbins, and Ferdig (2022), engaging students in authentic tasks can enhance students' self-efficacy. Ke (2014) showed that learning by design could enhance students' self-efficacy. Therefore, this study anticipated that engaging students in authentic tasks that involve learning by design could enhance students' self-efficacy for learning.

2.3. Learner-Generated Digital Materials as a Learning Approach

Learner-generated digital materials refer to digital artefacts created by students to demonstrate their learning such as podcasts, digital infographics, videos or animations (Reyna et al., 2016). Different types of software help students produce digital artefacts. Learner- generated digital materials can engage students in different learning processes including developing, designing and presenting their works. Studies showed that learner-generated digital materials could provide a positive and authentic learning experience. For example, Huynh et al. (2022) found that learner-generated digital materials enhance students' learning outcomes and decrease mental effort. Similarly, Bakla (2018) found that learner-generated digital materials provide a sense of joy, positive attitudes towards the learning experience and active learning. In another study, Reyna, Horgan, Ramp, and Meier (2017) found that learner-generated digital materials enhance students' creativity and the connection between the learning subject concepts. According to Orús et al. (2016), learner-generated videos enhance students' cross-curricular

competencies such as intellectual, personal and social skills and outcomes. Moon (2020) found that learner-generated digital materials can increase students' self-confidence, motivation and satisfaction.

Previous studies showed the positive effect of learner-generated digital materials on students' learning experiences, they have not considered the impact of learner-generated digital materials on students' deep learning approach and self-efficacy. Previous studies found that using technology in learning activities can provide various opportunities to engage students in the learning process by offering an authentic and meaningful environment and enhancing students' self-efficacy. For example, Vos et al. (2011) found that engaging students in a constructivist learning approach through technology could enhance students' deep learning strategies. Ke (2014) showed that learning by design through using technology can enhance students' thinking and problem-solving. Therefore, this study anticipated that learner-generated digital materials could play a role in giving students control over their learning and engaging them in a deep learning approach which can enhance their self-efficacy in learning. Additionally, students' self-efficacy is linked with their perceptions of their responsibility for learning (Wilson & Narayan, 2016) particularly in creating digital materials. Students with strong beliefs about their ability to learn feel more responsible for designing digital materials that encourages them to engage in the activity. Several recent studies recommended that future research examine the impact of learner-generated digital materials on engaging students in the process of active learning and higher-order learning skills (Bakla, 2018; Reyna et al., 2021). Therefore, this current study sought to investigate the impact of learner-generated digital materials on students' deep learning approach and self-efficacy.

3. Research Questions

The study aimed to investigate the following research questions:

1. What is the effect of learner-generated digital materials on students' deep learning approach?
2. What is the effect of learner-generated digital materials on students' self-efficacy?

4. Methodology

4.1. Research Design

This study used a quasi-experimental design that involved a pre-test, a post-test, a control group and an experiment group. This design was employed to determine the impact of learner-generated digital materials on learners' deep learning approach and self-efficacy. It can help to reveal any differences before and after introducing the intervention within the group and also consider any prior differences between both groups (Chandra & Sharma, 2007).

4.2. Participants

Fifty one undergraduate students studying "The Principles of Psychology" from a Saudi university were recruited to participate in this study. All the participants in this study were female. Students were at the first level of the university. Twenty-five students participated in the control group and twenty-six students participated in the experiment group. The same instructor taught both groups.

4.3. Procedure

The study was conducted in the course "The Principles of Psychology". The course was conducted over twelve weeks for two credits and taught on campus. The experiment activities were focused on creating digital media on specific topics. The digital media students were required to create mind map or presentations using Canva. Before the experiment, a training session on how to use Canva was provided to the students to ensure that they did not have any difficulty during the design. The experiment consists of four activities that focus on designing digital media for the following topics: the schools of psychology, research methods in psychology, personality and motivation. The participants in both groups were asked to read an article or book chapter related to the lesson before the class. The participants in the experimental group were asked to create digital media that demonstrated what they read. The instructor explained the lesson, demonstrated the digital media created by students and discussed it with them in the class. After the lesson, students modified their digital media according to the feedback they received from the instructor and their peers. Then, they uploaded the final version to blackboard. The participants in the control group were asked to summarise an article or chapter and take notes on what they read. Then, the instructor explained the lesson in the class and the students discussed what they read with the class.

4.4. Data Collection Methods

4.4.1. Deep Learning Approach

The Revised Two-Factor Study Process Questionnaire was used to measure students' deep learning (Biggs et al., 2001). The items were adapted for the target participants of the study. The points used in the five-point scale consisted of 'never' (1), 'sometimes' (2), 'half the time' (3), 'frequently' (4) and 'always' (5). The questionnaire's reliability was examined by calculating Cronbach's alpha. The value of Cronbach's alpha for both pre- and post-measurement was greater than 0.75 which is considered reasonable reliability.

4.4.2. Self-Efficacy Questionnaire

Self-efficacy was measured using a questionnaire developed by Nietfeld, Cao, and Osborne (2006). The selected instrument was designed for undergraduate students studying psychology courses that examined students at the university level (Wang et al., 2022). The number of statement items in the questionnaire is eight. The range of the five-point scale used in this questionnaire starts from 'strongly disagree' (1) to 'strongly agree' (5). The reliability of the questionnaire was assessed using Cronbach's alpha. The value of Cronbach's alpha for both pre- and post-measurement was greater than 0.70 which is considered reasonable reliability.

4.5. Data Analysis

To assess the differences between self-efficacy and deep learning within the group, an independent sample t-test was used to assess the differences between the control and experiment groups. The paired sample t-test was used to examine the differences between the pre- and post- measurement within group.

5. Results

5.1. Research Q1: Differences in Deep Learning Approaches

Table 1 shows no statistically significant difference between the control and experiment groups in the deep learning approach in the pre-questionnaire. After the intervention, the experimental group increased their deep learning approach more than the control group (see Table 1). The paired sample t-test revealed a significant increase in students' deep learning approach [t (25) = -9.95, p <0.001] for students in the experimental group. In terms of the control group, there was no significant development in the deep learning approach between the pre- and post- questionnaires [t (24) = 1.45, p = 0.16].

Table 1. The pre -and post questionnaire of self-efficacy and deep learning approach.

Measurement	Variables	Experimental group		Control group		T-test
		M	S. D	M	S. D	
Pre-questionnaire	Self-efficacy	2.88	0.85	2.96	0.87	0.31
	Deep learning approach	2.75	0.74	2.82	0.94	0.29
Post-questionnaire	Self-efficacy	3.78	0.57	3.10	0.82	3.06*
	Deep learning approach	3.87	0.55	2.74	0.92	5.26**

Note: *p<0.05, **p<0.001.

5.2. Research Q2: Differences in Self-Efficacy

The second research question explored the effect of learner-generated digital materials on the students' self-efficacy. Table 1 compares the pre- and post-questionnaire measures of students' self-efficacy between the two groups. Regarding the pre- questionnaire of student self-efficacy, the independent t-test was employed to examine any pre-difference among groups. The result showed no significant difference in the mean score between the control and experiment groups. In terms of the differences in the post- questionnaire, the t-test revealed a statistically significant difference between the control and experiment groups in favour of the experimental group.

The paired-sample t-test revealed statistically significant improvements in the experimental group between pre- and post- questionnaires for self-efficacy [t (25) = -7.69, p <0.001]. Although the control group showed little increase in the students' self-efficacy, there was no significant development in the students' self-efficacy between the pre-and post- questionnaires [t (24) = -2.01, p = 0.06].

6. Discussion

This study aimed to respond to gaps in the literature related to learner-generated digital materials and their impact on students' deep learning approach and self-efficacy. The first research question looked at the effect of learner-generated digital materials on students' deep learning approaches. The current study found that learner-generated digital materials enhanced students' deep learning approach. One possible explanation for this result is related to the nature of the tasks. This means that employing the creation of digital materials as a learning activity provides opportunities for students to construct knowledge. Students in this learning activity attempted to analyse the content, create and synthesise the ideas and present the information in digital form. This result aligns with Reyna et al. (2016) who found that learner-generated digital materials engage students in the learning process and stimulate some students' higher-order abilities. Lecumberri and Pastor-González (2020) found that engaging learning in creating digital content can enhance students' critical thinking. This implied that learner-generated digital materials help students construct their knowledge. Another possible explanation for this result lies in the process of constructing this learning activity. Students in this study were required to share and discuss their materials in class with teachers and their peers and they had the opportunity to modify them. This means that in-class discussion can provide scaffolding and support activities that encourage students to adopt higher-order thinking skills to modify their digital content. Korhonen, Ruhalahti, and Veermans (2019) found that scaffolding enhances learning. Bakla (2018) found that allowing peers to review learner-generated digital materials helped students engage actively with the subject matter in class. This finding has important implications for designing learning activities related to learner-generated digital materials. During the designing of the learning activity, peer support and teacher scaffolding should be considered to provide a supportive learning environment and engage students in the deep learning process. The second research question explored the effect of learner-generated digital materials on students' self-efficacy. The result showed that the learner-generated digital materials significantly developed students' self-efficacy. The finding of this current study is in line with Bandura's (1997) findings that students increased their self-efficacy because they participated in activities that required them to engage in different processes of designing and reforming their digital materials. An improvement in students' self-efficacy may be related to engaging students in the deep learning process and helping them take responsibility for their learning. Zhu, Lian, and Engström (2020) found that giving students responsibility for their learning and developing confidence in their abilities can enhance students' learning and self-efficacy. According to De Backer, Van Keer, De Smedt, Merchie, and Valcke (2022), designing learning activities that engage students in designing and completing different assignments can stimulate students learning and increase their self-efficacy. This implies that learning activities should be designed to stimulate students' self-efficacy by allowing them to create digital materials for the subject matter which enables them to take responsibility for their learning.

7. Limitations and Future Research

Although this present study confirmed the effect of learner-generated digital materials on students' self-efficacy and deep learning, several limitations need to be considered to develop future research. This study was conducted

only on female students. It was also conducted on students from one general course at the university level. Therefore, future studies should involve male and female participants from different courses. Another limitation is that the study examined only students' self-efficacy and deep learning while further research could cover other aspects. For example, future research could investigate students' critical thinking, digital competence and learning experience. Another limitation is that this current study used only a quantitative method to collect the data. Therefore, future research can employ qualitative methods such as interviews to understand students' learning experiences.

8. Conclusion

Promoting the creation of learner-generated digital materials among undergraduate students showed encouraging results regarding deep learning approaches and self-efficacy. The learner-generated digital materials can engage the students to learn actively, improve their ability to learn deeply and help them take responsibility for their learning. The study also suggests that one of the key factors in effectively employing learner-generated materials is involving teacher scaffolding and peer support to engage students in the deep learning process which is an important implication for designing learning activities related to learner-generated digital materials.

References

Alwafi, E. M., Downey, C., & Kinchin, G. (2020). Promoting pre-service teachers' engagement in an online professional learning community: Support from practitioners. *Journal of Professional Capital and Community*, *5*(2), 129-146. https://doi.org/10.1108/jpcc-10-2019-0027

Bakla, A. (2018). Learner-generated materials in a flipped pronunciation class: A sequential explanatory mixed-methods study. *Computers & Education*, *125*, 14-38. https://doi.org/10.1016/j.compedu.2018.05.017

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Cambridge University Press.

Biggs, J. (1999). What the student does: Teaching for enhanced learning. *Higher Education Research & Development*, *18*(1), 57-75.

Biggs, J., Kember, D., & Leung, D. Y. (2001). The revised two-factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, *71*(1), 133-149. https://doi.org/10.1348/000709901158433

Bong, M., Cho, C., Ahn, H. S., & Kim, H. J. (2012). Comparison of self-beliefs for predicting student motivation and achievement. *The Journal of Educational Research*, *105*(5), 336-352. https://doi.org/10.1080/00220671.2011.627401

Chandra, R., & Sharma, S. (2007). *Research in education*. New Delhi: Atlantic.

De Backer, L., Van Keer, H., De Smedt, F., Merchie, E., & Valcke, M. (2022). Identifying regulation profiles during computer-supported collaborative learning and examining their relation with students' performance, motivation, and self-efficacy for learning. *Computers & Education*, *179*, 104421. https://doi.org/10.1016/j.compedu.2021.104421

Hamilton, J., & Tee, S. (2010). Smart utilization of tertiary instructional modes. *Computers & Education*, *54*(4), 1036-1053. https://doi.org/10.1016/j.compedu.2009.10.009

Han, J., & Geng, X. (2023). University students' approaches to online learning technologies: The roles of perceived support, affect/emotion and self-efficacy in technology-enhanced learning. *Computers & Education*, *194*, 104695. https://doi.org/10.1016/j.compedu.2022.104695

Houghton, W. (2004). *Deep and surface approaches to learning. In L. Willis (Ed.), Engineering subject centre guide: Learning and teaching theory for engineering academics*. Loughborough: HEA Engineering Subject Centre.

Huynh, T. N., Lin, C. J., & Hwang, G. J. (2022). Learner-generated material: The effects of ubiquitous photography on foreign language speaking performance. *Educational Technology Research and Development*, *70*(6), 2117-2143. https://doi.org/10.1007/s11423-022-10149-1

Ke, F. (2014). An implementation of design-based learning through creating educational computer games: A case study on mathematics learning during design and computing. *Computers & Education*, *73*, 26-39. https://doi.org/10.1016/j.compedu.2013.12.010

Korhonen, A. M., Ruhalahti, S., & Veermans, M. (2019). The online learning process and scaffolding in student teachers' personal learning environments. *Education and Information Technologies*, *24*(1), 755-779.

Lecumberri, E., & Pastor-González, V. (2020). *Learner generated digital content: From posters to videos to promote content acquisition in a language class*. Paper presented at the In Five years of ELEUK Conferences: A Selection of Short Papers from 2019. Research-Publishing.

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I—Outcome and process. *British Journal of Educational Psychology*, *46*(1), 4-11. https://doi.org/10.1111/j.2044-8279.1976.tb02980.x

Moon, D. (2020). Learner-generated digital listening materials using text-to-speech for self-directed listening practice. *International Journal of Internet, Broadcasting and Communication*, *12*(4), 148-155.

Nelson Laird, T. F., Shoup, R., Kuh, G. D., & Schwarz, M. J. (2008). The effects of discipline on deep approaches to student learning and college outcomes. *Research in Higher Education*, *49*, 469-494. https://doi.org/10.1007/s11162-008-9088-5

Nietfeld, J. L., Cao, L., & Osborne, J. W. (2006). The effect of distributed monitoring exercises and feedback on performance, monitoring accuracy, and self-efficacy. *Metacognition and Learning*, *1*(2), 159-179. https://doi.org/10.1007/s10409-006-9595-6

Orús, C., Barlés, M. J., Belanche, D., Casaló, L., Fraj, E., & Gurrea, R. (2016). The effects of learner-generated videos for YouTube on learning outcomes and satisfaction. *Computers & Education*, *95*, 254-269. https://doi.org/10.1016/j.compedu.2016.01.007

Pajares, F. (2008). Motivational role of self-efficacy beliefs in self-regulated learning. In B. J. Zimmerman, & D. H. Schunk (Eds.), Motivation and self-regulated learning: Theory, research, and applications. In (pp. 111–140). New York: Erlbaum.

Reyna, J., Hanham, J., Vlachopoulos, P., & Meier, P. (2021). A systematic approach to designing, implementing, and evaluating learner-generated digital media (LGDM) assignments and its effect on self-regulation in tertiary science education. *Research in Science Education*, *51*(6), 1501-1527. https://doi.org/10.1007/s11165-019-09885-x

Reyna, J., Horgan, F., Ramp, D., & Meier, P. (2017). *Using learner-generated digital media (LGDM) as an assessment tool in geological sciences*. Paper presented at the The 11th annual International Technology, Education and Development Conference, INTED2017, Valencia (Spain), March 6th-8th.

Reyna, J., Meier, P., Geronimo, F., & Rodgers, K. (2016). Implementing digital media presentations as assessment tools for pharmacology students. *American Journal of Educational Research*, *4*(14), 983-991.

Sardegna, V. G., Lee, J., & Kusey, C. (2018). Self-efficacy, attitudes, and choice of strategies for English pronunciation learning. *Language Learning*, *68*(1), 83-114. https://doi.org/10.1111/lang.12263

Schuck, S., & Kearney, M. (2008). Classroom-based use of two educational technologies: A socio-cultural perspective. *Contemporary Issues in Technology and Teacher Education*, *8*(4), 394-406.

Sökmen, Y. (2021). The role of self-efficacy in the relationship between the learning environment and student engagement. *Educational Studies*, *47*(1), 19-37. https://doi.org/10.1080/03055698.2019.1665986

Sungur, S., & Kahraman, N. (2011). The contribution of motivational beliefs to students' metacognitive strategy use. *Education and Science*, *36*(160), 3-10.

Vos, N., Van Der Meijden, H., & Denessen, E. (2011). Effects of constructing versus playing an educational game on student motivation and deep learning strategy use. *Computers & Education*, *56*(1), 127-137. https://doi.org/10.1016/j.compedu.2010.08.013

Wang, J., Stebbins, A., & Ferdig, R. E. (2022). Examining the effects of students' self-efficacy and prior knowledge on learning and visual behavior in a physics game. *Computers & Education*, *178*, 104405. https://doi.org/10.1016/j.compedu.2021.104405

Wilson, K., & Narayan, A. (2016). Relationships among individual task self-efficacy, self-regulated learning strategy use and academic performance in a computer-supported collaborative learning environment. *Educational Psychology, 36*(2), 236-253. https://doi.org/10.1080/01443410.2014.926312

Zakariya, Y. F., Nilsen, H. K., Goodchild, S., & Bjørkestøl, K. (2022). Self-efficacy and approaches to learning mathematics among engineering students: Empirical evidence for potential causal relations. *International Journal of Mathematical Education in Science and Technology, 53*(4), 827-841. https://doi.org/10.1080/0020739x.2020.1783006

Zhu, L., Lian, Z., & Engström, M. (2020). Use of a flipped classroom in ophthalmology courses for nursing, dental and medical students: A quasi-experimental study using a mixed-methods approach. *Nurse Education Today, 85*, 104262. https://doi.org/10.1016/j.nedt.2019.104262