BSU International Journal of Humanities and Social Science
Available Online: http://buijhs.journals.ekb.eg/
Online ISSN: 2314-8810 Print ISSN: 2314-8802

"Using the project-based learning model with the mind mapping method to increase the motivation for learning the motor skills course among female students of the College of Early Childhood Education"

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ARTICLE INFO
Received
2024-02-02
Accepted
2024-12-24

KEYWORDS
project-based learning model · Motivation · mind mapping

ABSTRACT
The research aims to identify the effectiveness of Using the project-based learning model with the mind mapping method to increase the motivation for learning the motor skills course among female students of the College of Early Childhood Education
The researchers used the experimental method, as the research sample included (30) female students who were intentionally selected from the program's students. The results showed that concept maps have a positive impact on the level of cognitive achievement and learning motivation for the motor education course.

Introduction:

It is anticipated that students' learning motivation will enhance as they engage in crafts and entrepreneurship courses. (Ernita،2022; Lubis et al., 2018) Teacher pedagogy significantly influences student motivation, as supported by Jamil (2019), Belagra et al. (2018), and Syarif (2013). Teaching practices significantly impact student motivation. Research consistently demonstrates that teachers hold the power to both inspire and discourage students. Vallerand et al. (1990) highlight the crucial role of teachers in fostering student motivation through classroom management and pedagogical choices. Corroborating this, Korpershoek et al. (2015) found a strong correlation between high student motivation and increased learning commitment and confidence, ultimately leading to greater academic success.

Motivation is a cornerstone of learner-centered education. According to expectation theory (Eccles et al., 2016), it stems from students' personal goals and needs. Effective learning is contingent upon motivating students to actively engage in the learning process (Lestari et al., 2018). Intrinsic motivation fosters deeper involvement and enhances overall learning experiences (Vero et al., 2017).

Concept mapping-based learning activities are intended to foster students' cognitive development by providing opportunities to organize and analyze information. This approach is believed to improve language learning outcomes and cultivate critical thinking skills (Hwang et al., 2011; Yu & Wu, 2016, So, Lack of learning motivation significantly hinders meaningful learning and consequently, the development of students' creative thinking (Furmanti et al., 2019). Unfortunately, research indicates low levels of student motivation. Rahman (2004) found that most students exhibited poor motivation, characterized by disengagement and task neglect. Sari et al. (2018) corroborated these findings, reporting low student engagement and subsequently, suboptimal learning outcomes.

Project-based learning is a flexible, learner-centered approach that empowers students to take ownership of their education. Ergül et al. (2014) highlight its role in fostering student autonomy, critical thinking, and information organization. Students become active constructors of knowledge, developing creativity and problem-solving abilities through collaborative learning experiences. Aligning with this, Belagra et al.

(2018) emphasize the model's effectiveness in developing practical skills and achieving desired learning outcomes.

The dynamic nature of today's world necessitates problem-solving and innovative solutions from students. Project-based learning (PBL) offers a promising approach to cultivating these skills. Cakici (2013) emphasizes PBL's ability to equip students with real-world problem-solving capabilities through inquiry, research, and critical thinking. By engaging in authentic projects, students develop a deeper understanding of concepts and actively participate in the learning process. Belagra et al. (2018) further support the motivational aspects of PBL. Given the compelling evidence in favor of PBL, it is imperative to explore its implementation in crafts and entrepreneurship to enhance student motivation.

Research questions

In this study, an educational system was developed that uses the project-based learning model in the mind map style. A quasi-experimental study was also conducted to test the effect

Academic performance and motivation system for university students

To explore their cognitive load during learning activities. The study focused on

The following research questions:

1. Do students who use the mind map project-based learning model outperform those who learn through the traditional method?
2. Do students who use the mind map project-based learning model method have increased motivation to learn compared to students who use the traditional learning method?

Method

This study employed a one-group pre-test-post-test design to examine the impact of project-based learning on students' motivation. Thus, the community targets all 35 students of the kindergarten teacher preparation program for the English language section, Beni-suef University, and creativity consisting of 30 students was selected. Learning motivation was assessed by comparing pre- and post-implementation using the Wilcoxon signed-rank test for significant differences.

Students' learning motivation was assessed using a questionnaire. The resulting ordinal data were converted into interval data through the interval successive method (MSI) for subsequent analysis.

To determine the impact of project-based learning on student motivation, a Wilcoxon test was conducted at a significance level of $\alpha = 0.05$. The null hypothesis was that there is no difference in learning motivation before and after the intervention. Conversely, the alternative hypothesis posits a significant difference in motivation levels.

Experimental procedure

Prior to the learning intervention, all participants completed a pretest to measure, Upon course completion, participants were administered a questionnaire to assess motivation and cognitive load.

Measuring tools:

This study employed a posttest and a survey to assess learning motivation and cognitive achievement. To establish a baseline, participants completed a pretest measuring their understanding of the motor education course and cognitive abilities before commencing the learning activities. Both the pre-test and post-test consisted of 20 multiple-choice questions aligned with course content, with scores ranging from 0 to 10.

Keller's (1987) ARCS model—comprising attention, relevance, confidence, and satisfaction—informed our assessment of learning motivation. The learning motivation survey was adapted from the Instructional Materials Motivation Survey (IMMS), which operationalizes the ARCS model (Keller, 2010). This instrument has been validated in multiple studies investigating technology as a motivational factor (Di Serio et al., 2013).

The motivation and cognitive load questionnaires were adapted from previously published research. The original measures reported Cronbach's alpha values of .88, .83, .89, and .92 for the respective dimensions, and a total scale reliability of .96, indicating excellent internal consistency of the learning motivation survey.

The cognitive load questionnaire was adapted from Hwang et al. (2013). The original instrument reported Cronbach's alpha coefficients of .84 and .86 for the mental load and mental effort dimensions, respectively, demonstrating high internal consistency and reliability in measuring students' cognitive load.

The motivation test comprised 36 five-point Likert scale items. Twelve items assessed the attention dimension (e.g., "These learning materials appeal to me"), nine items measured relevance (e.g., "This course is not

relevant to my requirements, as I already know the majority of it [reversed]"), and nine items evaluated confidence (e.g., "When I first started taking classes, I was under the impression that this would be quite easy for me").

Results and Discussion

Learning achievement

To examine the impact of two different learning methods on students' academic performance, a one-way ANCOVA was conducted. Pretest scores served as a covariate, while the learning method was the independent variable, and posttest scores represented the dependent variable.

First, A homogeneity of regression test was conducted prior to the ANCOVA and revealed no violations of the assumption ($F = 0.19$, $p > .05$). The ANCOVA results, presented in Table 1, indicate a significant difference between the two learning groups ($F = 18.114$, $p < .001$, $\eta^2 = .29$).

Table 1 Results of an ANCOVA on students' learning achievements

Data Group	Mean	SD	F
Experimental group	60.21	12.36	18.47*
Control group	48.51	14.18	

*p<0.001

Table 2 Results of a t test of the motivation of the students in the two groups

	Data Group	Mean	T
Motivation	Experimental group	4.26	2.61
	Control group	4.40	

*p<0.05

Adjusted posttest mean scores for the experimental and control groups were 60.21 (SD = 12.36) and 48.51 (SD = 14.18), respectively. These results indicate that AR-based learning significantly enhanced student learning outcomes.

Motivation to learn

A t-test revealed a significant difference in learning motivation between students exposed to project-based learning with mind mapping and those taught using traditional methods ($t = 2.614$, $p < .05$). The experimental group exhibited higher mean motivation ($M = 3.54$, $SD = 0.48$) compared to the control group ($M = 3.22$, $SD = 0.43$). These

findings indicate that project-based learning with mind mapping effectively enhanced student motivation.

Table 3 presents descriptive statistics for the four motivation scales. The experimental group consistently outperformed the control group on all subscales. Independent t-tests were used to examine the effect of the project-based learning model with the mind mapping method on each dimension.

Table 3 Results of a t test of the four subscales of learning motivation for the two groups

Variable and source	Data Group	Mean	SD	T
Attention	Experimental group	4.29	0.74	3.42*
	Control group	4.11	0.64	
Confdence	Experimental group	3.78	0.67	2.78
	Control group	3.36	0.63	
Satisfaction	Experimental group	4.05	0.54	2.18
	Control group	3.97	0.33	
Relevance	Experimental group	4.24	0.48	2.89*
	Control group	4.38	0.42	

*p<0.05, **p<0.01

Table 4 Results of a t test of the Cognitive achievement of the two groups

Variable and source	Data Group	Mean	SD	T
Cognitive achievement	Experimental group	18.45	0.98	-3.51*
	Control group	11.31	1.21	

*p<0.05

Discussion

This study aimed to enhance motivation and knowledge acquisition in motor skills among female early childhood education students through a novel mind map-based project-based learning system. Our findings indicate that this approach significantly improved students' learning performance, motivation, and cognitive outcomes in the course.

Drawing on Lin and Hwang's (2018) work, this study employed a mind map-based project-based learning model to enhance student motivation. Observations revealed that students were more engaged in pre-class learning activities. This approach offers dual benefits: it optimizes cognitive learning by allowing for independent listening practice and collaborative speaking during class, while simultaneously boosting

motivation.

Previous research by López-Belmonte et al. (2020) and Arifn et al. (2022) suggests that most studies have focused on teaching effective technology use within simulated environments, often overlooking diverse student populations. Additionally, Mokmin & Rassy (2022a) and Anuar et al. (2021) highlight AR's potential to increase student motivation.

Previous research, such as López-Belmonte et al. (2020) and Arifn et al. (2022), indicates that most studies have concentrated on teaching effective technology use within simulated settings, often neglecting the needs of diverse learners. Furthermore, Mokmin & Rassy (2022a) and Anuar et al. (2021)

Researchers attribute the enhanced learning outcomes to the nature of concept maps, which facilitate long-term retention and recall. This aligns with Sasked's findings that concept maps improve long-term learning by clarifying key ideas. By reviewing academic material through concept maps, the experimental group demonstrated sustained cognitive achievement, as evidenced by follow-up measurements.

Sensory stimulation enhanced students' concentration, aligning with the findings of Fouad Abu Hatab, Sayed Muhammad Khairallah, and Aziz Hanna Daoud (1988) who emphasized the positive impact of multisensory learning.

Conclusions:

Based on the research methodology, sample population, available resources, and considering the limitations, assumptions, tools employed, and research procedures, statistical analysis led to the following conclusions:

"The project-based learning model, integrated with mind mapping, significantly enhances cognitive achievement and motivation in motor skills among early childhood education students".

Recommendations:

- Conduct a study to investigate the effectiveness of the concept mapping strategy in teaching other subjects.
- Undertake similar studies on diverse student populations across different educational levels.

- Revise the motor skills textbook to incorporate concept maps that facilitate students' comprehension of concepts, identification of relationships between them, and organization of knowledge within their cognitive frameworks, thereby promoting meaningful learning.
- Provide training for female student teachers on the creation of concept maps.

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