International Journal of Educational Research and Studies
www.multidisciplinaryarticle.org
Online ISSN: 2664-6811, Print ISSN: 2664-6803
Received: 06-11-2023, Accepted: 22-11-2023, Published: 07-12-2023
Volume 5, Issue 2, 2023, Page No. 52-56

Comparing the influence of PBL active instructor monitoring and PBL passive instructor monitoring on students' database design acquisition in a physical education distance learning course

Maria Giannousi, Charalampos Liakos, Nikolaos Vernadakis, Efthimis Kioumourtzoglou
Department of Physical Education and Sports Science, Democritus University of Thrace, University Campus, Komotini, Greece

Abstract
The purpose of this study was to compare two approaches to instructor monitoring, active and passive, regarding the learning of relational database design in a problem-based distance learning course at Democritus University of Thrace. Fifty-four (n=54) third-year undergraduate Physical Education students, aged between 20-21 years old, were randomly assigned to two instructor monitoring groups: a PBL active instructor monitoring group comprising 27 students and a PBL passive instructor monitoring group with 27 students. The instructional period, practical exercises (activities), and tests lasted six consecutive weeks, including five 90-minute instructional sessions for learning relational databases (LibreOffice Base 6.4). At the end of the experimental process, students underwent a knowledge test as the final measurement. An independent sample t-test analysis was conducted to investigate the hypothesis that students who received PBL active instructor monitoring would achieve higher knowledge scores than students in the PBL passive instructor monitoring group. The analysis revealed that both instructor monitoring approaches, PBL active and PBL passive, could be effective for teaching relational database design. Specifically, students engaged in PBL activities with active instructor monitoring demonstrated similar knowledge acquisition compared to students who received PBL passive instructor monitoring in the posttest. To comprehensively understand the underlying reasons for this finding, additional studies are recommended.

Keywords: Problem-based learning, instructor monitoring, distance learning, database, physical education

Introduction

Interactivity within distance learning courses encompasses both student-student and student-instructor communication (Chou, 2003 [1]; Thurmond &Wambach, 2004) [2]. The quality of students' responses in discussions may be influenced by factors such as instructor feedback and the quantity of discussion posts. An, Shin, and Lin (2009) [3] found that instructors' discussion posts providing encouragement or constructive feedback led to heightened discussion activity. Nevertheless, an excess of instructor interaction was associated with a reduction in peer-to-peer communication.

Student-instructor interaction encompasses various forms of communication, including email, discussion posts, meetings, lectures, and feedback on papers. It is considered a pivotal factor in student satisfaction in online courses, particularly when paired with prompt instructor feedback. A strong connection with the instructor often leads to greater student contentment with the course, and this interaction has been linked to student success (Tayebinik & Puteh, 2013) [4].

Research by Trujillo *et al.* (2014) [5] demonstrated that pharmaceutical students performed better on evaluation questions after engaging in instructor-directed learning during online discussions about case studies. This method involved more written assignments, offering students practice for the written portion of exams. The guidance provided through instructor-directed learning was consistent and covered all necessary information.

However, contrasting findings were presented by Bye, Smith, and Rallis (2009) [6], who compared satisfaction and achievement in online discussions where students interacted with peers versus receiving one-time feedback from the instructor. Students in the online discussion group, where they engaged in reflective conversations about readings, rated their mastery of course objectives higher. In contrast, the control group, which submitted hard copies of reflections to the instructor, had more limited communication. The instructor provided written feedback, and students were unable to discuss their papers with the instructor. While both groups achieved similar course grades, the discussion group had the advantage of expressing views, engaging in conversations with peers, and seeking ways to improve their papers.

The outlined research underscores the crucial role of student-instructor interaction as a fundamental component in effective distance learning courses. Student satisfaction with the course is closely linked to the perceptible presence of the instructor (Tayebinik & Puteh, 2013 [4]; Nandi, Hamilton & Harland, 2012) [7, 18]. However, finding the right balance in instructor presence is imperative, as both too little and too much can result in decreased levels of student participation, potentially impacting overall achievement (Gerber, Scott, Clements & Serena, 2005 [8]; Hagenauer &Volet, 2014) [9].

Key findings highlight that students express a preference for instructors who showcase subject matter expertise, possess strong communication skills, and convey empathy (Bender, 2012 [10]; Sanchez, Martinez-Pecino & Rodriguez, 2011) [11]. Notably, the type of instructor interaction should be adaptable, changing based on the specific needs of students (Esjeholm & Bungum, 2013 [12]; Muller, 2014) [13]. This can encompass various forms such as providing feedback and guidance, prompting higher-order responses, and sharing personal anecdotes (Imlawi, Gregg & Karimi, 2015) [14].

In conclusion, these studies emphasize the critical significance of student-instructor interaction in online learning, suggesting a positive impact on student satisfaction, success, and the mastery of course objectives. However, there is a call for further research to determine optimal levels of support and affect that contribute to higher teaching and learning quality in the realm of distance education.

Therefore, the purpose of this study was to compare two instructor monitoring approaches, active and passive, on learning relational database design in a problem-based distance learning course at the Democritus University of Thrace. The objectives of this study are geared towards offering valuable guidance for instructors engaged in delivering distance learning courses, with a particular focus on physical education undergraduate students. The aim is to illuminate the most effective forms of student-instructor interaction, thereby supporting educators in improving the overall quality of teaching within the context of web-based courses. The research question guiding this study was the following:

1. Is there a difference in relational database proficiency among physical education students who undergo active instructor monitoring compared to those who receive passive instructor monitoring in a problem-based distance learning course?

Methods

Participants

This study included fifty-four (54) third-year students from the Department of Physical Education and Sport Science at Democritus University of Thrace. The participants, aged between 20 and 21 years (M=20.5, SD=.504), consisted of 31 males (57.4%) and 23 females (42.6%). They were enrolled in the 334–New Technology in Health course during the spring semester of 2020. The students were randomly assigned to two instructor monitoring groups: an active group comprising 27 students (15 males and 12 females) and a passive group with 27 students (16 males and 11 females). Before the assignments, participants were briefed on the study's purpose, their assigned experimental group, the teaching method, and their participation requirements. Although all students in the two classes were invited to participate, the procedures differed for the two course delivery formats. Each student provided voluntary consent to participate, with the assurance that their involvement would not impact their grades.

Instruments

A knowledge test developed by Giannousi, Liakos, Vernadakis & Derri (2023) [15] was used to assess students' learning in relational databases (LibreOffice Base, 6.4). The knowledge test included 20 multiple-choice questions. The questions included in the questionnaire were categorized into one of the following 5 categories: a) familiarity with the working environment (2 questions), b) creating tables and entering data (4 questions), c) creating relationships between tables (4 questions), d) creating queries (4 questions), and e) creating reports (4 questions). Each question presented five options to minimize the probability of guessing. Correct answers on the questionnaire were assigned a score of (1), while incorrect answers received no score (0). The knowledge test questionnaire demonstrated a Cronbach's alpha reliability coefficient of .77.

Procedure

In this study, 54 third-year students underwent a knowledge test as a final measurement, irrespective of group design. The instructional period, practical exercises (activities), and tests spanned six consecutive weeks, comprising five 90-minute instructional sessions focused on learning relational databases (LibreOffice Base 6.4).

Classes were conducted through the eClass Learning Management System, providing students access to their courses by logging into the system. Various tools, such as email, discussion boards, assignments, tests, web links, and groups, were employed in alignment with instructors' strategies and course objectives. The facilitator, a full-time instructor in computer technology for physical education, had access to each class section and established a standardized set of assignments, tests, groups, and links within the eClass Learning Management System. A dedicated folder on each class section's home page contained links to these resources.

An introductory email was sent to all students, outlining the study's purpose and tasks to be completed, with the facilitator addressing any queries. Students were grouped based on course sections, with one group assigned a PBL activity with active instructor monitoring and the other a PBL activity with passive instructor monitoring. The PBL activity, guided by research (Hmelo-Silver, 2004) [16], involved an ill-structured problem, necessitating collaborative problem-solving within small groups facilitated through discussion boards, chat rooms, file exchange, and email.

In the active instructor monitoring group, students determined types of information to include in the database, identified fields for tables, and established relationships between tables. Guided questions aided in creating primary keys (unique identifiers) and utilizing foreign keys to link tables. The facilitator actively monitored discussions, posed questions, and provided clarifications as needed.

During the five instructional sessions, each student in the active monitoring group received up to five email messages from the facilitator, offering general encouragement and feedback on completed work. Examples included prompts to participate in group discussions or acknowledging good contributions to discussions.

In the passive instructor monitoring group, students were also assigned to groups, received the same PBL activity, and utilized the discussion tool within their groups to work on the activity. They were expected to design a relational database, received guided questions, and had five weeks to complete the assignment. However, in this treatment, no additional feedback was provided during the five instructional sessions, and no email messages were sent by the facilitator.

At the end of the experimental process, students were given a knowledge test as a final measurement.

Statistical analysis

The experiment was a factorial design with instructor monitoring groups (active, passive) as independent variable, and knowledge acquisition as dependent variable. Independent samples t-test analysis was conducted to investigate the differences of knowledge acquisition among the instructor monitoring groups (active, passive) of the participants. The hypothesis of this study was:

H01: Students who receive PBL activity with active instructor monitoring will have higher knowledge achievement than students in the PBL activity with passive instructor monitoring group.

Results

An independent samples t-test was applied to examine the H01 hypothesis that students who receive PBL activity with active instructor monitoring will have higher knowledge achievement than students in the PBL activity with passive instructor monitoring group. The homogeneity of variance was checked using the Levene's test, and the normality of the sample was assessed with the Shapiro-Wilk test. The level of significance for measurements was set at ($p < 0.05$). The analysis revealed that the use of PBL instructor monitoring (active, passive) during distance courses has a no significant impact on the knowledge acquisition of undergraduate students, $t_{(52)} = .526$, $p = .601$, $d = .143$. Online students implementing the PBL active instructor monitoring (M = 12.9, SD = 3.07) showed similar knowledge achievement compared to online students who receive PBL passive instructor monitoring (M = 12.4, SD = 3.14). Therefore, the use of PBL instructor monitoring (active, passive) during distance courses did not affect the knowledge acquisition of online students. In Table 1, the mean value (M), standard deviation (SD), and the t-value with the corresponding level of significance are presented in detail.

Table 1: Mean scores and standard deviations of knowledge acquisition for the PBL active instructor monitoring and PBL passive instructor monitoring.

Variable	PBL active instructor monitoring (n=27)		PBL passive instructor monitoring (n=27)			
	M	*S.D.*	*M*	*S.D.*	*t*	*p*
Knowledge acquisition	12.9	3.07	12.4	3.14	.526	.601

According to the results, the H01 hypothesis, which suggested that students who receive PBL activity with active instructor monitoring will have higher knowledge achievement than students in the PBL activity with passive instructor monitoring group, is not supported. Therefore, undergraduate students who received PBL active instructor monitoring during the intervention did not gain more knowledge acquisition from their participation in the distance learning course compared to undergraduate students who receive PBL passive instructor monitoring (Figure 1).

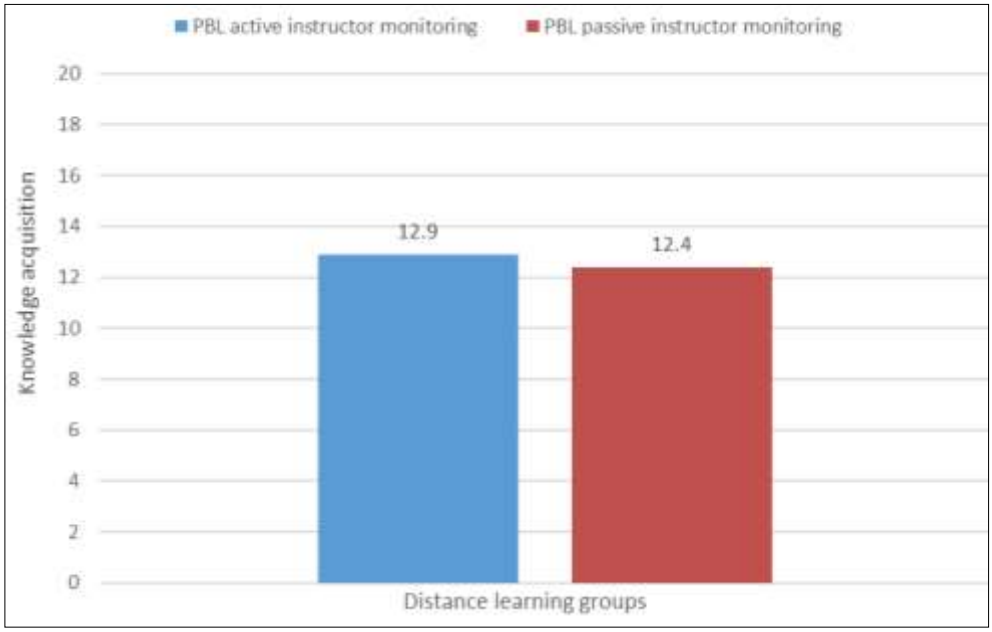

Fig 1: Mean scores of the distance learning groups (PBL active instructor monitoring, PBL passive instructor monitoring) in knowledge acquisition.

Discussion

The highlighted research emphasizes the fundamental importance of student-instructor interaction in successful distance learning courses. Student contentment with the course is significantly associated with the noticeable engagement of the instructor (Tayebinik & Puteh, 2013 [4]; Nandi, Hamilton & Harland, 2012) [7, 18]. Striking a balance in instructor presence is crucial, as an excess or deficiency can lead to reduced student participation, potentially affecting overall academic performance (Gerber, Scott, Clements & Serena, 2005 [8]; Hagenauer & Volet, 2014) [9]. Therefore, the purpose of this study was to contribute to the distance learning literature by comparing two instructor monitoring approaches, PBL active instructor monitoring and PBL passive instructor monitoring, for teaching the complexities of relational database design within a distance learning course at the Democritus University of Thrace. To address this objective, a specific question was formulated and investigated, and the study's findings regarding this question are discussed below.

The research question focused on whether there could be differences in the proficiency of relational database among physical education students who participated in PBL active instructor monitoring compared to those who attended PBL passive instructor monitoring. The data from this study appeared to support the hypothesis that participants exposed to PBL active instructor monitoring environment would have higher knowledge performance than students in PBL passive instructor monitoring environment.

The results of this study indicated that both instructor monitoring approaches, PBL active and PBL passive, could be effective for teaching relational database design. Specifically, students engaged in PBL activities with active instructor monitoring demonstrated similar knowledge acquisition compared to students who received PBL passive instructor monitoring in the posttest.

Nevertheless, students who underwent active instructor monitoring with PBL activities demonstrated slightly higher scores on the posttest compared to those who experienced passive monitoring. Even though students in the PBL activities with passive monitoring did not receive email messages, they still benefited from interactions between the instructor and students within the PBL activity. These students performed similarly on the posttest to those assigned active instructor monitoring. The feedback provided through coaching and scaffolding within online discussions contributed to the comparable performance of the two groups.

While numerous authors mention that student-instructor interaction is crucial for the success of distance learning courses (Bye, Smith & Rallis, 2009 [6]; Blignaut & Trollip, 2003 [17]; Nandy, Hamilton & Harland, 2012), few studies have systematically measured its impact. Blignaut and Trollip (2003) [17] attempted to create a taxonomy of interactions by analyzing the types of instructor posts. Garrison, Anderson & Archer (2010) [19] discovered that cognitive and teaching presence, where instructors encouraged deeper levels of critical thinking, led to greater student satisfaction in courses. Additionally, research suggests that both the type and quantity of instructor interaction play a significant role in student satisfaction (Gerber, Scott, Clements & Serena, 2005 [8]; Hosler & Arend, 2012) [20].

Nonetheless, there is a scarcity of research that directly correlates student success on tasks with specific types of instructor interaction. Further investigation is required to ascertain the optimal level and type of instructor interaction for fostering student success in distance learning courses. Evidently, in this study, the type and frequency of feedback proved effective in enhancing student learning. While instructor feedback within the PBL activity facilitated successful completion of tasks, feedback in the PBL active instructor monitoring did not offer additional assistance in cognitive performance. To wield a greater impact, instructors must analyze student needs, offer scaffolding, and stimulate critical thinking through student-instructor interactions.

Conclusions

In this study, the impact of instructor feedback (active instructor monitoring) on knowledge achievement appeared limited. The specific nature of instructor feedback in Problem-Based Learning warrants further exploration. This study solely assessed whether the instructor provided feedback or not, while previous research (Gerber, Scott, Clements, & Serena, 2005) [8] has indicated that an excess of feedback can be as detrimental as receiving no feedback at all. The provision of praise, scaffolding, guidance, and constructive criticism should be examined in conjunction with the method of instruction. Students seeking reassurance in the correctness of their answers may benefit from constructive feedback or praise, while those aiming for independent problem-solving may prefer a simple acknowledgment or no feedback. Tailoring the type of feedback appropriately has the potential to enhance student learning, thereby improving performance on activities and tests.

References

1. Chou C. Interactivity and interactive functions in Web-based learning systems: A technical framework for designers. British Journal of Educational Technology,2003:34(3):265–279.
2. Thurmond VA, Wambach K. Understanding interactions in distance education: A review of the literature. Journal of Instructional Technology and Distance Learning,2004:1:9–33.
3. An H, Shin S, Lim K. The effects of different instructor facilitation approaches on students' interactions during asynchronous online discussions. Computers & Education,2009:53(3):749–760.
4. Tayebinik M, Puteh M. Does greater participation in online courses lead to passing grade? An EFL learning context. British Journal of Educational Technology,2013:44(6):199–202.
5. Trujillo JM, Saseen JJ, Linnebur SA, Borgelt LM, Hemstreet BA, Fish DN. Impact of student- versus instructor-directed case discussions on student performance in a pharmacotherapy capstone course. American Journal of Pharmaceutical Education,2014:78(3):1–8.
6. Bye L, Smith S, Rallis HM. Reflection Using an Online Discussion Forum: Impact on Student Learning and Satisfaction. Social Work Education,2009:28(8):841–855.
7. Nandi D, Hamilton M, Harland J. Evaluating the quality of interaction in asynchronous discussion forums in fully online courses. Distance Education,2012:33(1):5–30.
8. Gerber S, Scott L, Clements DH, Sarama J. Instructor Influence on Reasoned Argument in Discussion Boards. Educational Technology Research & Development,2005:53(2):25–39.
9. Hagenauer G, Volet SE. Teacher-student relationship at university: an important yet under-researched field. Oxford Review of Education,2014:40(3):370–388.
10. Bender T. Discussion-based online teaching to enhance student learning. (2nd ed). Sterling, Virginia: Stylus, 2012.
11. Sanchez MM, Martinez-Pecino R, Rodriguez YT. Student perspectives on the university professor role, Social Behavior and Personality,2011:39(4):491–496.
12. Esjeholm B, Bungum B. Design knowledge and teacher-student interactions in an inventive construction task. International Journal of Technology and Design Education,2013:23:675–689.
13. Muller HL. A grounded practical theory reconstruction of the communication practice of instructor-facilitated collegiate classroom discussion. Journal of Applied Communication Research,2014:42(3):325–342.
14. Imlawi J, Gregg D, Karimi J. Student engagement in course-based social networks: The impact of instructor credibility and use of communication. Computers & Education,2015:88:84–96.
15. Giannousi M, Liakos C, Vernadakis N, Derri V. The Impact of problem-based learning versus structured online tutorials on students' database design acquisition

in a physical education distance learning course. International Journal of Educational Research and Studies,2023:5(2):47–51.
16. Hmelo-Silver CE. Problem-based learning: What and how do students learn? Educational Psychology Review,2004:16(3):235–266.
17. Blignaut A, Trollip SR. Measuring Faculty Participation in Asynchronous Discussion Forums. Journal Of Education for Business,2003:78(6):347–353.
18. Nandi D, Hamilton M, Harland J. Evaluating the quality of interaction in asynchronous discussion forums in fully online courses. Distance Education,2012:33(1):5–30.
19. Garrison D, Anderson T, Archer W. The first decade of the community of inquiry framework: A retrospective. Internet & Higher Education,2010:13(1/2):5–9.
20. Hosler KA, Arend BD. The importance of course design, feedback, and facilitation: student perceptions of the relationship between teaching presence and cognitive presence. Educational Media International,2012:49(3):217–229.