



Development of Problem-Solving Skill by Project-Based Learning in Physical Therapy Students, Mae Fah Luang University

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Received June 29th, 2022

Accepted July 13th, 2022

Published July 21st, 2022

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ABSTRACT

Introduction: Project-based learning is a classroom approach that based on the problems or questions that allows student to work together on a project. The engagement of the student in the investigation of problems could help student to develop problem - solving skill which could be applied in physical therapy in sports course. Therefore, this study hypothesized that the use the project-based approach in physical therapy in sports course could improve problem-solving skill in physical therapy student.

Objective: To evaluated the effect of project-based learning on problem-solving skill in physical therapy in sport course.

Methods: Students worked on the athletes to identify the problem and then did the searching and concluded the all of the data for planning and constructed the project. The problem-solving skill will be evaluated on the first and final week. The satisfaction survey of this course was taken by the students after the project by the university system.

Results: The problem-solving skill is significantly improved by project-based learning in physical therapy in sports course and the satisfaction after this course was in high satisfaction level.

Conclusion: The project-based learning in physical therapy in sports improved the problem-solving skill of the physical therapy students in this course.

Keywords: *problem-solving skill, project-based learning, physical therapy in sports*

Introduction

Project-based learning is the learning through the project. The projects-based learning is consisted of complex tasks. It is involved the demanding the questions or problems that give the students a chance to develop the problem-solving, decision making and allow students to work together to work continuously through the project and present the work in the classroom (1–3). The student will find the solutions for the questions or problems that cause the problem-solving process especially in the process of the project-based learning together in a group that requires lots of skills more than problem-based learning.

The physical therapy in sport course includes the physical therapy management in athlete pre, during, and post even; assessing, diagnosing sport injury; physical

therapy and rehabilitation; promoting physical fitness and preventing sport injury; adhesive taping, providing the knowledge regarding exercise, principles of nutrition for athlete training; contraindications and danger stimulants and addictive substance using; procedure of transferring the injured athletes and sport for the handicapped. Moreover, this course is focused on experience learning. Therefore, the project-based learning is one of the learning procedures which could facilitate student in experiencing learning, working together as a team, develop the ability of problem-solving skill. Furthermore, the previous studies showed that the project-based learning demonstrated some development in self-directed learning skill and also 21st century skill that include the problem-solving skill (4,5) due to the student could create knowledge by themselves

by designing planning performing on a project that facilitate the problem-solving skill. Therefore, for promoting the problem solving-skill, this study hypothesized that project-based learning in physical therapy course could improve problem-solving skill in physical therapy student.

Methodology

This study recruited the physical therapy student 4th year who enrolled in physical therapy in sport course year 2019 and 2020.

Outcomes measurement

Problem-solving measurement by questionnaire that developed by the content of bloom's taxonomy. The questionnaire has strong agreement from 3 lecturers.

The questionnaire was in rubric scores that had four items totally 16 points. It is consisted of the ability to state the problems of the athlete, the ability to create exercise /program and find the reference following the athlete's problems by thinking critically and the ability to analyze, synthesis and evaluate of the relevant information to solve the athlete problems, the ability to perform exercise/program following the athlete's problems. The scores criteria have 4 scores including excellent (4) which is the ability to do the task 90-100%, superior (3) which is the ability to do the task 70-89%, satisfaction (2) which is the ability to do the task 50-69%, need improvement (1) which is the ability to do the task less than 50%.

Procedures

Student set into 4 groups in year 2019 and 5 group in 2020 the problem-solving skill evaluated by questionnaire first week and final week of the project. The student had worked in a project for 8 weeks. There were 5 activities throughout the project which were define the athlete's problems, Data collection and finding the related topic following the problems, project planning , project construction, project presentation.

Statistical analysis

Descriptive statistics showed the score for the first and final week. The Wilcoxon signed-rank test was used for testing the difference between first and final week. The p-value set at ≤ 0.05 .

Results

The result of the activities shown in table 1.

Table 1 demonstrated the learning procedure through the project-based learning

Activities	Result
1. Define the athlete's problem	Student were learning from real situation and define the athlete's problem
2. Data collection and research the related topic following the problem	Student shared knowledge and discussed with group member and lecturer
3. Project planning	Student planned activities and project together
4. Project construction	Student constructed the project and submitted work through google classroom
5. Project presentation	Student presented the project to the class

The students who enrolled in physical therapy in sport course in year 2019 (N = 54) had the score of problem-solving skill of 9.07 ± 1.24 (mean $\pm$ SD) for the first week and 14.00 ± 1.01 for the week.

The data were not distributed normally. The Wilcoxon signed-rank test was used to evaluated the difference between first and final week of project-based learning. The result in Figure 1 showed the significantly improvement of problem-solving after project-based learning ($p = 0.00$).

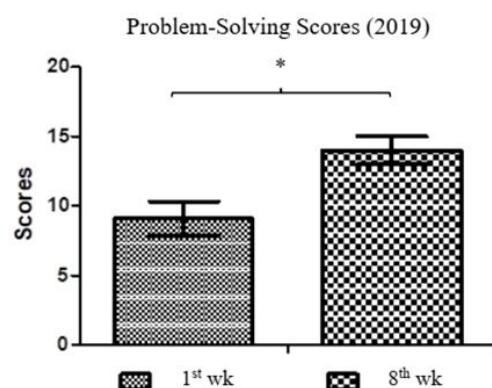


Figure 1 showed the difference between the scores of problem-solving skills in first week and final week

* Show statistically significant difference ($p \leq 0.05$)

The students who enrolled in physical therapy in sport course in year 2020 (N = 50) had the score of

problem-solving skill of 13.90 ± 0.92 (mean $\pm$ SD) for the first week and 14.60 ± 1.21 for the final week.

The data were not distributed normally. The Wilcoxon signed-rank test was used to evaluate the difference between first and final week of project-based learning. The result in Figure 2 showed the significantly improvement of problem-solving skill after project-based learning ($p = 0.00$).

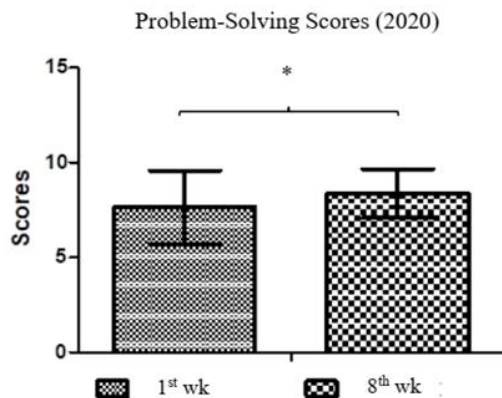


Figure 2 showed the difference between the scores of problem-solving skills in first and final week

* Show statistically significant difference ($p \leq 0.05$)

Satisfaction scores of physical therapy in sport course from the student showed high satisfaction level at 4.8/5 in 2019 and 4.7/5 in 2020.

Discussion

This study demonstrated that the project-based learning significantly improved the problem-solving skill through the process of project-based learning which facilitate the student to carefully indicated the problem and searching all of the solution and systematically working in the activities in a group by their own interests (1,6–9). In order to complete the activities, the student developed the interpersonal skill, computer skill, problem-solving skill, physical therapy skill. Therefore, the student could create the solution for athletes according to their problems which was similar to the previous study that showed the improvement in problem-solving skill in nursing student (10). Moreover, the project-based learning helped students to integrated the knowledge and improve the skill in main competences in engineer students (11). From the learning process of the project-based learning, it could one of the factors that affected the motivation in the student (12).

The project-based learning took a long time to completed the activities. The teaching plan and the amount of other homework in the course should not be too much for the students, otherwise the students could not received the benefit from the project-based learning. The satisfaction level could reflect the appropriate

amount of the work and time from the student which was high satisfaction level in this study.

The project-based learning could be applied to other physical therapy courses which focused on the problem-solving skill, interpersonal skill, computer skill, physical therapy skill. However, this learning style take a lot of time to do the project, the project and the time should be considered appropriately.

Conclusion

The project-based learning in physical therapy in sports improved the problem-solving skill of the students in this course.

Limitations of this study

This study did not provide the data of validity and reliability of the questionnaires. It was the agreement of the lecturer based on the bloom's taxonomy. Therefore, the further study should investigate the validity and reliability of the questionnaires.

Competing Interests

The authors report no declarations of interest.

Funding

This research was supported by MLII - MFU Learning Innovation Institute.

Acknowledgements

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author contributions

Author 1 conceived and designed the analysis, collected the data, contributed data or analysis tools, performed the analysis and wrote the paper.

Author 2 conceived and designed the analysis, contributed data or analysis tools, performed the analysis.

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