

Physical Education Teacher's Comprehension of the Principles of Biomechanics and Its Application in Learning

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Abstract—The main purpose of this determination was to show the level of knowledge and understanding of physical education teachers in applying the principles of biomechanics in physical education learning in junior high schools. This study used a survey method with 33 state junior high school physical education teachers in the city of Cimahi, Indonesia, as the respondents. The data collection techniques used were semi-structured interviews. The results showed that 81.8% of physical education teachers did not understand the principles of biomechanics, thus the implementation of physical education learning in schools did not apply the principles of biomechanics. This happened because almost all physical education teachers take for granted the biomechanics as an important aspect in physical education. The conclusion of this article paper is that the principles of biomechanics are very important to be understood by physical education teachers. For physical education learning, cognitive comprehensive is boasted on by students about how to move effectively and efficiently.

Keywords: *biomechanics, physical education, teaching, sport science*

I. INTRODUCTION

Physical fitness is an important part to do the various activities. Physical education subjects at school has goal at helping students to understand how to maintain fitness, develop muscle strength, improve cardiovascular health and adopt a healthy lifestyle. Children especially boys who were performing at regular physical activities had better quality of life in terms of physical health and social functions [1]. A broad understanding of the motion activities that should be done by junior high school students is needed.

Knowledge of concepts provides a firm basis upon which students can make intelligent choices about the sports in which they would like to participate. This knowledge, in turn, facilitates the learning of new activities [2]. This opinion firm, the importance of students to understand the concept of motion in physical education, so that when doing a task of motion no longer makes mistakes. It is high time for physical education teachers in junior high schools to introduce the principles of biomechanics of motion. The teaching of physical education in many schools is based on a sporting model. This

model focuses largely on the acquisition and performance of skills in a multi activity curriculum organized mostly around team games, taught with a limited range of teaching approaches most of which are formal, didactic and teacher centred [3]. The physical education curriculum in junior high school, discusses various kinds of motion in sports, such volleyball, running, how to dribble in basketball and so on. Findings of the study indicated that student's interest in biomechanics and their cumulative grade point average were relatively strong variables in learning [4]. This approach to teaching biomechanics has been a welcome change to the instructor. It allows for more interaction with the students and reduces overall time spent on lecture by requiring the students to prepare content outside of classroom and learn by doing in the classroom [5].

Other research claimed, biomechanics is the most important part of physical education and sports and playing a great role in this field. It helps a coach to give a proper training for athletes if we ignore the concept of biomechanics, we can't give a proper training to athletes and their skills will not be improved [6]. The research proves the importance of biomechanics in physical education learning.

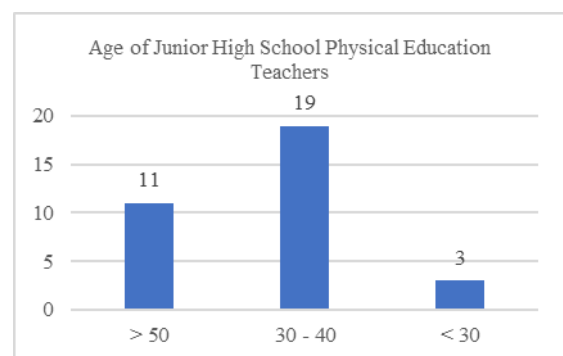


Fig. 1. Age of junior high school physical education teachers.

There are still many physical education teachers who do not understand the concept of biomechanics in physical education. Physical Education teachers do not recognize the substance content of biomechanics, whereas motion analysis is a basic part of biomechanics qualitatively and quantitatively. The

results of the study said the existence of misconceptions in sports biomechanics in prospective sports teachers. With the emergence of misconceptions, it is expected that there is a grand formulation of instructional design in sports majors, especially the right sport biomechanics course to reduce the consistency of misconception [7].

Other research shown, although physical education teachers understood the concept of biomechanics, they still had to make adjustments in physical education learning. Our findings suggest that although teacher's knowledge of biomechanical concepts improved after both courses, more time would be necessary to establish the conceptual relationships that would allow them to apply the selected biomechanical phenomena with assurance [8].

The purpose of this study was to know physical education learning activities in junior high schools in the city of Cimahi. The main focus in this research is, do physical education teachers in the city of Cimahi understand the principles of biomechanics? And how far do they apply the principles of biomechanics in physical education learning?.

II. METHOD

This study involved 33 physical education teachers at junior high school in Cimahi City. We divided it into two groups, namely the age group (figure 1) and the year of college graduation (figure 2). Then a semi-structured interview was conducted to all teachers using Darido's interview guidelines [9].

III. RESULTS AND DISCUSSION

The results of the study showed that during their undergraduate education, all physical education teachers received a curriculum of sports biomechanics learning. However, 51.5% of them said that they did not understand the contents, 21.2% expressed doubt and 27.3% said they understood the principles of biomechanics (figure 3).

When asked about the application of sports biomechanics principles, in physical education learning, 81.8% said they did not apply it and 18.2% applied it (figure 4).

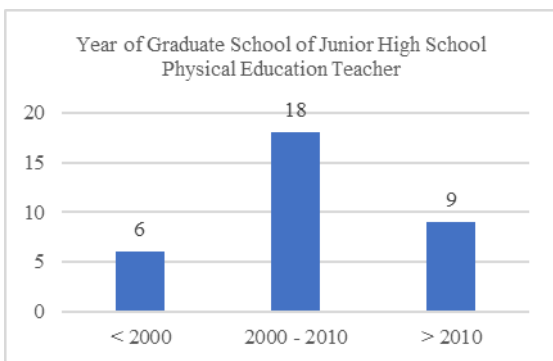


Fig. 2. Year of graduate school of junior high school physical education teacher.

This condition causes the learning of physical education in junior high schools in Cimahi City to be less meaningful.

Physical education learning is only limited to running, throwing, jumping, jumping and swimming. In many schools, in doing body work out/Sport Motion, many students make mistakes, even some students do it as if by force. This time because students do not understand the purpose and benefits of the sport motions they are doing.

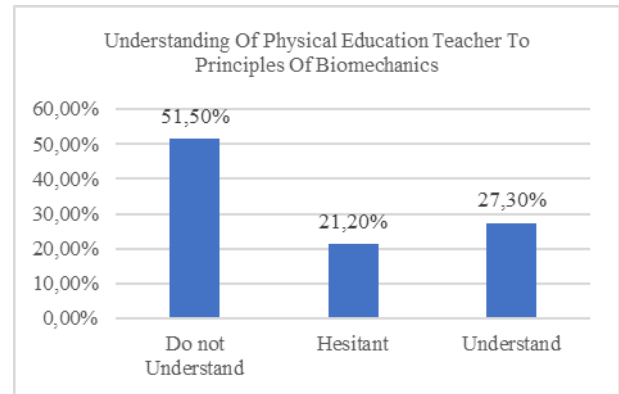


Fig. 3. Understanding of physical education teacher to principles of biomechanics.

The condition was caused the teacher did not explain by detail how students should move, as well as the goals and benefits of the given assignment.

Another thing that makes students do not do the task of moving well, because some physical education teachers when doing learning activities, does not discuss the relationship between physical education science with other science, so students consider physical education only as a complementary Subject [of lesson]. Increase in sports performance utilizing various new techniques of biomechanical principles in the Physical Education can help to enhance performance of students in the several sports [10]. Therefore, it is very important, the teachers introduce physical education to students on the basis of sports science so that the knowledge gained by students becomes complete. However, the results of above study showed 51.5% of physical education teachers did not understand the principles of biomechanics they learned while pursuing undergraduate education.

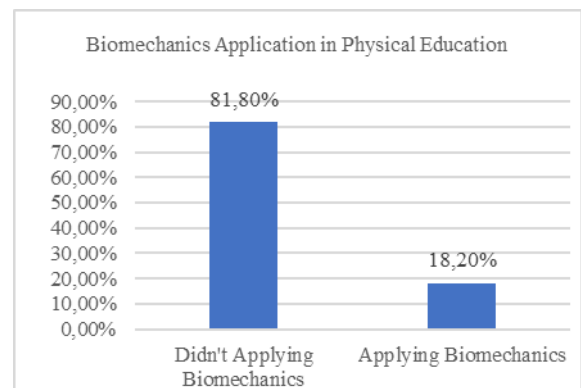


Fig. 4. Biomechanics application in physical education.

As many as 21.2% said that the biomechanics they learned at university were not for physical education, only for sports,

so they did not consider, it is important to apply the principles of biomechanics to physical education. Even though the application of biomechanical principles in learning is very important to increase students' knowledge. A study explains the primary purpose of teaching within the field of biomechanics is to develop the cognitive and practical breadth required to function as competent practitioners within the chosen field [11]. The task of motion in learning physical education accompanied by biomechanics principles will give more confidence to students that the teacher is a professional. To change this comprehensive, requires the role of universities to implement the concept of biomechanics learning to physical education teacher candidates. So, when they become teachers can implement the principles of biomechanics in physical education learning. Understanding what factors contribute to students being successful in mastering biomechanical concepts can improve the teaching and learning process at the undergraduate level [12]. Other research and study recommend biomechanics' teachers in the University should readjust the content of the discipline to fit the needs of the professional [13]. Also strengthened by other studies which stated that student characteristics of general academic ability, interest in biomechanics, and perception of the application of biomechanics to their future career are significant factors that correlate to learning of biomechanical concept [12].

In other case physical education teachers' comprehension of biomechanics is also influenced by the environment where they associate and the period of their years of undergraduate education. Physical education teachers who take undergraduate education in the period after 2010 better understand the importance of the application of biomechanics, it's caused in that period began to be known the term sports science in Indonesia. However, from 27.30% of respondents who understand biomechanics, only some of them do it in physical education learning. They have some reasons that physical education in schools does not need to use the principles of biomechanics. Physical education learning targets are only to make students actively move. Their resume that the principles of biomechanics are more suitable to the development of sports achievements. Research has shown that many physical education teachers are motivated to enter the profession because of their experiences, and success, in sport as opposed to physical education [14]. Though a study conducted by Orunaboka concluded that physical education as the base of sports development [15].

Sports development will not be separated from physical education at school. All who pursue a career as a professional athlete must start from the age of children and adolescents, and of course, they are school students. So, it is important for them to understand sports from the scientific side. A study concluded even though youth sport participants far outnumber adult participants in sport, there is a paucity of biomechanics studies and application at the youth sport level. By bridging the gap between the science and practice of biomechanics, opportunities exist for biomechanists to make widespread contributions to youth sports in many ways: injury prevention, performance enhancement, equipment design, rule modifications, and instructional/coaching practices [16].

In addition to these findings, this study found the reason for physical education teachers in Cimahi City did not apply the principles of biomechanics in physical education learning. Most of the physical education teachers stated that the application of biomechanical principles in learning requires them to change the learning plan documents, and demand that they work hard to learn the biomechanics of sports that they have forgotten. This situation will only take up their time to learn and create new learning planning documents. Their experience of teaching for years with methods that never change, makes them feel comfortable, so when asked to make changes, some of them refuse.

As a professional, physical education teacher should not only depend on the knowledge they have got from the undergraduate level, but need to increase knowledge through courses, workshops or conferences on biomechanics, and higher continuing education to master degree/ level. Therefore, we require a party that is concerned in the development of biomechanics to implement at the physical education learning.

IV. CONCLUSION

The principle of biomechanics is essential much comprehensive by physical education teachers. Some efforts are needed to change the physical education teacher's perception to the importance of learning biomechanics in physical education. These can be started from changes in the learning curriculum at the university, make perfect the physical education learning curriculum at school and conducting physical education teacher training in the field of biomechanics. Training can be facilitated by universities or official institutions in developing biomechanics in physical education and sports.

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