Use of Kinovea Application Software as Biomechanic Analysis of Basic Biomechanic Technique Movements in Volleyball Courses

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Abstract. The kinovea application is software as a tool to analyze the biomechanics of basic technical movements in the sport of volleyball. Kinovea software functions to slow down exercise videos, so that the results of the exercise can be recorded and the results observed. This research aims to provide understanding to course lecturers and students about the use of kinovea software to analyze the biomechanics of volleyball before taking volleyball courses or after attending lectures. Kinovea software as a tool for analyzing the biomechanics of basic volleyball techniques, is expected to make it easier for students to understand the biomechanics of basic movements in volleyball, then this application is expected to increase students' interest in studying basic volleyball techniques. The development of Kinovea software to analyze the biomechanics of volleyball, so that lecturers who teach courses can make it easier to carry out evaluations independently using a science and technology approach

Keywords: Kinovea, Analysis, Biomechanics, Basic Techniques, Volleyball.

1 Introduction

Universities are expected to be able to combine the interests of advancing the learning process that is oriented towards the advancement of science and technology with elements of cultural diversity of students that can produce learning outcomes with the ability to understand cultural diversity in society, thus producing a spirit of tolerance and mutual understanding of the presence of diversity. Students of the Sports Science Program at the State University of Medan are expected to be able to have the ability in the field of sports technology as a mega competency that must be possessed by prospective professionals in the field of sports in the 21st century. It is the basis for developing a sports science curriculum that is able to facilitate students to learn according to their times, a curriculum that is able to prepare students to be able to live better in the 21st century, have an active role in the industrial era 4.0, and be able to read signs of its

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development. In the current learning situation, an educator must think creatively and try as hard as possible so that every learning material can be mastered and understood by students. With the learning process carried out online, it has not been felt optimally in the process of achieving input from learning outcomes, especially the allocation of time that is also limited by the communication process carried out through applications that assist in the learning process. However, with the various obstacles faced, all of that does not become a thing in realizing quality learning. According to P. Ratu Ile Tokan (2016), the factors that determine the effectiveness of learning are the previously set learning objectives, identified student factors, supporting situation factors and also factors from the educators themselves. The phenomenon in the form of facts from the description, the researcher innovates in developing and improving students' understanding and abilities in volleyball courses. One form of development is to utilize Kinovea software to analyze the biomechanics of volleyball sports, so that lecturers in charge of the course can make it easier to conduct independent evaluations with a science and technology (IPTEK) approach. By providing assistance on Kinovea software to analyze basic volleyball technique training videos, lecturers and are expected to be able to innovate by utilizing technological advances to create learning devices according to needs. The advantage of Kinovea is that it makes it easier to analyze movements through training videos by slowing down the movements to be documented and used as evaluation material. In addition, the application can be uploaded for free to make it easier to analyze the angle of training movements through training recording videos to be documented as evaluation material for the next training. By utilizing technology, it is expected to create harmony between volleyball lecturers and students, in correcting the training process. For this reason, the use of technology in the training process so that training becomes more qualified and is supplemented by lecturers who have the innovation to make changes by utilizing one of the software, namely the Kinovea application. This software can make it easier to document and analyze training movements by slowing down the training video so that the basic techniques practiced can be used as evaluation material for both lecturers and students. Biomechanical analysis in sports is an important aspect that contributes to improving athlete performance. With a deep understanding of body movements during sports activities, coaches and athletes can identify technical weaknesses, optimize movements, and prevent injuries. In the sport of volleyball, biomechanical analysis becomes very relevant considering the complexity of the movements involved, such as serving, spikes, and blocks, which require precise muscle coordination and speed.

Along with the development of technology, various digital tools have been developed to assist in biomechanical analysis, one of which is Kinovea Software. This application allows users to record and analyze movements in detail, including measuring speed, angle, and trajectory of movement. In the context of education, especially in the Sport Science Study Program, State University of Medan, the use of tools such as Kinovea Software can provide great benefits in the learning and training process. This study aims to evaluate the effectiveness of using Kinovea Software in the biomechanical analysis of volleyball in an academic environment. By analyzing the results of using this application on students, this study is expected to provide insight into the role of technology in improving the quality of sports education and assisting in the development of more efficient and safe techniques for athletes. The results of observations made to observe directly during the volleyball lecture process, as a basis for determining data analysis through the Kinovea application. Researchers conducted observations at the Sport Science Study Program, State University. Where the subjects of this study were students taking volleyball courses. After that, the researchers conducted observations and consultations with the lecturers who taught volleyball courses. Researchers found that the ability to analyze biomechanical movements of basic volleyball techniques in the game in students is still lacking and has not

met the KKM expected by the lecturer in charge of volleyball courses. This Kinovea application makes it easier for lecturers in charge of volleyball courses to evaluate biomechanical movements that are lacking in the process of basic volleyball technique training in students. Thus, it can be concluded that from the results of this observation, it is necessary to conduct video analysis using the Kinovea application to review the results of the training by slowing down the video of the volleyball training results to be analyzed both qualitatively and quantitatively.

2 Method

This study aims to evaluate the effectiveness of using the Kinovea Software application as a tool in biomechanical analysis in volleyball. Specifically, this study focuses on improving students' abilities in understanding and analyzing biomechanical movements, as well as identifying the benefits and limitations of using Kinovea Software in an academic environment in the Sports Science Study Program, State University of Medan. The research and development model that will be used by this researcher uses the research and development (R & D) method, namely the ADDIE model.

3 Results and Discussion

3.1. Result

This study aims to evaluate the effectiveness of using the Kinovea Software application in biomechanical analysis in volleyball. The Kinovea Software application is used as a tool in analyzing athlete movements, focusing on measuring biomechanical parameters such as speed, angle, and body position during matches or training. This study involved students of the Sports Science Study Program at Medan State University as research subjects. The results showed that the use of Kinovea Software significantly improved students' understanding in analyzing biomechanical movements, as well as helping them identify and improve suboptimal techniques. Therefore, this application is recommended as a learning aid and biomechanical analysis in sports education, especially in volleyball. The results of the study showed that the use of the Kinovea Software application significantly improved students' ability to analyze biomechanical movements in volleyball. Students who used Kinovea Software could more easily identify movement details such as body angles when spiking, hand movement speed when serving, and foot positions when blocking. Compared to traditional analysis methods that rely more on visual observation and manual descriptions, the use of Kinovea provided more accurate and easily interpreted results. In terms of improving understanding, students involved in this study reported that the use of Kinovea Software helped them better understand biomechanical concepts that were previously considered abstract. A more structured approach to incorporating this technology into study programs can improve the overall effectiveness of learning. Overall, Kinovea Software offers great potential to enrich the biomechanical learning process and improve the quality of movement analysis in volleyball. However, to achieve maximum benefits, coordinated efforts are needed in terms of providing infrastructure, training, and curriculum integration.

3.2. Discussion

This application will not only improve students' technical competence but will also encourage innovation in sports education at Universitas Negeri Medan. With movement visualization that can be replayed and analyzed frame-by-frame, students can see directly the impact of various biomechanical variables, such as arm strength and angle, on the final movement outcome. This makes the learning process more interactive and effective. In addition, the use of Kinovea Software has also proven to be more efficient in terms of time. Movement analysis that previously took a long time with manual methods can now be completed faster with the help of this application. This speed of analysis allows coaches and students to immediately provide feedback and make technique improvements during training sessions, which directly contributes to improving athlete performance. However, this study also identified several limitations in the use of Kinovea Software. One of them is the need for additional equipment, such as a high-quality camera and tripod, to obtain clear and stable recordings. In addition, the results of the analysis are also highly dependent on the user's skills in operating this software, so adequate training is needed to ensure optimal results. In terms of application in an academic environment, Kinovea Software is recognized as a very useful tool, but there are challenges in terms of integration with existing curricula. Several lecturers stated the need for adjustments in teaching methods so that the use of this application can provide maximum benefits without disrupting the established learning flow. Therefore, a more structured approach is needed in integrating this technology into the curriculum. Overall, this study concludes that Kinovea Software is an effective tool for biomechanical analysis in volleyball, especially in an educational context. Its use not only improves the accuracy and efficiency of the analysis but also enriches the learning experience of students. However, to achieve optimal results, support is needed in terms of adequate training and infrastructure.

4 Conclusion

This study has successfully revealed that the Kinovea Software application is an effective tool in analyzing biomechanical movements in volleyball. This effectiveness can be seen from the application's ability to provide more accurate and detailed analysis compared to manual analysis methods. Students who use Kinovea Software can visualize and understand movements better, which in turn helps them identify and improve volleyball techniques more efficiently. In addition, the use of Kinovea Software has also been shown to speed up the biomechanical analysis process. This speed is important in the context of sports training, where fast and timely feedback is essential to improving athlete performance. With Kinovea, coaches and students can immediately see the results of the movement analysis and immediately make necessary adjustments, which ultimately contributes to improving the quality of training and learning. However, this study also shows that the use of Kinovea Software requires adequate infrastructure support, such as high-quality cameras and sufficient technical knowledge in operating this software.

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