Volleyball Information System for Volleyball Performance Assessment

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Received April 23, 2021; Revised June 16, 2021; Accepted July 21, 2021

Cite This Paper in the following Citation Styles

(a): [1] Yunyun Yudiana, Yusuf Hidayat, Burhan Hambali, Agus Gumilar, Mudjihartono, "Volleyball Information System for Volleyball Performance Assessment," *International Journal of Human Movement and Sports Sciences*, Vol. 9, No. 4A, pp. 94 - 99, 2021. DOI: 10.13189/saj.2021.091316.

(b): Yunyun Yudiana, Yusuf Hidayat, Burhan Hambali, Agus Gumilar, Mudjihartono (2021). *Volleyball Information System for Volleyball Performance Assessment. International Journal of Human Movement and Sports Sciences*, 9(4A), 94 - 99. DOI: 10.13189/saj.2021.091316.

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Abstract This study aimed to test the application of the volleyball information system (VIS) based performance appraisal model to assess the performance of volleyball athletes. The research method used a quasi-experimental design with interrupted times-series design. Participants in the study were 12 volleyball athletes who were trained at one of the volleyball clubs in Bandung, Indonesia, aged 15-17. The instrument used in this research was the observation format developed from the VIS FIVB 2005 which measured six skills to play volleyball, namely serve, receive, set, spike, block, and dig. All data from the measurement results of the VIS assessment model were analysed using the one-way analysis technique of variance in the overtime measurement (repeated measures ANOVA). The results of the study proved that the VIS-based performance assessment model has a significant impact on improving the basic skills of playing volleyball. The result of analysis concludes that the implementation of the VIS-based performance assessment instrument model can be used in the volleyball training process and contributes to improving the basic skills of volleyball performance.

Keywords Performance Assessment, Volleyball Information System, Volleyball Learning

1. Introduction

Volleyball is a popular sport that is often played by

everyone [1]. In the context of learning and training, volleyball is one sport that is popular among students, because, in the process, it demands comfortable, effective, and interesting learning [2, 3], as well as helping to develop competence in motor skills and student movement patterns [4]. At the practical level, volleyball learning is in a package with a modified learning model in game learning activities [5], so that athletes or students are expected to be able to have and master the basic skills of playing volleyball as a result of the learning process, which is the goal of success in educational programs (6).

In the education and training process, assessment plays an important role in seeing the achievement of learning outcomes, even, in some literature, it is stated that the complexity of the relationship between assessment and learning is very close in considering the achievement of learning outcomes [7]. Therefore, the assessment is an indicator to find out the success of the implemented learning or training program.

Basically, assessment is one of the important components in the provision of education [8]. It is administered to improve the quality of the learning process and provide feedback for students and teachers. Assessment and measurement are inseparable parts of evaluation activities in the learning process, so they can be used as a tool to determine whether learning is successful or unsuccessful [9].

In the context of assessment, volleyball is a sport that requires assessment, and even though it is a team sport, the assessment is carried out individually [10]. In this case,

performance assessment is one type of assessment that can be carried out. Performance assessment is an evaluation method that observes and assesses the knowledge, functions, and attitudes of students in various authentic tasks and situations [11]. In its implementation, the performance assessment aims to reveal problems in learning assessment and is a representative evaluation method [12]. Therefore, this assessment technique is used to assess students' skills according to the objectives and competencies to be achieved, one of which is in sport practice, in the context of mastery of skills.

The performance results have two main indicators, namely assignments and rubrics [13]. The task is a motion task that will be carried out by students aimed to measure student abilities based on indicators that have been arranged in accordance with the learning objectives, while the rubric is a score criterion that is arranged based on the motion task indicators aimed to assess student abilities in response to the motion task that has been implemented by students [35]. Score rubrics are commonly used when quality assessment is required and can be used to evaluate a variety of subjects and activities [14,36]. Therefore, the rubric is one of the descriptive assessment schemes carried out by teachers, trainers, or evaluators to guide the evaluation of students' performances or efforts in performing skills [15,37]. Based on this view, it concludes that performance appraisal is an assessment of the results in performing skills according to the ability of each individual to move through a task that will be assessed through an assessment format using scoring criteria (scoring rubric).

Skills assessment has been developed by researchers with various types of development that are specific to certain skills. However, specific development of assessment instruments in volleyball games is rarely implemented. Recent research conducted by Palao, Lopez & Ortega (2015) examined the model and validity of instruments for measuring techniques and tactics in beach volleyball, but, these instruments were used to measure athletes when playing and competing, not in learning conditions [16]. The instruments that can be used in learning conditions are the instruments developed by Oslin et al. (1998) named the GPAI (Game Performance Assessment Instrument) [17]. Then, Memmert & Harvey (2008) redeveloped the GPAI which aimed to measure playing performance, critical understanding, and the ability to solve tactical problems by applying the appropriate skills [17,18].

The instrument usually used to measure volleyball playing skills is the AAHPER Volleyball Skill Test. The instrument is included in the type of test battery and aims to measure students' ability in mastering the basic techniques of playing volleyball, namely Passing, Serving, Setting, Volleying [19,20]. However, the instrument used to measure performance in the process of playing volleyball in real playing conditions is the volleyball

information system (VIS) developed by the International Volleyball Federation (FIVB). The instrument is a program to complete a match that includes statistics for each individual player to the team [21].

VIS is a model information kit developed to be used as an aid to volleyball competitions, as well as support to inform the general public about volleyball [22]. There are six criteria in this VIS-based instrument, namely evaluation of the attack, evaluation of the block, evaluation of the serve, evaluation of the dig, evaluation of the set, and evaluation of the service reception [23]. In the implementation of the assessment, this system is carried out based on software with an assessment technique of three check list categories, namely success, fault, and attempt. The main objective of VIS is to inform national and international media on the results of team and individual player match statistics.

Yudiana, Hidayat & Hambali (2017) developed a VIS-based performance appraisal instrument model. The instrument was made in the checklist type assessment, referring to six criteria with the aim of assessing student skills during volleyball learning. Estimating content validity (Lawshe's CVR) obtained a ratio value between 0.60 to 1.00. The score exceeds the minimum threshold criterion of 0.50 as the standard that the value ratio is acceptable. So that the results of the validation show that the content of developed instruments are valid [24].

Based on the main ideas and global issues regarding volleyball instruments. Several research results indicate that the instrument for measuring volleyball skills and performance is still based only on development research to test the validity and reliability of the instrument, while studies at the level of dissemination or the impact of applications in the use of the assessment model are still rarely carried out. Therefore, the authors intended to try to implement a VIS-based performance assessment instrument model to assess the performance of students or athletes during the learning process or volleyball training aimed to make it easier for teachers or coaches to assess students' abilities when playing volleyball and can be adjusted to the material already taught. In addition, this evaluation system will be useful at a practical level, so that it can be used by teachers to measure students' ability to master volleyball playing skills and provide feedback for students, athletes, as well as teachers and coaches during the learning and training process.

2. Methods

Participant

The research method used in this study was a quasi-experimental design with interrupted times-series [25]. The research participants were 12 volleyball athletes in one of the volleyball clubs in Bandung, Indonesia, aged

15-17 years.

Instrument

The instrument used was an observation guideline adapted and modified from VIS FIVB 2005 which measured six playing skills, namely Service, Receive, Set, Spike, Block, and Dig [24]. The content validity coefficient of the challenged instrument was between 0.60 to 1.00 using the Content Validity Ratio (CVR) technique. The observation sheet was used to measure students' ability to display basic skills for playing volleyball during the learning process. The number of raters in assessing the subject's ability when playing volleyball was five people who had firstly attended a training. The VIS-based performance assessment instrument is presented in the following table.

Table 1. Blue Print of VIS-Based Performance Assessment Instrument

Variable	Skill Indicators	Assessment	
		Success	Unsuccess
Volleyball Skills	Service		
	Receive		
	Set		
	Spike		
	Block		
	Dig		

Procedure

This study aimed to test the application of the VIS-based performance assessment model in assessing the performance of volleyball athletes during the training process. Data were collected using observation instruments. Observations were conducted on students during volleyball training at the athlete's training site. Measurements were administered during the practice of playing volleyball in the real game. Measurements were made at each meeting, with the aim of seeing the development of athletes' abilities in each learning process for six meetings. Measurements were based on six basic technical criteria: Service, Receive, Set, Spike, Block, and Dig. The training process was conditioned on the Teaching Game Tournament, so that during the training process, athletes focused more on the actual practice of volleyball.

Data Analysis

To test the application of the VIS-based assessment instrument, the data obtained from the measurement results of each meeting were analyzed using one-way analysis of variance in the overtime measurement (repeated measures ANOVA). The analysis aimed to test the improvement of students' skills at each meeting. All

data were processed and analyzed using SPSS for windows 21.

3. Results

Descriptive Statistics

The data generated in the measurement process were presented in descriptive statistics to make it easier for further analysis. The results of descriptive statistical analysis (mean and standard deviation) are presented in Table 2.

Table 2. Descriptive Statistics of Measurement Results

Trial	N	Success		Unsuccess	
		M	SD	M	SD
Trial 1	12	10.42	0.51	7.42	0.51
Trial 2	12	11.33	0.78	6.75	0.75
Trial 3	12	11.50	0.80	5.67	0.65
Trial 4	12	11.67	0.98	5.50	0.67
Trial 5	12	11.92	0.90	4.67	0.49
Trial 6	12	12.58	0.67	3.92	0.29
Total	72	11.57	1.00	5.65	1.31

Note: M = Mean; SD = Standard Deviation

Based on the measurement results in each trial, the mean value ranged from 10.42 to 12.58 and a standard deviation ranged from 0.51 to 1.00 for the successful assessment category criteria. Furthermore, on the unsuccessful assessment criteria, the mean value stretched between 3.92 and 7.42, while the standard deviation ranged from 0.29 to 1.31.

One Way Anova Analysis

One way analysis was used to test the comparisons of each meeting, both on the criteria for assessing success and the criteria for assessing unsuccessfulness. The analysis results are presented in Table 3.

Table 3. F Test Results - One Way Anova Analysis

Criteria	Sum of Squares	df	Mean Square	F	Sig.
Success	41.1	66	0.6	9.8	.00
Unsuccess	22.4	66	0.3	58.8	.00

The results of the F test analysis shows that the F value was 9.8 for the successful criteria and was significant at p_value 0.00 ($0.00 < 0.05$), while the F value of the unsuccessful criteria was 58.8 and was significant at p_value 0.00 ($0.00 < 0.05$). These results prove that there was a significant difference in each meeting on both success and unsuccess criteria. It means that the implementation of VIS-based performance assessment has

an impact on increasing the basic skills mastery of playing volleyball. It was considered from the success assessment criteria for each meeting which had increased and the criteria for not succeeding from each meeting which had decreased.

Correlation Analysis of Assessment Criteria

The next analysis to strengthen the results of this study was a simple correlation analysis. It aimed to see the level of correlation or the relationship between the criteria for success and unsuccess. The results of the correlation analysis are presented in Table 4.

Table 4. Correlation Test Result

Criteria		Unsuccess
Succes	Pearson Correlation	-0.24
	Sig. (2-tailed)	0.64

Based on the results of the correlation test, the correlation coefficient value was -0.245 and it was not significant at p_value 0.64 ($0.00 > 0.64$). This means that there was a negative relationship between the criteria for success and unsuccess in the application of VIS-based assessments. This means that any increase in the successful criteria score will be followed by a decrease in the unsuccessful criteria score. The results of this analysis are strengthened by the graphs presented in Figure 1.

Figure 1. Graph of Measurement Results for Each Trial

Figure 1 shows a relationship line that is inversely proportional to successful and unsuccessful scores in the VIS-based assessment process during volleyball, meaning that any increase in the Success score will be followed by a decrease in the unsuccess score.

4. Discussion

The purpose of this study was to examine the application of the volleyball information system (VIS) based performance assessment model in assessing the performance of volleyball athletes. The results of the F

test analysis obtained an F value of 9.82 for the successful criteria and significant values at p_value 0.00 ($0.00 < 0.05$), while the unsuccessful criteria obtained an F value of 58.8 and significant at p_value 0.00 ($0.00 < 0.05$). These results prove that there was a significant difference in each meeting on the success and unsuccess criteria. This means that the implementation of VIS-based performance assessment has an impact on increasing the basic skills mastery in playing volleyball.

The increase of success assessment criteria and the decrease of unsuccess assessment criteria for each meeting prove that the implementation of the performance assessment using the modification of the VIS method has a significant effect. This is evidenced by an increase in learning outcomes of playing volleyball at each meeting and strengthened by the results of statistical tests, an F value of 9.8 and a significance value of 0.00 ($0.00 < 0.05$) shown in Figure 1.

The results of the analysis were verified by the correlation coefficient value of -0.245 and not significant at p_value 0.64 ($0.00 > 0.64$). This means that there was a negative relationship between the success and unsuccess criteria in the application of VIS-based assessments. These results interpreted that any increase in the successful criteria will be followed by a decrease in the unsuccessful criteria. The results of this analysis reinforce the results of the graph presented in Figure 1 which illustrates the inversely proportional line between successful and unsuccessful scores in the VIS-based assessment process during volleyball games.

The application and implementation of an evaluation system using the VIS-based performance assessment instrument model is useful for monitoring and providing feedback on the effectiveness of learning programs and talent scouting purposes [26], especially for students who have the largest population in the spectrum of the learning process. In addition, the benefits of this research can help improve the quality of volleyball achievement coaching, especially early childhood coaching which is believed to be one of the most basic strategies to achieve international achievement, because coaching at a young age is an ideal asset and has strategic value to be fostered and developed. It is assumed because, basically, by carrying out tests, measurements, and evaluations on an on-going basis and supported by reliable and valid test instruments, the teacher will know the strengths and weaknesses of students based on the results tests and measurements, because it will provide feedback for both teachers and students, as well as knowing the abilities of students after going through the learning process. The results of this study support several previous studies conducted by [16, 24].

The results of the analysis in this study indicate that the implementation of the VIS assessment has an impact on increasing the success of athletes in carrying out their movement tasks. This is assumed because the application

and implementation of the VIS assessment provided a direct feedback to athletes. It is because, basically, when this assessment is carried out, it will provide data related to the success of athletes in performing volleyball playing skills, so that it becomes a note and follow-up in the next training process. Besides, the athletes who receive the feedback get information about their performance, how well they have performed the task [27]. This study supports the research result that feedback impacts different variables, for example on cognitive (attention, strategy, etc.), motivation, and affective processes, and has a lasting effect on recipients' self-concept (self-esteem, control, etc.) [27].

In the context of motor skill learning, better known as Knowledge of Performance (KP) feedback, it is used to provide information about the nature and quality of movement responses for the purpose of guiding active learning or improving motor skills [28]. Therefore, the results of the VIS-based performance assessment given to athletes are one type of self-controlled feedback. The results of research conducted by Lim et al. (2015) [29] showed that the self-controlled feedback group had a significantly higher performance compared to the acquisition and retention feedback group. The results of this study can contribute to the literature on feedback by extending the usefulness of self-controlled feedback for learning serial skills [29]. It reinforces the theory that, basically, feedback is information about a person's performance, which is usually provided by an external source, in this case an observer who provides information to athletes about their performance [30]. The results of this study confirm the results of research on performance assessment [31,32,33,34] as well as research on the effects of feedback [28,29,30].

5. Conclusion

Based on the results of the analysis, it concludes that the implementation of the VIS-based performance assessment method has an impact on improving athletes' performance in playing volleyball. It means that the implementation of VIS-based performance assessments can be used in the learning or training process with the aim of providing direct feedback to athletes on the achieved performance.

Acknowledgments

The authors would like to thank all those who have helped this research, especially to the management of the volleyball club in Bandung, the Faculty of Sports and Health Education, and the Institute for Research and Community Service, Universitas Pendidikan Indonesia.

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