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Recording Students' Performance in Physical Education Using Mobile-Based Applications

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Abstract

The aim of this study is to analyze products based on mobile application development in helping teachers record student performance in physical education. Development method was carried out by the following procedure: requirement analysis; initial product development; expert validation; field trials; product revision; and final result. Interview guides, validation sheets, and questionnaire sheets were distributed in data collection process. Expert validation result on the phase I obtained average 76% which is classified as good criteria, and on the phase II obtained average 81,33% which is classified as very good criteria. While on the small scale trial obtained average 69,88% which is classified as good criteria, and on the big scale trial obtained average 79,40% which is classified as good criteria. Conclusion of the study shows that the mobile application product can be used to assist teachers in recording student performance in Physical Education which can be accessed by teachers, students, and parents of students.

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INTRODUCTION

Performance based assessment methods have been used physically educators over the years, particularly when testing various motor behaviors such as basic movement patterns, sports skills, and specific components of physical fitness (Hensley, 2013). Assessment according to a standards-based curriculum supports schools to measure student progress across physical education programs. Feedback received by the teacher of student performance greatly determines teacher actions in subsequent learning (Avery & Avery, 2013).

The effort that must be made by the teachers to ensure that the learning objectives are achieved is by conducting an assessment in their learning process. Assessment is a process of gathering information that serves to assist students in their learning, not just gathering information for assessment purposes (Kitts, 2003). This data can be directly used as feedback for student improvement in learning, this is more natural (not done officially). Assessment is used to collect data about how student responses are related to learning material, so that it can be used as a basis for determining decisions and improvements in learning.

Assessment in physical education can be divided into two categories — assessment for learning and assessment for accountability — each of which is structured in different ways and serves distinctly different purposes (Kang, Mahar, & Morrow, 2016). Various instruments have been developed to assess physical activity under field conditions. They each have certain advantages and disadvantages that must be considered before determining the most suitable instrument. In particular, it is important to consider factors such as time required, ease ofuse, reliability/validity, output measure, burden on participant, and cost (Welk & Wood, 2013)

The assessment activities carried out by the teacher are not solely to bring up values in physical education subjects, but are more useful as evidence of the track record process of student development in physical education learning. The track record of student learning activities is not only useful for the teacher, but also for the students themselves, by seeing their progress, students will feel motivated, and try not to fall behind with other friends. The important thing that is often overlooked is the parents of students. It should be remembered that they are also entitled to follow the pace of their child's development in receiving or participating in the physical education learning process in school (Allen, 2013). Authentic assessment is becoming increasingly popular as educators seek new and better ways to prepare students for the world of tomorrow (Chng & Lund, 2018)

Assessment should have several objectives, including: a) to find out how far students can reach the required competency level, both during learning and after the learning process takes place. b) to provide feedback for students, to be able to find out their strengths and weaknesses in the process of achieving competence. c) to control the learning progress achieved by each student, as well as the teacher can trace the learning difficulties experienced by students so that they can precisely determine which students need remedial to achieve the specified competencies.

Assessment should be seen as having several purposes (Allen, 2013). A good assessment must have assessment principles so that there are clear rules for developing an assessment. In general, the assessment has the following principles; 1. Keeping track, which must be able to trace and track the progress of students according to the predetermined learning plan; 2. Checking up, which must be able to check the achievement of students' abilities in the learning process; 3. Finding out, namely the assessment must be able to find and detect errors that cause weaknesses in the learning process; 4. Summing up, namely the assessment must be able to conclude whether students have reached the specified competencies or not (Avery & Avery, 2013)

Performance appraisal is an assessment carried out by observing students doing a job. Assessment is carried out to assess how students perform in completing certain tasks, not just assessing students' final results (López-Pastor, Kirk, Lorente-Catalán, MacPhail, & Macdonald, 2013). Attitude assessment is an assessment conducted by the teacher to measure the level of attainment of students' attitudinal competence which includes aspects of receiving, responding, assessing, appreciating, organizing or managing character (Phillips & Silverman, n.d.). The primary purposes of student assessment are to determine what students know and are capable of doing, to help students advance in their learning, and to assist students in making an informed decision on the next step in their education (Georgia, 2019).

The world is in the midst of a revolution in modern communication civilization it is evident that mobile phones are now more prevalent than computers or Internet access worldwide. Simple mobile phones have developed into smart phones such as sophisticated mini personal compu-

ters that are integrated with email, the Internet, and this special application must be accepted by technology users including educators (Kirwan, Duncan, Vandelanotte, & Mummery, 2013). The development of smartphones also affects the development of applications in it. From the other side, it is proven by a study that smartphone applications can increase mass and beneficial changes in health behavior interventions for individuals (Hebden, Cook, Van Der Ploeg, & Allman-Farinelli, 2012).

The article "Web-Based Assessment of physical education standards" in Marybell Avery's research states that "performance reports can provide motivation for students while informing parents of their children's progress". This means that reports or news of children's appearances in activities will be able to increase the motivation of the students themselves, and also provide information to parents about the rate of development and activities of their children in physical education at school. The article "Using Assessment Data to Monitor Physical Education Programs" in the "Journal of Physical Education, Recreation, & Dance" provides a summary that assessment is more than information about student learning.

The current trend in using digital technology to support physical activity is unstoppable at that time. The growing number of mobile device users maximises the possibility of the better utilisation of these devices for the support of physical activities including physical education at school (Palicka, Jakubec, & Zvonícek, 2016). Mobile applications provide an array of instructional tools and resources to present fitness information, create assignments, assess fitness levels, and track physical activity participation and its very helpfull for students and also teachers (Goad, Towner, Jones, & Bulger, 2019).

Mobile technology has become popular worldwide with a wide variety of users, including students of all educational levels. Although the impact of cellular technology in classrooms is very broad, teachers still know little about how mobile technology is developed based on applications that can be used in physical education learning activities (Domingo & Garganté, 2016)

Based on observations made by researchers by interviewing 8 elementary school physical education teachers in the city of Semarang, it turns out that they experience problems such as; a) Difficulties that are still felt by teachers in carrying out assessment activities, b) Lack of openness of teachers in carrying out assessment activities, c) Teachers often forget the track records of the development of students' abilities in physical education, d) Students and parents have not been able to monitor the rate of student development in learning physical education skills, and e) The absence of tools for collecting and storing data on student development in physical education.

Another research stated that technology can greatly assist educators in reaching their goal of teaching and helping students learn (Lester, 2015). The previous invention resulted in an application called PA Apps, a mobile application for implementing physical activity. This application makes it possible to monitor the course of various physical activities or sports through sensor technology integrated in mobile devices (Palicka et al., 2016). This is the reason for researchers to develop mobile-based applications that will be more focus on the skills and attitudes of students in following physical education at school. Therefore, the researcher wants to develop a data storage model to control student performance in physical education. The use of mobile-based applications can help teachers to assess students' performance in physical education.. The purpose of this study was to analyze the use of mobile-based application in making it easier for teachers to assess and collect data on the development of upper class students in learning physical education in schools.

METHODS

Development method was carried out by the following procedure: requirement analysis; initial product development; expert validation; field trials; product revision; and final result. Interview guides, validation sheets, and questionnaire sheets were distributed in data collection process. Questionnaire was distributed to the test subjects which consisted of a small-scale test that was carried out on 60 students, 60 parents and 3 physical education teachers. Whereas at the large-scale test stage the trial subjects were carried out on 100 students, 100 parents of students, and 6 physical education teachers.

The data analysis technique in this research is to use the first method, change the assessment in the form of qualitative to quantitative by using a Likert scale, calculate the average score, then the third is to change the average score into a qualitative value. The steps are as follows:

a. Change the assessment in qualitative to quantitative form with the following conditions

Table 1. Score Assessment Guidelines

Qualitative Data	Score
Very good	5
Good	4
Pretty good	3
Less	2
Very less	1

b. After the data is collected, calculate the percentage using a calculation formula:
Information:

$$P = f/n \times 100$$

P = Percentage of results of trial subjects
f = Subject frequency
n = Total

Make decisions using defined criteria

Table 2. Criteria for Determining Percentage

Scale	Assessment
0 – 55%	Very less
56 – 65%	Less
66 – 80%	Good
81 – 100%	Very good

RESULTS AND DISCUSSION

The results of this study are explained through a description of the results of the assessment of application users that are processed based on the results of the validation of physical education experts and media experts and the responses of users, namely teachers, students, and parents, which were carried out in two testing phases. Overall the results obtained are a very positive and supportive response to the use of this application in physical education learning activities. The following is a detailed explanation of the product trial results.

The results of the first stage expert validation can be seen in the following **Table 3.**

Table 3. Expert Validation Results

Expert	Phase I	Phase II
Physical Education Expert	84 %	80 %
Media Expert 1	68 %	80 %
Media Expert 2	76 %	84 %
Average	76%	81.33

Table 4. Percentage of the results

SUBJECT	Questions	Percentage Phase 1 small-scale		Percentage Phase II large-scale		Percentage increase
		Yes	No	Yes	No	
Students Phase I (N60) Phase II (N100)	I	70 %	30 %	73 %	27 %	
	II	61,66 %	38,33 %	70 %	30 %	
	III	60 %	40 %	68 %	32 %	
	IV	56,66 %	43,33 %	70 %	30 %	
	V	80 %	20%	73 %	27 %	
	Average	65,66%	34,33%	72%	28 %	6.34%
Parents Phase I (N60) Phase II (N100)	I	75 %	25 %	89 %	11 %	
	II	70 %	30 %	84 %	16 %	
	III	60 %	40 %	86 %	14 %	
	IV	70 %	30 %	89 %	11 %	
	V	85 %	15 %	89 %	11 %	
	Average	72 %	28 %	87,4 %	12,6 %	15,4 %
Teachers Phase I (N3) Phase II (N5)		72 %		80 %		
		68 %		76 %		
		76 %		84 %		
Average		72 %		80 %		8 %

Based on the results **Table 3.** (Phase I) of the expert validation, the percentage of responses from physical education experts was 84%, media experts 1 and 2 were 68% and 76%, which means that the product is feasible to be tested. After revision and repair, the product is presented to the experts for re-validation before being tested on a Phase II. From the results obtained, there is a percentage of 80% of physical education experts, 80% of media experts 1, and 84% of media experts 2. These results fall into the good and excellent categories. So that researchers can continue on large-scale trials. Based on the results in phases 1 and 2, the response was increased by 5.33%.

After a small-scale test **Table 4** was carried out on 60 students, the results of the answer 'yes' got a percentage of 65.66% which means that it is in the good category, however, these results still get a response to the answer of 'no' as much as 34.33% . Whereas in the results of the small-scale test questionnaire to 60 parents, the percentage of "yes" answers was 72% in the good category, and only 28% of the answers "no". Based on the results of small-scale tests on 3 physical education teachers, the percentage of those who answered "yes" was 72% where the results were in the good category.

The percentage diagram for the responses of users of small-scale test results is as follows **Figure 7**.

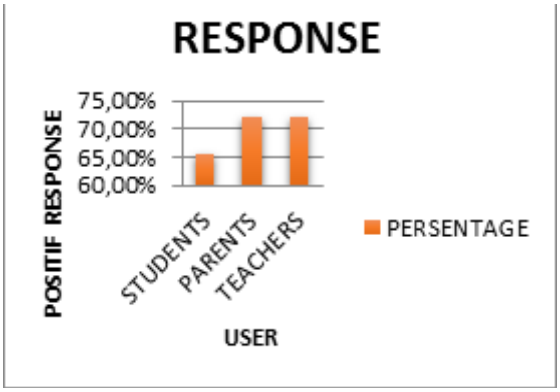

Figure 7. Percentage of User Responses in Small Scale Test Results Applications.

Based on the results **Figure 7** of small-scale trials as a whole, it can be obtained that the response from students reached 65.66% in the good category, parents with a percentage of 72% in the good category, and physical education teachers with a percentage of 72% also in the good category. However, from the results of the small-scale test, several comments were obtained for the improvement of the application being developed so that it is necessary to make improvements and retest at the large-scale test stage. After revision and repair, the product is presented to the experts for re-validation before being tested on a large scale. From the results obtained, there is a percentage of 80% of physical education experts, 80% of media experts 1, and 84% of media experts 2. These results fall into the good and excellent categories. So that researchers can continue on large-scale trials

The results **Table 4** of large-scale test to 100 students, obtained a percentage of 70.8% 'yes' answers. Where this result increased from the previous results on a small-scale test which only got 65.66%. Based on a large-scale trial with 100 parents, the result was a percentage of 87.4%, which is in the very good category. This result is also an increase from the previous trial which only got 72%. Large-scale trials were also carried out on 6 physical education teachers, with a percentage of 80% this result also increased from the previous test with a result of 72%. After collecting all the results on small and large scale tests, the researcher compiled the results of the study by displaying all the results in order to see an increase in the response of application users.

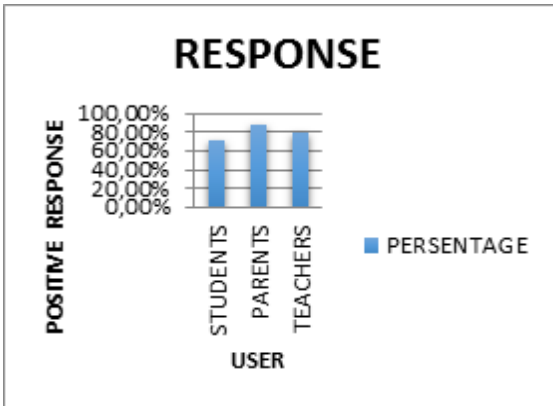

Figure 8. Diagram of the percentage of large-scale test results application users. Source: Research Results

The results **Figure 8** of large-scale trials are shown in the diagram above with the percentage of "yes" answers from students as much as 70.8%, parents 87.4%, and physical education teachers as much as 80%. The final result as a whole can be seen from the comparison of the percentage at the time of the small-scale test and the large-scale test.

Based on the results **Table 4** of small-scale trials and large-scale tests, it was found that all students, parents, and physical education teach-

ers all experienced an increase in responses related to the My PEP application development product with an increase in the percentage of students increasing 5.14%, parents increasing 15.4 %, and also the response from physical education teachers increased by 8%

The advantage in this research is that the product produced is very influential in making it easier for teachers to provide authentic assessments of students' physical education learning outcomes. This produces a My PEP application which contains the affective aspects of students and students' mastery of skills in physical education. This product contributes to make it easier for students to learn material skills and also makes it easier for teachers to provide information on student achievement to parents. In addition, some of the menus contained in this development product are simple and easy to use directly by students, teachers and parents of students. In this My PEP application, teachers can provide notes directly to students and parents can open and view these notes as evaluation material for students.

However, this study still has weaknesses. one of which is related to the maintenance of applications in order to exist, which requires relatively high costs. Related to the content ,. the weakness of this product is that it only contains two aspects of physical education and focuses more on the achievement of student skills. while there are three domains or aspects that students must master in physical education, namely cognitive, affective, and psychomotor. In this case, My Pep can only cover two domains, namely affective and psychomotor.

The results of this study have a novelty that is different from previous studies. Research and development products have a novelty in the focus of recording student performance in terms of mastery of their skills and attitudes in physical education. this means more to a physical education teacher than simply being able to see a record of overall physical activity results. This study carries multi-access where the application is not only used by one user, but there are three users, namely students, teachers and parents. This refers to the importance of communication that exists between student teachers and parents to be able to always control student achievement in physical education in schools (Palicka et al., 2016)

DESIGN OF PRODUCT

The Main Menu is used by physical education teachers to organize and manage applications (teachers only). View Students are used by students and parents to monitor, view, and check student achievements

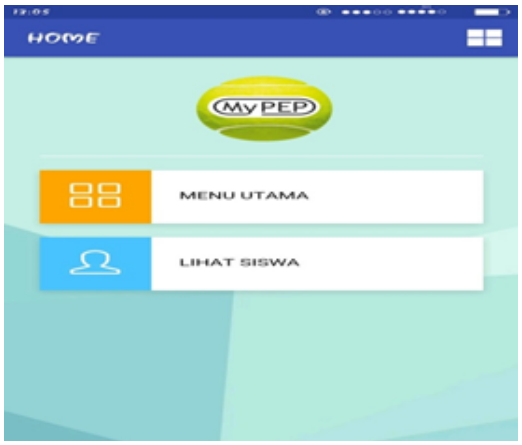

Figure 1. Display Product

Figure 2. Main Page

The main page of My PEP is shown on the side. Contains 7 menus, namely; Student List, Attendance, Behavior, Skills, Class Notes, Passwords, and Exit. There is the teacher's name in the upper left corner, which indicates that the access is only the authority of the teacher to manage and organize data storage Meanwhile, in the upper right corner there is a "logout", which is to exit to the main application page

Figure 3. Attitude points

Behaviour: is one of the main menus in My PEP, which is to provide points for the number of times students do or show good behavior attitudes during learning. The figure that appears is to show the number, and serves as a teacher's assistant in providing value for behavior.

So it is not merely a number that is the final value. The + sign is used if you want to add student behavior points

Figure 4. Skill menu

Skill Menu: Provides 9 materials with each material containing sub-learning materials complete with indicators appropriate to the class (4 and 5) Not only that, My PEP also provides an edit menu (see red arrow), which functions to add or edit material according to what the teacher wants.

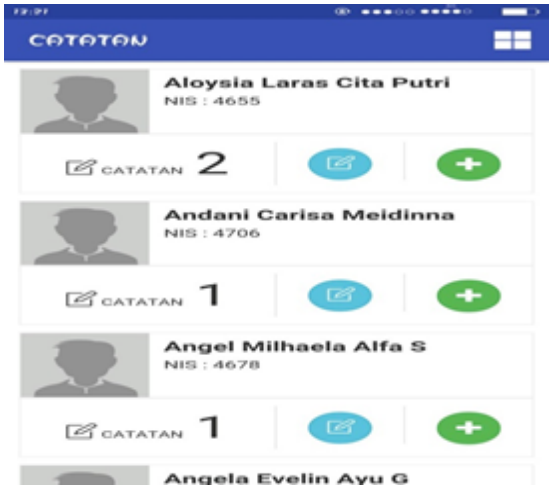

Figure 5. Teacher evaluation menu

Class notes; contains notes from the teacher about students during physical education learning. There are numbers, a blue circle for editing notes, and a green circle for adding notes Either positive or negative, the teacher is free to write as information material to the parents of students

Figure 6. Parental Access

The application also facilitates parents to see their child's performance. After entering, parents / students will see the core menu for students and parents. Consists of the student's name and NIS, as well as 4 data storage menus, namely; Attendance, Behavior, Skills, and Notes. For the Behavior and Notes aspect, there are numbers that show how many behaviors are shown, and records are obtained. How to view by simply clicking on the desired menu aspect.

CONCLUSION

The conclusions of this study include; 1) A development product has been produced in the form of the My PEP application, which can be used by physical education teachers to assess and store student performance data, and can also be used by parents and students to monitor the results of the student's own performance in physical education. 2) Teachers, students, and parents give positive and supportive responses about the development and use of the My PEP application, and 3) the My PEP application is effectively used by teachers, students and parents in monitoring the development of the learning process of upper class students in physical education in elementary schools. Development of student performance appraisal technology in physical education needs to be continuously developed because it is able to facilitate communication between teachers, students and also parents.

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