KEMAS 20 (1) (2024) 149-155

Jurnal Kesehatan Masyarakat

http://journal.unnes.ac.id/nju/index.php/kemas

Design Laboratory for Developing Students Competencies: Physical Education for Elementary School

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Article Info

Article History:
Submitted May 2023
Accepted June 2023
Published July 2024

Keywords:
design; development; laboratory; physical education; students

DOI
https://doi.org/10.15294/kemas.v20i1.50140

Abstract

Attention to student competence as prospective physical education teachers is very important. Physical education is not only learning about how to maintain health but also how to provide space for students to learn movement skills. Analysis in 2023 shows no laboratory that facilitates a special space for microteaching practice for prospective physical education teacher students at the elementary school level. This research aims to develop a basic physical education movement learning laboratory design for elementary school physical education study program students in 2023. The method used in this research is the research and development method. This type of development research is carried out to produce certain products and test the effectiveness of these products. The results of this research found that the suitability, safety, and usability of the products developed for users received a good response. Five questions addressed to lecturers and students as potential design users showed that on the first question, respondents gave a good response with an average of 72% regarding the placement and use of spatial layout. Next, regarding basic movement coverage, the result was 68.3%. Questions related to the suitability of material outcomes obtained a result of 65.1%. The percentage regarding aspects of ease and safety in use obtained a value of 55%, and regarding the usability and usefulness of the product, a response of 56.5% was obtained. This response concludes that the development product received a good response and support from the lecturers and students of the elementary school physical education study program. Suggestions for further research are the development of a laboratory with the concept of game activities by including elements of tactics and strategy.

INTRODUCTION

The physical education study program is one of the study programs that plays a very important role in improving the physical quality of students and increasing their competence as prospective teachers (Guo, 2020). Talking about physical activity is very important to pay attention to because, through physical activity, we can prevent stress from occurring in children from an early age (Santanu *et al.*, 2023). Apart from that, the important role of physical activity is to reduce the level of obesity that occurs among teenagers (Fauzi *et al.*, 2022). One of the routes that can be used as a place to apply physical activity to teenagers is through educational levels starting from an early age to higher education (Wintle, 2022). A variety of modern techniques and concepts have been applied by higher education to reshape the content and maximize the facilitiesand teaching models of physical education in higher education (Rourke, 2020). The education and skills obtained through physical education students in tertiary institutions are very useful in the future not only for the world of work, but theskills obtained by students during education can also influence user satisfaction (Asún *et al.*, 2020). Physical education in higher education

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pISSN 1858-1196
eISSN 2355-3596

can help students build the concept of lifelong education and foster lifelong physical education habits (Indarto *et al*., 2020). Students in physical education colleges continuously improve their physical skills, build scientific awareness of physical education, and rely on college physical education provided by the standardi zation,systematization, and standardization of physical education (Bai & Xia, 2019). Higher education gradually emphasizes the focus on implementing, analyzing, and studying the effectiveness of new educational models based on appropriate competencies to provide to students (Ross *et al*., 2014). Physical education curriculum in higher education generally includes professional knowledge at various levels and directions of learning (Engdahl *et al*., 2023). Physical education study program organizers always facilitate students to be able to maximize professional competence in sports or physical education,and to develop the quality of prospective physical education teachers (Jin, 2018).

Elementary school physical education study program students are certainly required to master professional competencies as physical education teachers (Wilujeng *et al*., 2019). Awareness of innovation must be embedded in them as sports practitioners and education experts. Awareness of innovation is a source of motivation for them as prospective teachers and also for prospective students (Blegur & Lumba, 2022). Physical education study programs in universities will not be effective in capturing the spirit of professional innovation in the field of physical educationand sports without awareness of innovation (Spittle *et al*., 2022). Apart from that, students are also unable to carry out in-depth professional development (Toom *et al*., 2021). The professional innovation abilities of students majoring in physical education must be cultivated to ensure that each student has good work and communication skills, self-awareness, and adaptability (Egan *et al*., 2019). It is very important to ensure that students as prospective physical education teachers have acquired mastery of their general competencies in professional teacher education before they complete their undergraduate education (Yılmaz *et al*., 2020).

The use of innovative teaching approaches is an effective way to provide appropriate educational standards (Qiang *et al*., 2022). Innovative teaching positively influences student performance. It can be created by having a laboratory or space to demonstrate and hone the skills and innovation of prospective physical education teachers (Naz & Murad, 2017). Laboratory experience is a direct interaction with the physical world where scientific tools and research skills are used together with various tools and materials in the development and interpretation of scientific knowledge according to the field (Prabha, 2016). Higher education, as a producer of future generations, is obliged to optimize ideas and improve infrastructure, such as the use of places and sports monitoring in the teaching process (Bayerlein *et al*., 2021).

Elementary School Physical Education is one of the study programs established under the auspices of the Faculty of Sports Science, Semarang State University. Several activities in implementing the lecture process in the study program appear to be in accordance with the curriculum provided. However, if seen in accordance with the theories from previous research results, several points strengthen the identification of problems in the elementary school physical education study program, such as; The Primary School Physical Education Study Program is required to prepare the next generation of prospective physical education teachers for the elementary school level; Students needto be provided with practice space facilities appropriate to their field of science to improve skills and competencies; There is no special practice place for elementary school physical education study programs.

Students are required to be able to master basic scientific materials, in this case physical education, for the elementary school level, which is identical to the variety of basic movement learning for elementary school students, as well as the amount of free space in the actual campus environment will be very useful for students to improve their teaching skills or competence as prospective physical education teachers elementary school. There are many open spaces and areas that can still be utilized as places or study rooms for students.

If the development is carried out, it will be much more useful for the learning activities in elementary school physical education study programs.

Method

This type and design of research is included in development research or Research and Development (R&D). The stages carried out in this research, include; Analysis, Planning (Design), Development, Implementation, and Evaluation. *Analysis*; Researchers do initial observations to study, investigate, and collect information. This step includes needs analysis, review of previous research, initial observations in the field, and identification of existing problems. *Planning*; Researchers create a design plan in the form of an initial product development draft. Several vital aspects in the plan include what the product developed about, the goals and benefits of development, who the product users will be, why it is important to develop the product, where is the location for the development, and what is the development process.

Development; Researchers carry out product designs developed and equipped with product assessment instruments carried out by experts. This development stage is validated by experts regarding the feasibility of the product before the product is implemented in the testing stage in the field. Researchers implement products that have been validated by experts, to potential users of the product to get responses in the form of assessments and suggestions from potential users. The users of this development product are lecturers and students of elementary school physical education study programs. *Implementation;* Researchers disseminate development results after going through the testing and product improvement stages. This implementation is, of course, adjusted to the needs in the field, in this case the elementary school physical education study program. *Evaluation;* Researchers regularly make improvements to products in accordance with developments in the field. The evaluation stage is carried out with the aim of ensuring product development always follows developments in needs in the field.

The research location is in Central Java, within the Universitas Negeri Semarang, with the population in this study being lecturers in the elementary school physical education study program and students in the elementary school physical education study program. The respondents in this study were 30 lecturers who have a scientific field in physical education, and 100 students from elementary school physical education study programs. The sampling technique was carried out using a simple random sampling technique based on the researcher's needs in the field. The instrument in this research uses a validation sheet addressed to open space planning expert and Primary School Physical Education Experts. Each uses five assessment indicators to obtain validation from experts. Green Architecture, Utilization of Open Space, Electrical Energy Savings, Environment friendly, Ease of Maintenance are the five basic questions for space planning experts. Next, physical education experts are given assessment indicators regarding Suitability of Primary School Physical Education Characteristics, Comfort in Use, Conformity with the Study Program Curriculum, Usefulness, Coverage of basic movement learning activities provided.

Apart from the instruments used to obtain assessments from experts, this research also uses a questionnaire sheet containing a range of assessments from product users regarding the design being developed. The contents of the questionnaire are related to five aspects there are; Appearance of the basic movement laboratory layout for elementary school physical education; Coverage of basic movement learning activities; Suitability of laboratory functions with course outcomes taken in the elementary school physical education study program; Ease and safety in laboratory use; and Usefulness for students in supporting microteaching lecture practices. Respondents are given a score range of 1 to 5 to assess the aspect in question, as are experts in the assessment of the suitability of the product. The Research Team carried out a needs analysis in the field by focusing on three problem points, namely: space utilization, increasing student competency, and laboratory innovation specifically for elementary school physical education. The results of the needs analysis were

resolved by formulating a product development design in the form of a basic movement learning laboratory prototype created by utilizing empty space in the campus environment. Next, the research team implemented the product results validated by experts for users, teaching staff, and students. From the test results, an evaluation is carried out on the sustainability of the product so that it can always be useful and can be developed in stages. The data obtained were processed using a Likert scale formula approach to describe the results in the percentages for each aspect used to assess the development product. The percentage scale formula used is:

"Index Formula % = Total Score /Y x 100%"

Apart from using this formula to see the percentage results of product assessments from each aspect formulated by the research team, trend criteria are also used in research to show how each aspect in the criteria ranges from very good to not good. The trend criteria formula used is as follows:

Table 1. Propensity Criteria

No	Formula	Category
1	X > M + 1,5 SD	Very Good
2	M+ 0,5 SD ≤ X< M + 1,5 SD	Good
3	M-0,5 SD ≤ X< M + 0,5 SD	Pretty Good
4	M-1,5 SD ≤X<M-0,5 SD	Not Good
5	X<M - 1,5 SD	Very Not Good

Result and Discussion

Design a practical laboratory specifically for the Primary School Physical Education study program, by providingan open space used as a Microteaching practice space by providing a learning space for elementary schoolphysical education basic movements. The design has been validated by two experts, including experts in open space planning, with 88% of the five indicators assessment product showing that experts give a "very good" category on this product. Another expert from physical education, especially at the elementary school level with mastery of material specifically for children's basic movements gives 84%, which is shown in the "good" category. Based on two validations from experts, the product is ready to be tested. The following is a display of the designs that were assessed and will be tested with comments from respondents:

Figure 1. Design Laboratory for Physical Education Study Program

Questionnaires are needed to obtain comments from lecturers and students of elementary school physical education study programs, as users. The questionnaire sheet contains comments and suggestions from lecturers and students regarding product development in the form of a physical education basic movement learning laboratory design for elementary school level. Contains the same statement between the lecturer and students regarding the usefulness of the development product. The assessment results or responses from the lecturers are as follows:

Table 2. Results of Filling in the Lecturer Questionnaire Sheet (N=30)

Aspect	Evaluation				
	1	2	3	4	5
1. Aspect 1			7	21	2
2. Aspect 2			5	20	5
3. Aspect 3			4	19	7
4. Aspect 4			10	15	5
5. Aspect 5			2	18	10
Total Score			28	93	29

Source: Primary Data

Based on the table 2, it can be seen that the response from 30 users gave good comments, with a percentage of 70% regarding the layout of the basic movement laboratory; 66.6% answered "good" regarding the coverage

of basic movement activities available in the product design being developed; 63.3% was obtained from answering "good" responses regarding the suitability of laboratory functions with study program course outcomes; while the aspects of easy and safety in use were only obtained by 50% who answered "good"; and regarding the usefulness of the product for students, it reached a percentage of 60% with "good" answers. Overall, the assessment results of 30 physical education lecturers obtained a percentage of 62%. This percentage is in the "Good" category.

Table 3. Trends in Product Aspect Criteria Based on Lectures Answer

No	Formula	f	Category
1	X > 28.97	0	Very Good
2	25.92 ≤ X< 28.97	2	Good
3	22.87 ≤ X< 25.92	3	Pretty Good
4	19.83 ≤X< 22.87	0	Not Good
5	X< 19.83	0	Very Not Good

Source: Primary Data

Table 3 shows the five aspects of product assessment. The results obtained showed that the criteria for aspects 1, regarding the layout of the basic movement laboratory, and 2, regarding the coverage of basic movement activities available in the product design developed, are in a good category. Then aspects 3, regarding the suitability of laboratory functions with study program course outcomes. Aspect 4 regarding the ease and safety in use, and aspect 5, regarding the usefulness of the product for students are in the pretty good category. The next table is the assessment results or responses from students as follows:

Table 4. Results of Completing Student Questionnaire Sheets (N=100)

Aspect	Evaluation				
	1	2	3	4	5
1. Aspect 1			12	74	14
2. Aspect 2			17	70	13
3. Aspect 3			10	67	23
4. Aspect 4			34	60	6
5. Aspect 5			7	40	53
Total Score			80	311	109

Source: Primary Data

Table 4 shows the response from 100 users gave "good" comments, with a percentage of 74% regarding the layout of the basic movement laboratory; 70% answered "good" regarding the coverage of basic movement activities available in the product design being developed; 67% was obtained from answering "good" responses regarding the suitability of laboratory functions with the study program course outcomes; while the aspects of ease and safety in use were only obtained by 60% who answered "good"; and regarding the usefulness of the product for students, the percentage reached 53% with "very good" answers. Overall, the assessment results for 100 physical education students obtained a percentage of 62.2%. This percentage is in the "Good" category.

Table 5. Trends in Product Aspect Criteria Based on Students Answer

No	Formula	f	Category
1	X > 100.05	0	Very Good
2	89.35 ≤ X< 100.05	3	Good
3	78.65 ≤ X< 89.35	2	Pretty Good
4	67.95 ≤X< 78.65	0	Not Good
5	X< 67.95	0	Very Not Good

Source: Primary Data

Table 4 shows the criteria for aspects 1, regarding the layout of the basic movement laboratory and 2, regarding the coverage of basic movement activities available in the product design being developed, and aspects 3, regarding the suitability of laboratory functions with study program course outcomes is in a good category. Aspect 4, regarding the ease and safety in use, and aspect 5, regarding the usefulness for students are in pretty good categories. Based on the overall data analysis, we concluded that the five aspects of product assessment carried out by users resulted in the product's suitability being able to be developed and used in the future according to needs.

Based on the results obtained from this research, a discussion can be carried out about how the results of this research match the findings of previous research that has been carried out. Some related research that has been carried out includes: "*Pedagogy for Effective Learning of Clinical Skills: An Integrated*

Laboratory Model", research on this topic focuses on laboratory models that function to teach clinical skills in physical therapy education (Reilly *et al*., 2020). The study explains the importance of the laboratory to the practice of physical therapy. So this research became one of the bases for implementing the idea of designing a laboratory for physical education activities. Motor skills learning laboratories in physical education are very useful in helping students learn skills by paying attention to the student's abilities (Takiyama & Shinya, 2016). Laboratories play a very important role in helping students learn movement skills. The laboratory is a space that provides students with the opportunity to gain hands-on experience and allows students to develop critical thinking and problem-solving skills (Gyarmati, 2022). The laboratory also offers the opportunity to train students to adapt response skills and abilities to existing conditions (Da Silva *et al*., 2022). Based on the results of all this research, it is clear that the existence of a laboratory is very useful as a learningspace. In physical education, it is closely related to how students are able to learn movement skills. Therefore, the design of the movement learning laboratory developed is very much in line with suggestions and input from several previous studies. Moreover, from several existing research results, a special laboratory design has not been found that provides a place for students to learn basic movement skills in physical education.

Conclusion

The design of the movement learning laboratory developed received a good response from users. It is proven by evaluations from several experts which show percentage values of 84% and 88%. Users, including lecturers and students of elementary school physical education study programs, gave good responses with a starting percentageof more than 50% with good criteria. Using five questions addressed to lecturers and students as users of development design, we found that on the first question, respondents gave a good response at an average of72% regarding the placement and utilization of space layout. Furthermore, regarding coverage of basic movement activities, the results were 68.3%. Questions related to suitability for table tennis course outcomes obtained a result of 65.1%. Meanwhile,the aspect of ease and safety in use was only obtained by 55%, and regarding the usefulness of the product, the response was 56.5%. With this percentage, we concluded that user interest in laboratory design is good. Suggestions for further research are the development of a laboratory with the concept of game activities by including elements of strategy in it.

Acknowledgments

This article was written by Hermawan Pamot Raharjo with a team from the Physical Education Study Program, Faculty of Sports Sciences, Semarang State University. Based on the results of research entitled "Design of a Basic Movement Learning Laboratory as a Competency Development Space for Students in the Primary School Physical Education Study Program" funded by Semarang State University in 2023. The contents of the article are the full responsibility of the author.

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