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Analysis of the Audiovisual Media Development for Basic Self-defense Learning in Sports Science Colleges

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Abstract: The development of learning technology in pencak silat (*Indonesian* for self-defense) theory and practice course positively benefits Sports Science Colleges. This study aims to find out and develop technology-based learning media to improve students' learning mastery of basic self-defense. The process of learning self-defense theory and practice course still uses simple learning media and has not yet used the latest technology in learning. The old habit in this discipline uses direct movement examples demonstrated by the lecturers or their assistants. Audiovisual learning media facilitates the students to understand and practice basic movements of self-defense. The development of audiovisual media in self-defense theory and practice learning is very desirable in Sports Science Colleges. It becomes a new way to apply technology in terms of the audiovisual mixture used as a learning reference for the self-defense practice as it is always done through direct actions by trainers over time. Thus, an analysis should be conducted on the effectiveness of audiovisual media development for basic self-defense learning in Sports Science Colleges.

Keywords: audiovisual media, basic self-defense, instructional media.

体育科学院校基本自卫学习视听媒体发展分析

摘要：武术（印度尼西亚语用于自卫）理论和实践课程中学习技术的发展对体育科学学院产生了积极的影响。本研究旨在寻找和开发基于技术的学习媒体，以提高学生对基本自卫的学习掌握程度。学习自卫理论和实践课程的过程仍然使用简单的学习媒体，尚未使用最新的技术进行学习。该学科的旧习惯使用讲师或其助手演示的直接动作示例。视听学习媒体有利于学生理解和练习基本的自卫动作。在自卫理论和实践学习中发展视听媒体是体育科学学院非常可取的。它成为一种将视听混合物应用技术的新方法，用作自卫练习的学习参考，因为随着时间的推移，它总是通过培训师的直接行动来完成。因此，应分析视听媒体发展对体育科学学院基本自卫学习的有效性。

关键词：视听媒体，基本自卫，教学媒体。

1. Introduction

Providing Considering philosophical approach to science and technology, the development of audiovisual media in basic self-defense learning in Sports Science College should take scholarship/benefit truth, feasibility/merit/efficiency, and creativity in the frame of human rights, ethics, and positive law. The lecturers of

theory and practice courses tend always to use never-changing learning media in teaching self-defense [1]. The learning process of self-defense course always uses simple learning media, not utilizing renewable technology in the learning but using direct movement examples demonstrated by lecturers with their assistants' help [2].

Technology development in self-defense theory and practice courses benefits Sports Science Colleges positively. It was suggested that Mario Bungo's technology and philosophy is divided into five branches: (1) techno-epistemology, (2) techno metaphysics, (3) techno-axiology, (4) techno-ethics, and (5) technopraxiology. Technology philosophy can be an intermediary between pros and cons perspectives on technology because its development should be based on the essence of science, benefit, ethics, and suitability [3]-[6].

It also recommends the stages needing serious attention in developing the audiovisual-based learning model [7], [8]. They are: need analysis, instructional design, development, implementation, and evaluation. The early stage needing consideration is whether or not audiovisual-based learning is needed. The reality should be adjusted with the characteristics and conditions of an educational institution. The instructional design includes content analysis and analysis of other learning components [9], [10].

Firstly, a product organizing step is taken using the audiovisual media product to determine the development of audiovisual media. Designing an audiovisual media product involves a series of activities, including content development, task analysis, design concept, and program description. Content of audiovisual media originates from self-defense theory and practice courses in Sports Science College. The content includes basic movements of self-defense consisting of four groups: (1) attitude formation, (2) movement formation, (3) defense, and (4) attack [11]-[15].

Self-defense is a general term that describes fighting and martial art [16]. Self-defense is a sport that has mental, spiritual, martial arts, arts, and sports aspects. The spiritual mentality is closely related to a noble personality, obedience to the norms and values in religion and society, always uphold brotherhood and strong character, and faith in God Almighty. The self-defense aspect is related to the condition that requires a fighter to defend himself when threatened or endangering himself [16], [17].

Art aspects showed that self-defense is identical with taste, aesthetics, and beauty in its movements [18][19]. The sport aspect means that self-defense is also one of the elements of the sport that is contested and physical fitness and achievement purposes. Self-defense can be a physical activity that can improve health and fitness [20].

Material is presented in the form of moving images or movements organized in such a way and supported with clear text and sound that facilitates the students to attend the learning process. Image, text, and sound presentations are packaged into DVD that can be displayed or projected through laptop and LCD on the screen or other

materials (e.g., the wall) [21]-[23]. Audiovisual media product is DVD containing basic self-defense learning supported with text and sound display to explain the basic self-defense movement presentation [24].

Accompanying music is prepared to make the display attractive. Self-defense learning media is developed from an intact presentation in a folder containing all materials of basic self-defense. The title "basic self-defense learning" and the developer's identity are put onto the cover of the DVD [25]. The original presentation display is the sequence of presentation menu of basic self-defense presenting the materials of attitude formation, followed with movement formation and defense, and ended with an attack. Each of the sub materials presents in detail the movements, complete with text and sound [26].

Secondly, audiovisual media product is developed. Audiovisual media product development is the follow-up of the initial audiovisual product designing stage ready to be validated. The elements needing to be prepared in the product development stage are material and early DVD presentations ready to be validated [27]. Furthermore, early audiovisual media product development is conducted involving the following elements: (1) selecting software, (2) preparing presentation image, (3) preparing text according to the presentation displayed, including form and diction, (4) preparing audiovisual element and other supporting components, (5) doing recording process, in which the recording process is conducted as planned, involving model personnel, recording personnel, and equipment [27], [28].

To produce a quality audiovisual media product, during preparation, recording, and editing processes, the developer conducted ongoing evaluation non-formally [29], [30]. Ongoing evaluation during learning media development for basic self-defense material is adjusted with need analysis, competency of self-defense theory and practice course particularly in basic self-defense material, strategy selection, and follow-up. Having been organized, all learning components are packaged (included) into the DVD to be developed into learning media, with basic self-defense material being the early product of audiovisual media [29].

As prospective Sport and Physical Education teachers, the students should master self-defense teaching skills [30]. The material of Self-defense theory and practice course in Departments of Physical Education, Health and Recreation and Sports Coaching of Teacher Training and Education Faculty of UNS includes (1) basic self-defense, (2) advanced self-defense, (3) jurus baku tunggal (Single Compulsory Movement), (4) jurus baku ganda (Double Compulsory Movement) and (5) jurus baku beregu (Group Compulsory Movement), and (6) rules of competition and contest. Meanwhile, the material of

basic self-defense (chosen in this dissertation) given to the students in Sports Science College consists of four components: (1) attitude formation, (2) movement formation, (3) defense, and (4) attack. The four components underlie other materials such as advanced self-defense and jurus baku (compulsory movement) [30]-[32].

A lecturer as a professional is required to have the ability to develop learning media [33]. Furthermore, the development of learning media should be able to answer learning difficulty problems. The word media derives from Latin constituting the plural form of medium, literally meaning intermediary or conductor. Thus, the meaning of media is intermediary or the one delivering a message from the sender to the receiver [34].

It suggests that a medium (plural, media) is a means of communication and source of information. Derived from the Latin word meaning *between*, the term refers to anything that carries information between a source and receiver [35]. Examples include video, television, diagram, printed materials, computer program, and instructors. There are considered instructional media when they provide a message with an instructional purpose. The purpose of media is to facilitate communication and learning [36].

A self-defense course is a practical cycle, developing from the simplest to the highest (most difficult) one. For that reason, students need to practice it out of face-to-face learning hours. It can be done both individually, in a group or along with friends [37]. Audiovisual media is chosen as the solution to address the weaknesses found in the self-defense learning process, in which audiovisual media is a media with sound and image elements. It is said that the procedure of developing audiovisual media involves the production of audiovisual media involves three activity stages: pre-production, production, and post-production [38].

The research results show that the use of applications makes the students interested rather in learning a martial art and their attitude more open to and accepting the multimedia system. In addition, it can be seen that the students' mastery of martial art improves. It can be

concluded that this application is very useful to help students have good knowledge, skill, and attitude to martial art [39].

To better understand and practice the basic movement of self-defense, audiovisual media processes and stages are needed in the learning. Thus, the advantages of audiovisual media products will facilitate the students to learn independently. At the same time, the lecturers serve mainly as consultants or facilitators rather than as authority or the only source of knowledge [40].

Successful independent learning indicates the students not depending on lecturers' continuous supervision and direction but having their own creativity and initiative, and ability to work themselves by referring to lecturers' guide (self-directed learning) [41], [42]. Thus, lecturers and students need the development of audiovisual media for basic self-defense learning in Sports Science College. Effectiveness analysis of audiovisual development for basic self-defense learning in Sports Science College is very desirable [43].

2. Method

This study used Research and Development model aiming to develop the effectiveness of audiovisual learning media in basic martial art learning in Sports Science College. The learning media development model used in this study was Alessi & Trollip's [38] model emphasizing flexibility aspect in designing and, more particularly, developing learning multimedia. Alessi & Trollip's model is simpler, particularly in evaluating learning media products. The development process becomes more efficient, viewed from a number of tested subjects involved, time, and evaluation used

3. Results

The result of product implementation in this research is based on the pretest and post-test data analysis in each of the sample groups. The condition of the tested sample can be seen from control and experiment class groups, as shown in Table 1.

Table 1 Description of sample condition

Location of the Large-Scale Trial Group	Sample Quantity		
	Control class (Conventional)	Experiment Group (Audiovisual Media)	Total
Faculty of Sports, Semarang State University	24	34	58

Continuation of Table 1			
Faculty of Sports, Yogyakarta State University	39	38	77
Training Education, Faculty of Sports, Sebelas Maret State University	21	26	47
Physical Education, Health, and Recreation Study Program, Faculty of Sports, Sebelas Maret State University	19	19	38

The implementation of audiovisual media in the large-scale test is divided into three activities: (1) early face-to-face meeting (pretest), (2) learning activity using audiovisual media, and other classes using conventional media, and (3) final face-to-face meeting (post-test).

3.2. Data Revealed in the Semarang State University

Table 2 Data of mean score for basic self-defense skill in the Semarang State University

No.	Components of basic self-defense	Control Group		Experiment Group	
		Pretest	Post-test	Pretest	Post-test
1	Attitude Formation	0.85	2.75	0.85	2.88
2	Movement Formation	0.96	2.88	0.91	2.97
3	Defense	0.92	2.92	0.94	3.03
4	Attack	1.25	3.00	1.32	3.18

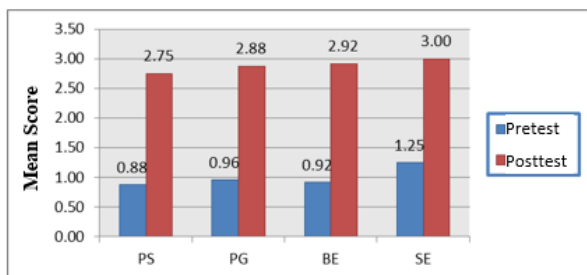


Fig. 1 Histogram of pretest and post-test data for control group in the Semarang State University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

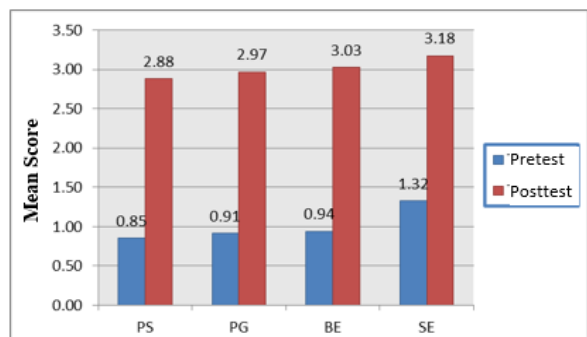


Fig. 2 Histogram of pretest and post-test data for experiment group in the Semarang State University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

Thus, it can be concluded that there is a difference of mean increase between control and experiment groups by 0.12.

3.3. Data Revealed in the Yogyakarta State University

Table 3 Comparison between basic self-defense skill value in the Department of Physical Education, Health and Recreation of Sport Science Faculty of the Yogyakarta State University

No.	Components of basic self-defense	Control Group		Experiment Group	
		Pretest	Post-test	Pretest	Post-test
1	Attitude Formation	0.97	2.82	0.82	3.05
2	Movement Formation	0.79	2.62	0.68	3.00
3	Defense	0.85	2.72	0.68	3.03
4	Attack	1.21	3.10	1.11	3.26

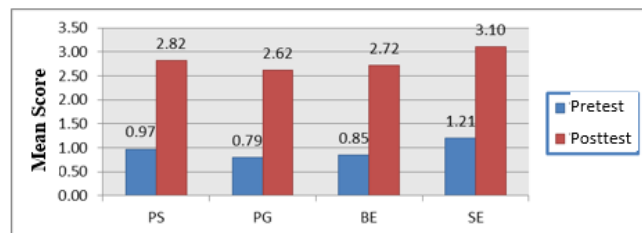


Fig. 3 Histogram of pretest and post-test data for basic self-defense in control group in the Yogyakarta State University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

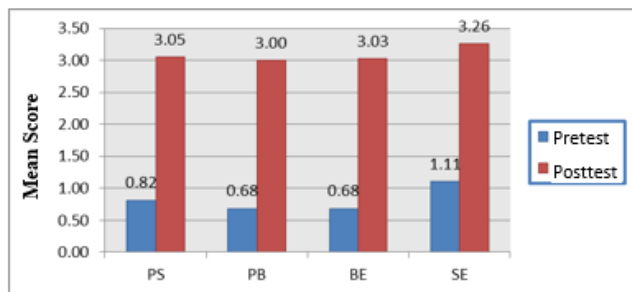


Fig. 4 Histogram of pretest and post-test data for basic self-defense in experiment group in the Yogyakarta State University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

Thus, it can be concluded that there is a difference of mean gain score increase between control and

experiment groups in the Department of Physical Education, Health and Recreation of Sports Science Faculty of Yogyakarta State University, by 0.4.

3.4. Data Revealed in the Department of Sports Coaching of the Sebelas Maret University

Table 4 Data of mean score for basic self-defense in the Department of Sports Coaching of the Teacher Training and Education Faculty of the Sebelas Maret University

No.	Components of basic self-defense	Control Group		Experiment Group	
		Pretest	Post-test	Pretest	Post-test
1	Attitude Formation	0.90	3.14	0.96	3.23
2	Movement Formation	0.76	3.10	0.88	3.19
3	Defense	0.95	3.05	1.00	3.27
4	Attack	1.29	3.10	1.31	3.83

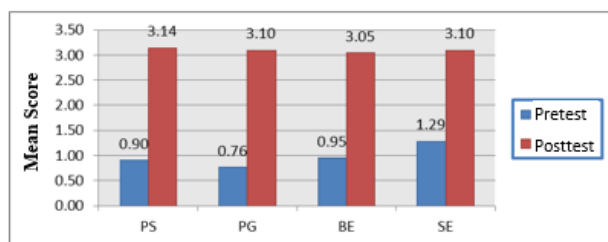


Fig. 5 Histogram of pretest and posttest score data for control group in the Department of Sports Coaching of the Teacher Training and Education Faculty of the Sebelas Maret University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

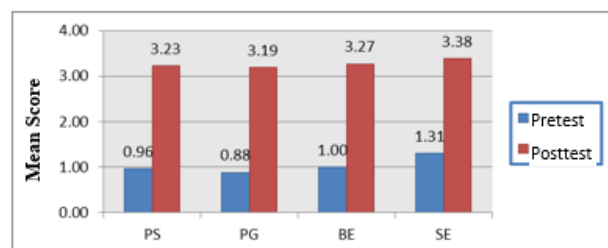


Fig. 6 Histogram of pretest and posttest score data for experiment group in the Department of Sports Coaching of the Teacher Training and Education Faculty of the Sebelas Maret University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

Thus, it can be concluded that there is a difference of mean score increase between control and experiment groups in the Department of Sports Coaching of Teacher Training and Education Faculty of Sebelas Maret University, by 0.17.

3.5. Data found in the Department of Physical Education, Health and Recreation of the Sport Science Faculty of the Sebelas Maret University

Table 5 Data of basic self-defense skill scores in the Department of Physical Education, Health and Recreation of the Sport Science Faculty, Sebelas Maret University

No.	Components of basic self-defense	Control Group		Experiment Group	
		Pretest	Post-test	Pretest	Post-test
1	Attitude Formation	1.68	3.32	1.74	3.42
2	Movement Formation	0.89	3.16	0.77	3.26
3	Defense	0.84	3.11	0.37	3.16
4	Attack	1.53	3.42	2.05	3.84

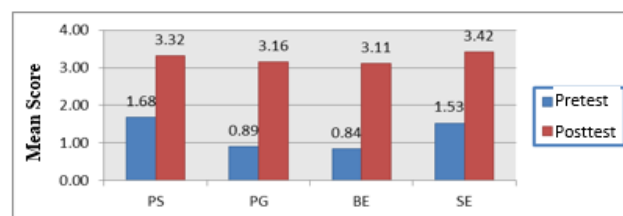


Fig. 7 Histogram of pretest and posttest data for control group in the Department of Physical Education, Health and Recreation of the Sport Science Faculty of the Sebelas Maret University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

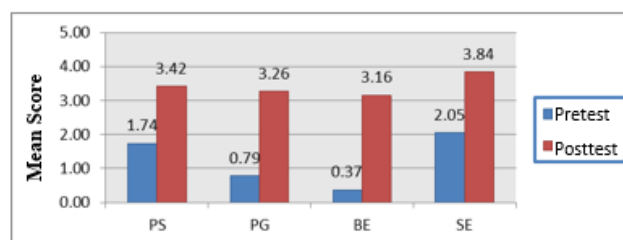


Fig. 8 Histogram of pretest and posttest data for experiment group in the Department of Physical Education, Health and Recreation of the Sport Science Faculty of the Sebelas Maret University

Note: PS - Attitude Formation; PG - Movement Formation; BE - Defense; SE - Attack

Thus, it can be concluded that there is a difference in the mean score of increase between control and experiment groups in the Department of Physical Education, Health and Recreation of Teacher Training and Education Faculty of Sebelas Maret University, by 0.07.

3.6. Data Revealed in Sports Science Colleges in Central Java and Region of Yogyakarta

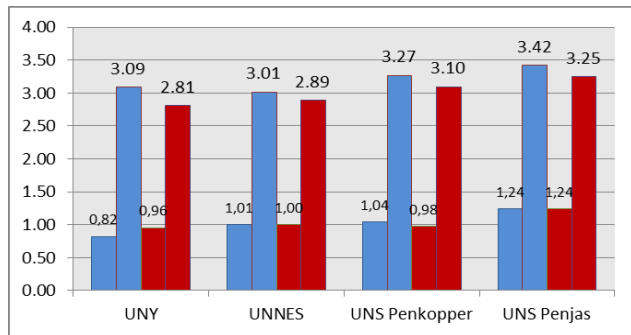


Fig. 9 Histogram of comparison of pretest and posttest between experiment and control groups in sports science colleges

The analysis results for all the large-scale trial groups are summarized in Table 6.

Table 6 Conclusion of analysis

Colleges	Class	N	Mean	Significance	Conclusion
Sebelas Maret State University	Control	193	274	0.164 > 0.05	H_0 is supported, insignificant (no difference between the control and experiment groups)
	Experim.	193	437		
Sebelas Maret State University	Control	213	100	0.073 > 0.05	H_0 is supported, insignificant (no difference between the control and experiment groups)
	Experim.	263	277		
Semarang State University	Control	242	904	0.091 > 0.05	H_0 is supported, insignificant (no difference between the control and experiment groups)
	Experim.	343	032		
Yogyakarta State University	Control	392	831	0.001 < 0.05	H_0 is not supported, significant (a difference between the control and experiment groups)
	Experim.	38	3.105		

3.7. External Effectiveness Test on Audiovisual Media Product

Considering the ANCOVA analysis design, the one-way ANCOVA external effectiveness test was designed in this study as follows (Table 7):

Table 7 The layout of ANCOVA analysis design

Group	Experiment Group		Control Group	
	Pretest	Post-test	Pretest	Post-test
Observed data	Semarang State Uni. Class C	Semarang State Uni. Class C	Semarang State Uni. Class A	Semarang State Uni. Class A
	Yogyakarta State Uni. Class C1+C2	Yogyakarta State Uni. Class C1+C2	Yogyakarta State Uni. Class B1+B2	Yogyakarta State Uni. Class B1+B2
	Sebelas Maret State Uni. Class B	Sebelas Maret State Uni. Class B	Sebelas Maret State Uni. Class A	Sebelas Maret State Uni. Class A

	Sebelas Maret State Uni. Class C	Sebelas Maret State Uni. Class C	Sebelas Maret State Uni. Class B	Sebelas Maret State Uni. Class B
Number of data	103		117	

Table 8 Summary of data gain for the 2 (two) groups (conventional and audiovisual)

Colleges	Skill	Control Group	Experiment Group
		Gain-conventional	Gain-audiovisual
Sebelas Maret State University	PS	1.64	1.68
	PG	2.27	2.49
	BE	2.27	2.79
	SE	1.89	1.79
Sebelas Maret State University	PS	2.24	2.27
	PG	2.34	2.31
	BE	2.10	2.27
	SE	1.81	2.07
Semarang State University	PS	1.90	2.03
	PG	1.92	2.06
	BE	2.00	2.09
	SE	1.75	1.86
Yogyakarta State University	PS	1.85	2.23
	PG	1.83	2.32
	BE	1.87	2.35
	SE	1.89	2.15
Mean		1.97	2.17

3.8. Response of Lecturers using Audiovisual Media Product

Lecturers' opinions are summarized in Table 9.

Table 9 Summary of lecturers' response or comment

No	Response or Comment
1	Audiovisual media products in basic <i>self-defense</i> learning can actually grow students' thinking creativity and independence.
2	The Audiovisual media used as the learning media can grow the students' learning enthusiasm.
3	Students feel comfortable, happy, more satisfied, and confident in learning.
4	An adequate supporting infrastructure is required to create high-quality learning.
5	The implementation of audiovisual media in basic <i>self-defense</i> is very effective and efficient in the learning process.
6	Material elaboration is detailed and clear as it is followed by movement examples and written explanations.
7	Providing a new learning circumstance.

4. Discussion

This analytical research results are discussed and described to provide the research findings. The discussion section compares the research findings with the knowledge (theory and result of previous studies) and interprets the likely implication. Research & Development study produces audiovisual media in basic self-defense theory and practice course in Sports Science Colleges. The validation of audiovisual media products is highly determined by the effectiveness of audiovisual media when trialed with the client.

The effectiveness of audiovisual media products as the learning media is measured from the students' skill

learning outcome following the use of audiovisual in real learning. The effectiveness of an audiovisual media product is measured based on internal and external effectiveness. Internal effectiveness of audiovisual media product emphasizes the result of analysis on gain (effectiveness degree) of difference of pretest and post-test mean scores. In addition, it also takes into account the result of variance analysis (t) (post-test) between the two groups using SPSS version 19.

The external effectiveness of audiovisual products sees more the post-test result between trial groups by involving pretest value as a covariate. The effectiveness of audiovisual media products can be seen externally through the comprehensive ANCOVA analysis test in the control and experiment groups. The analysis of the internal and external effectiveness of audiovisual media during its implementation in basic self-defense learning in each field trial is as follows.

a. Internal effectiveness of audiovisual media

1) Internal effectiveness of audiovisual media in the Department of Sports Coaching in Sports Science Faculty of Semarang UNNES:

The analysis on students' learning outcome in the Department of Sport Coaching in Sports Science Faculty of UNNES Semarang in the experiment group using audiovisual shows better score than that in the control group (using conventional media) with a gain difference (effectiveness degree) of 0.12, between experiment and control groups. The result of variance test (t) on pretest-posttest for experiment and control groups shows a difference with significance level or probability value of 0.91 (> 0.05). It means that H_0 is supported and insignificant (no difference between control and experiment groups). To the authors, no difference between control and experiment groups is likely due to an event or something unobservable (uncontrolled). Out of lecturing hour, the control group gets something from the experiment group, which should be intended for the experiment group. Nevertheless, the result of variance test (t) on pretest-posttest of experiment group is larger than that of the control group. Such the difference can be explained by a gain score of the experiment group larger than that of the control group. This analysis indicates that the learning outcome of basic self-defense learning in the experiment group using audiovisual media is better than that in the control group (using conventional media) in the Department of Sport Coaching in Sports Science Faculty of UNNES Semarang.

2) Internal effectiveness of audiovisual media in the Department of Physical Education, Health and

Recreation in Sports Science Faculty of Yogyakarta UNY:

The analysis on students' learning outcomes in the Department of Physical Education, Health and Recreation in Sports Science Faculty of Yogyakarta UNY in the experiment group using audiovisual shows better score than that in the control group (using conventional media) with a gain difference (effectiveness degree) of 0.4, between experiment and control groups. The result of variance test (t) on pretest-posttest for experiment and control groups shows a difference with significance level or probability value of 0.01 (< 0.05). It means that H_0 is not supported and significant (there is a difference between control and experiment).

Similarly, the result of variance test (t) on pretest-posttest of group experiment shows a larger score than that of the control group. Such the difference can be explained with the gain score of the experiment group larger than that of the control group. It indicates that the learning outcome of basic self-defense of experiment group using audiovisual media is better than that of the control group (using conventional media) in the students in the Department of Physical Education, Health and Recreation in Sports Science Faculty, Yogyakarta UNY.

3) Internal effectiveness of audiovisual media in the Department of Sports Coaching of Teacher Training and Education Faculty of Surakarta UNS:

Analysis on the students' learning outcome of basic self-defense in the Department of Sports Coaching of Teacher Training and Education Faculty of Surakarta UNS in experiment group using audiovisual media is better than that in the control group (conventional media) with a gain difference (effectiveness degree) of 0.17, between experiment and control groups. The result of variance test (t) on pretest-post-test for experiment and control groups shows a difference with a significance level or probability value of 0.073 (< 0.05).

It means that H_0 is not supported and significant (there is no difference between control and experiment); each group has improvement viewed from post-test value $>$ pretest value. Nevertheless, the result of variance test (t) on pretest-posttest of experiment group is larger than that of the control group. Such difference can also be explained with the gain score of the experiment group (using audiovisual media) larger than that of the control group (using conventional media) in the students in the Department of Sports Coaching of Teacher Training and Education Faculty, UNS Surakarta.

4) Internal effectiveness of audiovisual media in the Department of Physical Education, Health, and

Recreation of Teacher Training and Education Faculty, Surakarta UNS:

Analysis of the students' learning outcome of basic self-defense in Department of Physical Education, Health, and Recreation of Teacher Training and Education Faculty of UNS Surakarta in experiment group using audiovisual media is better than that in the control group (conventional media) with a gain difference (effectiveness degree) of 0.07, between experiment and control groups. The result of variance test (t) on pretest-posttest for experiment and control groups shows a difference with a significance level or probability value of 0.164 (< 0.05).

It means that H_0 is not supported and significant (there is no difference between control and experiment); each group has improvement viewed from post-test value $>$ pretest value. Nevertheless, the result of variance test (t) on pretest-posttest of experiment group is larger than that of the control group. The analysis shows that the students' learning outcome of basic self-defense in the Department of Physical Education, Health, and Recreation of Teacher Training and Education Faculty of UNS Surakarta is better in the experiment group (using audiovisual media) than that in the control group (using conventional media).

Thus, overall, it can be concluded that the implementation of audiovisual media in basic self-defense learning has internal effectiveness in improving the students' learning outcome in basic self-defense compared with the achievement of conventional media.

b. External Effectiveness of Audiovisual Media

This external effectiveness of audiovisual media is obtained from a two-way analysis of covariance with experiment and control groups. This analysis includes pretest value as covariate variable to control the effect of pretest on dependent variable's post-test. The external effectiveness of audiovisual media products can be found by comparing the mean score of post-test in experiment and control groups.

The ANCOVA analysis with SPSS 19 indicates that the implementation of audiovisual media in self-defense learning has external effectiveness in improving the students' comprehension ability or learning outcome in a basic self-defense course. It is indicated with a significance level or probability value of 0,00 (< 0.05) in the experiment group, meaning a difference in learning outcome between students learning basic self-defense using audiovisual media and those using conventional media. In the control group (conventional media), a significance level or probability value of 0.82 (> 0.05) is obtained, meaning that there is a difference in learning outcome between students learning self-defense using conventional media and those using audiovisual media. It can be concluded that self-defense learning using

conventional media in all large-scale trial groups can also improve the students' learning outcome of basic self-defense.

The utilization of audiovisual media can explore the students' ability to find self-concept in learning, thereby relieving the students' duty. It makes the students more comfortable, happy, satisfied, and confident in learning and practices the students to be more skillful and to feature their moving skills more discretionarily. For that reason, the existence of audiovisual media is beneficial to colleges and should be implemented more broadly. Nevertheless, adequate supporting infrastructure is still required to create higher-quality learning.

The implementation of audiovisual media in learning is very effective and efficient in the learning process. Material elaboration of audiovisual product is detailed, clear, and followed with animation and simulation. It provides a new, more interactive learning circumstance. The determinants of a successful implementation of audiovisual media in basic self-defense learning are, among others: (1) students are required to be active, creative, and capable of exploring material, (2) lecturers' attitude should be changed from subject matter-oriented to mastery, passing successfully and comprehensive, and (3) independent and responsible characters should be inculcated.

The result of variance test (t) on pretest-posttest for experiment and control groups shows a difference with significance level or probability value of 0.91 (> 0.05). It means that H_0 is supported and insignificant (no difference between control and experiment groups). To the authors, no difference between control and experiment groups is likely due to an event or something unobservable (uncontrolled). Out of lecturing hour, the control group gets something (audiovisual media and its supplement) from the experiment group, which should be intended only for the experiment group.

5. Conclusions

Considering the findings of research obtained through preliminary study, individual group trial, small-scale trial, large-scale trial, and effectiveness test on audiovisual media for basic self-defense learning in Sports Science Colleges, it can be concluded that audiovisual media has internal and external effectiveness in improving the students' basic self-defense learning outcome. The implementation of an audiovisual media product is a combination of audio and visual media produced so that it can be utilized simultaneously as a learning aid. Audiovisual media benefits the students as it complements and maximizes the learning process. Audiovisual aids in education are very important in that they make learning permanent. The more senses these aids include, the more permanent and qualified learning

is. Thus, in choosing the educational aids to be used, aids that will switch on the child's audiovisual senses should be chosen.

References

- [1] AECT. *Selecting Media for Learning*. Washington DC. Association for Education Communication and Technology, 1977.
- [2] AGUS M. *Pencaksilat Dasar* (Basics of self-defense), Salatiga: Widya Sari, 2009.
- [3] ALTAVILLA G., D'ELIA F., D'ISANTO T., & MANNA A. Tests for the evaluation of the improvement of physical fitness and health at the secondary school. *Journal of Physical Education and Sport*, 2019, 19(5): 1784–1787. <https://doi.org/10.7752/jpes.2019.s5262>
- [4] HARROW A.J. *A Taxonomy of the Psychomotor Domain. A Guide for Developing Behavioral Objectives*. New York: Longman Inc, 1972.
- [5] BUABENG-ANDOH C., YAOKUMAH W., TARHINI A. Investigating students' intentions to use ICT: a comparison of theoretical models. *Education and Information Technologies*, 2019, 24 (1): 643–660.
- [6] CLARK R. C., & MAYER R.E. *E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning*. John Wiley & Sons, 2016.
- [7] DALE H. S. *Learning Theories an Educational Perspective*. Yogyakarta: Pustaka Pelajar, 2012.
- [8] DIKNAS (NATIONAL EDUCATION). *Peningkatan Kualitas Pembelajaran*. Jakarta: Dirjen PT Direktorat Pembinaan Pendidikan Tenaga Kependidikan dan Ketenagaan Perguruan Tinggi (Improving the Quality of Learning. Jakarta: Director General of PT Directorate of Educational Development for Education Personnel and Higher Education Personnel), 2005.
- [9] DALE E. *Audio Visual Methods in Teaching*. New York: Holt Rinehart & Winston Inc, 1969.
- [10] GERLACH V.S., & ELY D.P. *Teaching & Media: A Systematic Approach* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall Incorporated, 1980.
- [11] SOWELL E. J. *Curriculum and Integrative Introduction*. Pearson; 3rd edition, 2004.
- [12] HARIS M. *Belajar Mandiri* (Independent learning). Surakarta: UNS Press, 2006.
- [13] FRY H., KETTERIDGE S., & MARSHALL S. A *Handbook for Teaching and Learning in Higher Education*. New York: Routledge, 2009.
- [14] PLASS J.L., HEIDIG S., HAYWARD E.O. et al. Emotional Design in Multimedia Learning: Effects of Shape and Color on Affect and Learning. *Journal of Learning and Instruction*, 2013, 29: 1-13. www.elsevier.com/locate/learninstruc.
- [15] APPS J. W. A. *Problems in Continuing Education*. New York: McGraw Hill Books Company, 1979.
- [16] DROWATZKY J.N. *Motor Learning: Principles and Practices*. Minneapolis. Minnesota: Burgess Publishing Company, 1975.
- [17] JOHANSYAH L. *Pencaksilat Panduan Praktis* (Practical guide of self-defense). Jakarta: PT. Raja Grafindo Persada, 2004.
- [18] KERRES M. Against all odds: education in Germany coping with Covid-19, *Postdigital Science and Education*, 2020;1-5, doi:10.1007/s42438-020-00130-7
- [19] KOTOT S. R. *Teknik Dasar Pencaksilat Tanding* (Basic technique of self-defense fighting). Jakarta: Dian Rakyat, 2003.
- [20] MAGILL R. A. *Motor Learning: Concepts and Applications* (4th Ed.). Dubuque IA: WMC. Brown, 1993.
- [21] MCPHERSON M. & PICKETT W. Characteristics of martial art injuries in a defined Canadian population: A descriptive epidemiological study. *BMC Public Health*, 2010; 10, Article ID 795.
- [22] MEREDITH, D. G., JOYCE, P. G., & WALTER, R. B. *Educational Research: An Introduction*. Boston. Pearson Education, Inc, 2003.
- [23] METZLER M.W. *Instructional Models for Physical Education*. Massachusetts: A Pearson Education Company, 2000.
- [24] MUHAIMIN M., HABIBI A., MUKMININ A., et al. Predicting factors affecting intention to use Web 2.0 in learning: evidence from science education. *Journal of Baltic Science Education*, 2019, 18(4): 595-606.
- [25] PANNEN P. & PURWANTO. *Penulisan Bahan Ajar. PAU PPAI* (Writing teaching materials. Pau Ppa. Ditjen Dikti. Depdiknas Jakarta, 2001.
- [26] SCHMIDT R.A. & WRISBERG C.A. *Motor Learning and Performance: A Problem-Based Learning Approach*. Champaign IL: Human Kinetics, 2000.
- [27] MAYER R. E. *Learning and Instruction*. Englewood Cliffs, NJ: Prentice Hall, 2008.
- [28] MAYER R. E. *Multi Media Learning: Prinsip-prinsip dan Aplikasi* (Multimedia learning: principles and applications). Yogyakarta: Pustaka Pelajar, 2009.
- [29] HEINICH R., MOLEND A M., and RUSSELL J. *Instructional Media and the New Technology of Instruction*. New York: John Wiley and Sons, 1982.
- [30] HEINICH R., MOLEND A M., RUSSELL J. D., & SMALDINO, S. E. *Instructional Media and Technologies for Learning*. Englewood Cliffs, NJ: Prentice Hall, 7th ed., 2001.
- [31] SINGER R. N. *Motor Learning and Human Performance: An Application to Motor Skills and Movement Behaviors*. New York: Macmillan Pub, 1980.
- [32] ROMISZOWSKY, A. J. *Developing Auto Instructional Materials*. Philadelphia: Nicolas Publishing, 1986.
- [33] SMALDINO S. E., LOWTHER D. L., MIMS C. & RUSSELL J. D. *Instructional Technology & Media for Learning*. New York: Pearson Education, 2019.
- [34] SOETARNO, J. *Pembelajaran Efektif. Pembelajaran yang Membelajarkan* (Effective learning. learning teaches).

Surakarta: UNS Press, 2011.

[35] SRI, A. *Teknologi Pembelajaran* (Educational technology). Surakarta: FKIP UNS, 2009.

[36] HACKBARTH S. *Educational Technology Handbook*. Englewood Cliffs, NJ: Educational Technology Publication, 1996.

[37] SUGIYANTO &, AGUS K. *Belajar Gerak II* (Learning of motion II). Surakarta: UNS Pers, 1998.

[38] SUGIYONO. *Metode Penelitian Kuantitatif, Kualitatif, dan R & D* (Quantitative, Qualitative, and R&D Research Methods). Bandung: C.V. Alfabeta, 2011.

[39] GOOD T. L. & BROOPY, J. E. *Educational Psychology: a realistic approach*. New York: Longman, 4th ed., 1990.

[40] UNDANG-UNDANG REPUBLIK INDONESIA NOMOR 20 (Law of The Republic of Indonesia Number 20). Tentang Sistem Pendidikan Nasional (National education system), 2003.

[41] WANDA G. Y. Jean Piaget-Intellectual Development. Available at (<http://www.sk.com.br/skpiaget.html>). 2001.

[42] EDWARDS W. H. *Motor Learning and Control. From Theory to Practice*. Belmont: Wadsworth, 2011.

[43] WINA S. *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan* (Educational process standard oriented learning strategy). Jakarta: Kencana Prenada, 2001.

参考文献:

[1] 电汇。选择媒体进行学习。华盛顿特区。教育传播与技术协会, 1977。

[2] AGUS M. 自卫基础, 萨拉蒂加: 维迪亚·萨里, 2009。

[3] ALTAVILLA G., D'ELIA F., D'ISANTO T., 和 MANNA A. 中学身体素质和健康改善评估测试。体育与运动杂志, 2019, 19 (5): 1784-1787。
<https://doi.org/10.7752/jpes.2019.s5262>

[4] HARROW A.J. 心理运动领域的分类。制定行为目标的指南。纽约: 朗文公司, 1972。

[5] BUABENG-ANDOH C., YAOKUMAH W., 和 TARHINI A. 调查学生使用信息通信技术的意图: 理论模型比较。教育与信息技术, 2019, 24 (1): 643-660。

[6] CLARK R. C. 和 MAYER R.E. 电子学习和教学科学: 针对多媒体学习消费者和设计者的经过验证的指南。约翰威利父子公司, 2016。

[7] DALE H. S. 学习理论教育视角。日惹: 普斯塔卡·佩拉哈尔, 2012。

[8] DIKNAS (国民教育)。雅加达: 提高学习质量。雅加达: PT 教育人员和高等教育人员教育发展局局长, 2005。

[9] DALE E. 教学中的视听方法。纽约: 霍尔特莱因哈特和温斯顿公司, 1969。

[10] GERLACH V.S., 和 ELY D.P. 教学与媒体: 系统方法 (第 2 版)。新泽西州恩格尔伍德悬崖: 普伦蒂斯霍尔公司, 1980。

[11] SOWELL E. J. 课程与综合介绍。皮尔逊; 第三版, 2004。

[12] HARIS M. 独立学习。苏拉卡尔塔: 联合国系统出版社, 2006。

[13] FRY H., KETTERIDGE S. 和 MARSHALL S. 高等教育教学手册。纽约: 劳特利奇, 2009。

[14] PLASS J.L., HEIDIG S., HAYWARD E.O. 等。多媒体学习中的情感设计: 形状和颜色对情感和学习的影响。学习与教学杂志, 2013, 29: 1-13。
www.elsevier.com/locate/learninstruc。

[15] APPS J. W. A. 继续教育中的问题。纽约: 麦格劳希尔图书公司, 1979。

[16] DROWATZKY J.N. 运动学习: 原则和实践。明尼阿波利斯。明尼苏达州: 伯吉斯出版公司, 1975。

[17] JOHANSYAH L. 自卫实用指南。雅加达: PT. 拉贾·格拉芬多·佩萨达, 2004。

[18] KERRES M. 不顾一切: 德国教育应对新冠肺炎, 后数字科学与教育, 2020; 1-5, 土井: 10.1007/s42438-020-00130-7

[19] KOTOT S. R. 自卫格斗的基本技术。雅加达: 《人民日报》, 2003。

[20] MAGILL R. A. 运动学习: 概念和应用 (第 4 版)。迪比克 IA: 世界管理中心。布朗, 1993。

[21] MCPHERSON M. 和 PICKETT W. 特定加拿大人群中武术损伤的特征: 描述性流行病学研究。BMC 公共卫生, 2010, 10, 文章 ID 795。

[22] MEREDITH, D. G., JOYCE, P. G., 和 WALTER, R. B. 教育研究: 导论。波士顿。培生教育公司, 2003。

[23] METZLER M.W. 体育教学模式。马萨诸塞州: 培生教育公司, 2000。

[24] MUHAIMIN M., HABIBI A., MUKMININ A. 等。影响在学习中使用网络 2.0 的意图的预测因素: 来自科学教育的证据。波罗的海科学教育杂志, 2019, 18 (4): 595-606。

[25] PANNEN P. 和 PURWANTO. 编写教材。保平波帕。高等教育总局。雅加达国民教育部, 2001。

[26] SCHMIDT R.A. 和 WRISBERG C.A. 运动学习和表现: 基于问题的学习方法。香槟伊利诺伊州: 人类动力学, 2000 年。

[27] MAYER R. E. 学习与指导。新泽西州恩格尔伍德悬崖: 普伦蒂斯霍尔, 2008。

- [28] MAYER R. E. 多媒体学习：多媒体学习：原理和应)。日惹：学生图书馆，2009。
- [29] HEINICH R., MOLEND A. M. 和 RUSSELL J. 教学媒体和教学新技术。纽约：约翰威利父子公司，1982。
- [30] HEINICH R., MOLEND A. M., RUSSELL J. D. 和 SMALDINO, S. E. 教学媒体和学习技术。新泽西州恩格尔伍德悬崖：普伦蒂斯大厅，第7版，2001。
- [31] SINGER R. N. 运动学习和人类表现：运动技能和运动行为的应用。纽约：麦克米伦酒吧，1980。
- [32] ROMISZOWSKY, A. J. 开发自动教学材料。费城：尼古拉斯出版社，1986。
- [33] SMALDINO S. E., LOWTHER D. L., MIMS C. 和 RUSSELL J. D. 教学技术和学习媒体。纽约：培生教育，2019年。
- [34] SOETARNO, J. 有效学习。学习教导。苏拉卡尔塔：UNS 出版社，2011。
- [35] SRI, A. 教育技术。苏拉卡尔塔：FKIP 联合国，2009。
- [36] HACKBARTH S. 教育技术手册。新泽西州恩格尔伍德悬崖：教育技术出版物，1996。
- [37] SUGIYANTO 和, AGUS K. 运动学习 II。苏拉卡尔塔：联合国人员，1998。
- [38] SUGIYONO. 定量，定性和研发研究方法。万隆：简历。阿尔法贝塔，2011。
- [39] GOOD T. L. 和 BROOPY, J. E. 教育心理学：一种现实的方法。纽约：朗文，第4版，1990。
- [40] 印度尼西亚共和国法 号码 20 印度尼西亚共和国法律第20号。国民教育系统，2003。
- [41] WANDA G. Y. 让·皮亚杰 - 智力发展。可在 (<http://www.sk.com.br/skpiaget.html>) 获得。2001。
- [42] EDWARDS W. H. 运动学习和控制。从理论到实践。贝尔蒙特：沃兹沃思，2011。
- [43] WINA S. 面向教育过程标准的学习策略。雅加达：日期普雷纳达，2001。