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Learning Style and Multimedia: An Effort to Improve Student Learning Outcomes in Integrated Social Sciences Lessons

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Abstract: This study aims to determine the effect of exogenous variables namely learning media (conventional media and multimedia) and learning styles (visual and auditory) on endogenous variables namely learning outcomes of integrated social science (history, geography, and economics). The influence in question is the visible difference in learning outcomes of students who have visual and auditory learning styles after getting treatment by applying multimedia controlled with conventional media on integrated social science learning. The research team involved 50 students who were divided equally into experimental groups and control groups. In the first stage, the team conducted a questionnaire of 36 questions to divide students into two parts, namely the auditory and visual learning style groups. The second stage provides treatment with the use of multimedia and conventional media. Finally, analyze data and test hypotheses from the results of tests that have been given. Based on the results of data analysis obtained information that the learning outcomes of students who have auditory learning styles taught with multimedia are the same as the learning outcomes of students who have a visual learning style taught with conventional media, then the learning outcomes of students who are taught multimedia with visual learning styles are higher than with students with auditory learning styles. That is, students with a visual learning style are more appropriately taught with multimedia and produce higher scores than students with auditory learning styles.

Keywords: learning style; multimedia; learning outcomes

1. Introduction

Learning media or educational media were initially interpreted with learning aids or teaching aids. However, along with the development of learning technology, the notion of learning media has evolved and is broader than just a tool or props as a component of the strategy for delivering messages to be delivered by learners, in the form of people, tools or teaching materials. A media can only be said to have advantages over other learning media if it is used by learners who have characteristics (including learning styles) in accordance with the stimulation generated by the learning media.

Learning style is an important factor that is absolutely considered by the teacher in designing learning. This is in accordance with the opinion of Merrill (2000) in Jolly (2011), says that secondary style learning in selecting the fundamental components of instructional strategies is appropriate and consistent with a given learning goal. This opinion corroborates the results of the study put forward by Myron (2007), namely learning styles supported by the teaching of learning that contain scaffolding features and tailored instruction for different levels of prior knowledge.

If observed from several learning theories as mentioned by Roblyer and Aaron (2013), namely both behaviorist (BF Skinner) theory, information processing (Atkinson and Shiffrin), cognitive behavioral (Robert Gagne) and systems approaches (Gagne and Briggs), it is explained that the

technological implications in learning for students with multi-learning styles remain important. The presence of technology in learning has the potential to help students learn better, faster and make more sense.

The research conducted by Arylien et al (2018) with the title "Effect of Visual, Auditory, and Kinesthetic Learning Styles on Student Learning Achievement", shows that (1) there is a significant effect of visual, auditory and kinesthetic learning styles on learning achievement, (2) there is a significant effect of visual learning style on learning achievement, (3) there is a significant influence of auditory learning style on learning achievement, (4) there is a significant influence of kinesthetic learning style on learning achievement (5) the results of the determination test show a relative contribution of visual, auditory learning styles, and kinesthetic on student learning achievement by 34.8%. The relative contribution of each to learning achievement, namely visual learning style 26.4%, auditory learning style 24.2%, and kinesthetic learning style 26.2%.

Besides that, the results of other studies put forward by Lim et al (2013), show that adaptation to the application of technology in learning is influenced and inhibited by various factors such as conditions related to school technology resources, school culture, readiness and experience of teachers and students in using technology, and dynamics of social interaction in school systems. Then Roblyer (2013) suggests the impact of technological implications in learning with three main premises, namely (a) motivates and engages students, (b) supports students' learning needs, and (c) prepares students to learn. This is because future learning is characterized by several important characteristics, namely (1) involving individual students in total; (2) emphasizing cooperation; (3) using varied learning methods; (4) utilizing intrinsic motivation; (5) having an element of pleasure in learning (6) integrating learning activities with all aspects of student life (Heinich et al, 1993: 111).

2. Methods

2.1. Research Design and Participants

Generally, this study aims to determine the effect of exogenous variables (learning media namely conventional media and multimedia) and learning styles (visual and auditory) on endogenous variables (social science learning outcomes). The effect in question is the difference in learning outcomes of students who have a visual and auditory learning style after getting treatment by applying multimedia controlled with conventional media in learning social science. Then the selection of samples carried out through stages namely (1) provisions, namely group A which will be taught by multimedia learning media determines the treatment class for each learning media used, with and group B which will be taught with Conventional media; (2) evaluating learning styles in each class, with the results of measuring student groups with visual learning styles and groups of students with auditory learning styles; (3) the first group is students with visual learning styles, and the second group is students with auditory learning styles; (4) the composition of the study sample according to the treatment given based on learning styles based on Table 1 below:

Table 1. Research Participants (Sample)

No	Group	Sample		
		Multimedia	Conventional	Total
1	Visual Group	13	14	27
2	Auditory Group	12	11	23
	Total	25	25	50

2.2 Research Procedure

The research is carried out through 3 stages, namely preparation, implementation, and ending (closing). The preparation phase is characterized by the process of drafting an outline, namely (1) reviewing relevant teaching materials and theories, (2) making construction (conceptual and operational definitions), (3) developing dimensions and indicators, (4) making grids lattice of instruments, (5) writing items, (6) carrying out construction validation and content, (7) revising instruments, (8) conducting external validation by conducting instrument trials on respondents

outside the research sample, (9) conducting item selection questions, and (10) assembly and presentation of instruments. Especially for measuring student learning styles, in this study using standardized instruments (Learning Style Survey and Scoring Procedures worksheets) from Oregon University.

At the implementation stage, the researcher first conducts a discussion with the teacher who teaches the social sciences in school. The discussion was conducted to equalize perceptions related to the treatment process in the study. Before doing treatment in each group, the two groups were given a test first to distinguish between students of the visual learning style group and the auditory learning style group students. Then given treatment in both groups, namely the experimental group and the control group took place together and simultaneously for 9 (nine) meetings. Each meeting of both the experimental group and the control group was conducted at the same time as the school schedule. The treatment given to the experimental group is social science learning using multimedia learning media, while the treatment in the control group is learning social science with conventional media.

In the final stage, the researcher conducted a test of learning outcomes for all students who were the subjects of the study on the same day, hour and duration. This is done to see the effect of treatment, namely (1) multimedia learning, (2) conventional learning, (3) visual learning styles, and (4) auditory learning styles. The time given in answering the test is 40 minutes. After the data needed is collected, then it is continued with data analysis. Data analysis includes descriptive and inferential data analysis.

2.3 Research Instrument Grid

The instrument lattice refers to the previous definition, the following will be presented in the survey grid used to sort out the student's learning style in this study.

Table 2. Survey Grid of Learning Style Variables (Jerry, 2004: 1-6)

Aspect	Indicator	Total Item	No Item
Visual	Carefully pay attention to the subject matter.	2	1, 18
	Make notes to be reviewed again.	2	3, 17
	Use charts, maps, filmstrips, notes, and flashcards.	3	5, 20, 40
	It's easier to understand by using learning media.	3	7, 19, 37
	Visualize or describe words or concepts in his mind.	3	9, 22, 34
	Clear and coherent visual appearance.	3	11, 21, 33
	Write down everything to be more frequent and quick to see.	3	13, 24, 36
	Remember something better by displaying clearly.	2	8, 35
	Use a tape recorder and record the teacher to complete the notes.	2	2, 26
	Get to know the difference in sound better.	1	4
Auditory	Listen wholeheartedly and take notes, reviewing notes again and again.	2	6, 28
	Prefer listening to the radio rather than reading the newspaper.	1	15
	The importance of music and crowds	3	10, 32, 38
	In class always take a seat where you can listen more clearly.	2	12, 29
	After reading something, make a summary and read it aloud.	2	14, 32
	Rely on listening skills.	2	16, 31
Total		36	

3. Result

Overall the population of this study was 224 students, namely 144 students with visual learning styles and as many as 80 students with auditory learning styles. However, according to expert agreement and advice, the number of samples of this study was taken as many as 33% of the number of students from each learning style group. For that reason, affordable samples in this study were set at 50 students. The calculation results for the experimental class of 25 students have 13 people who have a visual learning style (field independent) and 12 students who have an auditory learning style (field dependent). Whereas in the control group of 25 students there were 14 people who had a visual learning style (field independent) and 11 students who had an auditory learning style (field dependent). Based on the frequency distribution of student learning outcomes scores on social science taught with conventional media, a category was created by dividing it into three groups, namely high, medium and low groups. The details of the overall research data can be seen in Table 3 below:

Table 3. Calculation of Descriptive Statistics From Research Results

Learning Style	Learning Media				Total of Rows	
	Multimedia		Conventional			
	A ₁		A ₂			
Visual (B ₁)	n _{A1B1}	13	n _{A2B1}	14	n _{B1}	27
	$\sum x$	505	$\sum x$	474	$\sum x$	979
	$\sum x^2$	19823	$\sum x^2$	16324	$\sum x^2$	36147
	s ²	15,82	s ²	19,69	s ²	24,04
	\bar{x}	38,85	\bar{x}	33,86	\bar{x}	36,26
Auditory (B ₂)	n _{A1B2}	12	n _{A2B2}	11	n _{B2}	23
	$\sum x$	390	$\sum x$	357	$\sum x$	747
	$\sum x^2$	12828	$\sum x^2$	11769	$\sum x^2$	24597
	s ²	12,75	s ²	16,61	s ²	14,60
	\bar{x}	32,50	\bar{x}	42,45	\bar{x}	32,48
Total of Columns	n _{A1}	25	n _{A2}	25	N	50
	$\sum x$	895	$\sum x$	831	$\sum x$	1726
	$\sum x^2$	32651	$\sum x^2$	28093	$\sum x^2$	60744
	s ²	24,40	s ²	18,82	s ²	16,34
	\bar{x}	35,80	\bar{x}	33,24	\bar{x}	34,52

Table 4. Frequency Distribution of Student Learning Outcomes with Visual Learning Style (B₁)

Interval Class	Absolute Frequency	Relative Frequency (%)
26 – 28	2	8
29 – 31	2	7
32 – 34	7	26
35 - 37	6	22
38 - 40	5	19
41 – 43	3	11
44 - 46	2	7
Total	27	100

Based on the results of calculations according to Table 4 above, the grouping of scores for Social Sciences learning outcomes of students with visual learning styles was obtained by 18% (5 people) in the high group, 41% (11 people) in the moderate group, and 33% (11 people) in the low group . From this it can be understood that Social Sciences learning outcomes of students with visual learning styles are generally in the middle and high groups. That is, the Social Sciences learning outcomes of students with visual learning styles are good.

Table 5. Frequency Distribution of Student Learning Outcomes with Auditory Learning Style (B2)

Interval Class	Absolute Frequency	Relative Frequency (%)
27 – 29	8	35
30 – 32	4	18
33 – 35	6	26
36 - 38	3	13
39 - 41	1	4
42 - 44	1	4
Total	23	100

Based on the results of calculations according to Table 5 above the frequency distribution of scores on students' Social Sciences learning outcomes with the auditory learning style above, the grouping of scores for Social Sciences learning outcomes of students with auditory learning styles obtained 8% (2 people) high groups, 39% (9 people) medium group, and 53% (12 people) low group. From this it can be understood that Social Sciences learning outcomes of students with auditory learning styles are generally in the middle and high groups. That is, Social Sciences learning outcomes of students with auditory learning styles are good.

Table 6. Frequency Distribution of Student Learning Outcomes with Auditory Styles with Conventional Media (A1B1)

Interval Class	Absolute Frequency	Relative Frequency (%)
32 - 34	3	23
35 - 37	3	23
38 - 40	3	23
41 - 43	2	16
44 - 46	2	15
Total	13	100

Based on the results of calculations according to Table 6 above, the grouping of scores for the Social Sciences learning outcomes of students with the experimental group auditory learning style was obtained 31% (4 people) in the high group, 46% (6 people) in the medium group, and 23% (3 people)) low group. From here it can be understood that Social Sciences learning outcomes of students with auditory learning styles are generally in the middle group. That is, Social Sciences learning outcomes of students with auditory learning styles still need improvement.

Table 7. Frequency Distribution of Student Learning Outcomes with Visual Styles with Multimedia (A2B1)

Interval Class	Absolute Frequency	Relative Frequency (%)
27 - 29	3	22
30 - 32	3	21
33 - 35	4	29
36 - 38	1	7
39 - 41	2	14
42 - 44	1	7
Total	14	100

Based on the results of calculations according to Table 7 above, the grouping of scores for Social Sciences learning outcomes of students with visual learning styles was obtained by 21% (3 people) in the high group, 36% (5 people) in the medium group, and 43% (6 people) groups low.

Table 8. Frequency Distribution of Student Learning Outcomes with Visual Styles with Multimedia (A1B2)

Interval Class	Absolute Frequency	Relative Frequency (%)
28 - 30	4	34
31 - 33	1	8
34 - 36	4	33
37 - 39	2	17
40 - 42	1	8
Total	12	100

Based on the results of calculations according to Table 8 above, the grouping of scores for Social Sciences learning outcomes of students with auditory learning styles obtained 25% (3 people) high groups, 41% (5 people) medium groups, and 34% (4 people) groups low.

Table 9. Frequency Distribution of Scores of Student Learning Outcomes with Control Group Auditory Learning Styles Learned by Conventional Media (A2B2)

Interval Class	Absolute Frequency	Relative Frequency (%)
25 - 27	1	9
28 - 30	3	28
31 - 33	3	27
34 - 36	2	18
37 - 39	1	9
40 - 42	1	9
Total	11	100

Based on the results of calculations according to Table 9 above, the grouping of scores for Social Sciences learning outcomes variables of students with auditory learning styles obtained 18% (2 people) high groups, 45% (5 people) moderate groups, and 37% (4 people) groups low.

4. Discussion

Student learning outcomes that have a higher visual learning style than auditory learning style students. This is concluded based on the results of data analysis in ANAVA test which shows that F-count (9.99) > F-Table (4.05) at 0.05 degrees of freedom, and if you see the average student with a visual learning style of 33.85 higher than the average learning outcomes of students with auditory learning styles that is equal to 32.50. This means that in general the learning outcomes of students with visual learning styles are better than students' learning outcomes with auditory learning styles. The results of the analysis above can be concluded that the hypothesis which states "integrated social science learning outcomes in students with a visual learning style higher than students in auditory learning style" is verified.

The results of the study reinforce some expert opinions stating that the condition of students' heredity with the nature of different learning styles provides an opportunity for optimal learning outcomes as long as it is optimized for its settings and usage. DePorter and Mike (2002) suggest that a person's learning style is the key to developing performance in work, at school, and in interpersonal situations. Although each researcher uses different terms and finds various ways to overcome one's learning style, it is generally agreed that there are two main categories of how we learn, namely (1) how to absorb information easily (modalities) and (2) how to regulate and processing that information (brain dominance). Furthermore, if someone is familiar with his own learning style, then he can help himself in learning faster and easier. It was also said by Levied an Levie (1975) and Gilakjani (2012) who reread the results of research on learning through image stimulus and word stimulus or visual and verbal conclusions that visual stimuli produced better learning outcomes for

tasks such as remembering, recognize, recall and connect facts and concepts. Baugh and Achsin (1986) in Tri Tugiyarti (2016) have a direct view of that. Comparison of learning outcomes through the senses of vision and sense of hearing is very prominent, the difference is approximately 90% of one's learning outcomes obtained through the senses (visual), and only about 5% is obtained through the auditory sense, and 5% with other senses (kinesthetic)) Meanwhile, Dale estimates that the acquisition of visual learning outcomes ranges from 75%, through the auditory sense to about 13% and through other senses (including kinesthetic) around 12%. This shows that students' learning styles are different and their potential is different in being able to absorb information.

5. Conclusions

Learning outcomes of students who have auditory learning styles that are taught with multimedia are the same as learning outcomes of students who have a visual learning style that is taught with conventional media. That is, specifically for auditory learning styles, both the application of multimedia and conventional media do not provide a striking difference in learning outcomes. Thus, teachers should use learning media that are appropriate to the conditions of student heredity such as their learning style. Then the student learning outcomes learned with multimedia with a higher visual learning style compared to students with auditory learning styles. That is, students with a visual learning style are more appropriately taught with multimedia and produce higher scores than students with auditory learning styles.

So that the learning outcomes of students who have auditory learning styles are the same as students who are taught with conventional media. This has implications for students with auditory learning styles not showing differences in learning outcomes with the application of conventional media. Thus, (1) it is important for teachers and schools to recognize the basic characteristics of students such as different student learning styles, intelligence levels and other characteristics, and (2) teachers should use appropriate learning media in accordance with the conditions of student heredity such as learning styles. Then the learning outcomes of students with visual learning styles are higher than students with auditory learning styles that are taught with multimedia. This has implications for students with visual learning styles unlike students with auditory learning styles that can be learned with multimedia because they show different learning outcomes.

Therefore, the research team advised the Social Sciences subject teachers to find learning solutions for students with auditory learning styles, namely by applying multimedia learning media and conventional media that emphasized the strengthening of the audio spectrum. Then to students so that students with visual learning styles are taught with multimedia that emphasizes visual imagery as students with auditory learning styles that emphasize an adequate audio spectrum.

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