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The Effect of Mobile Learning and Learning Style toward Students' Learning Achievement

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Abstract:

This research aims to determine the effect of mobile learning and learning styles on science learning result controlled by motivation achievement. This research used a quasi-experimental method with a 2x2 factorial design. The results showed that: (1) students' science learning result who used mobile learning was better than direct learning; (2) students' science learning result who has high visual learning style was not different than lower visual lerning style; (3) there was an interaction between learning approach and learning style; (4) students' science learning result who used mobile learning was higher than direct learning compared with the group of higher visual learning style students; (5) students' science learning result who used mobile learning was not different than direct learning to the group of higher visual learning style students; (6) students' science learning result who has high visual learning style was higher than low visual learning style compared with the mobile learning students group; and (7) students' science learning result who has high visual learning style was not different than low visual learning style compared with the direct learning students group.

Keywords: *Mobile Learning, Direct Learning, Motivation Achievement, Science Learning Result, Visual Learning Style.*

INTRODUCTION

Learning science in the context of teaching and learning is very instrumental in the process of educational and technological development, because science is able to arise human interest and the ability to develop science and technology (science and technology). Therefore, science education has a duty to prepare quality students, namely people who are able to think logically, critically, and creatively and take initiative in responding to the issues of development of science and technology in society

Mobile learning (M-learning) is a new trend that attracts many parties to explore this technology, learn about the impact on students and educators, and develop the infrastructure needed. M-learning has involved mobility from a number of dimensions: technological mobility, student mobility, educator mobility, and learning mobility (Al-Emran, 2016). In the other hand, only a few schools use a combination of lecture, discussion, question and answer methods and practices in the laboratory and learning resources that utilize various media such as video, multimedia and the internet that are utilized through smartphones (mobile-learning). In schools that are in good groups, the use of learning resources that optimize mobile technology is a must. In addition, the school prioritizes student independence in learning by finding the latest information via mobile or smart phone. Learning

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approaches that are appropriate to science learning will affect student learning result.

One of learning approaches that is able to provide solutions to learning problems is the mobile learning approach. Bonk and Graham (2009: 4-5) explain that mobile learning is a combination of two learning models namely face-to-face learning and learning that uses smartphone media such as the internet, the web and others. While the learning approach that plays a limited role but very important in a comprehensive education program is the direct learning approach which is also called direct instruction. Joyce, Weil and Calhoun (2009: 369).

Beside learning styles, another factor that influences learning result is achievement motivation. Atkinson with achievement motivation theory explains that success is influenced by the probability of success and attractiveness in achieving it, while to avoid failure is developed from repeated failures experienced and set goals that cannot be achieved (Biehler and Snowman, 1986: 479-480). Atkinson's opinion is in line with McClelland's achievement motivation as a product of two conflicting needs, the need to achieve success and the need to avoid failure (Crowl, Kaminsky and Podel, 1997: 238). While Winkel (1991: 96) said, achievement motivation (achievement motivation) is the driving force in students to achieve the highest level of learning achievement, for the sake of self-appreciation. The Weiner developed attribution theory based on achievement motivation theory

RESEARCH METHOD

This research employed a quasi-experimental method with a 2 x 2 factorial design. The research variable consists of one dependent variable that is the science learning result and two independent variables namely the learning approach (mobile learning and direct learning) as the treatment variable and learning style (high visual learning style and low) as an attribute variable. While achievement motivation is a covariate variable.

The population in the research were all students of SMPN in East Lombok. There were 112 students from four different classes were randomly selected and obtained as the research sample from grades VIII E and VIII F. These grades were selected as the experimental group, and class VIII A and VIII B were selected as the control group. Class VIII was taken purposively with the assumption that grade VII students had just started learning with a mobile learning approach while grade IX students were not allowed because they were prepared to face the National Final Examination (UAN). For the purposes of the analysis, each experimental and control group was taken 28% upper limit of 56 students and 28% lower limit of 56 students, so that the total sample was 64 students with a distribution in each cell of 16 students.

The research instruments were in the form of tests and questionnaires. The multiple-choice test was used to collect data on science learning result. While the Likert scale questionnaire with five answer choices (5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never for a positive statement and vice versa for a negative statement) is used to obtain learning style and motivation data achievers.

The data analysis technique used co-variance (ANACOVA) followed by t-test (Kadir, 2010: 242). Before doing the analysis, the requirements test must first include: (a) normality test with Lilliefors test, (b) homogeneity test using Bartlett test, (c) regression linearity test was done through least squares test (Sudjana, 2005: 261-467) , (d) homogeneity test of the regression coefficient with the F-test (Sudjana, 1991: 352-353), (e) significance test of the regression effect

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using the F-test and (f) the regression line alignment test using the statistical test of heterogeneous slope coefficient (heterogenous slope) (Agung, 2006: 188-190).

RESEARCH FINDING

Description

This part presents a description of achievement motivation data and science learning result wich constituted of the number of samples, average score (mean), and standard deviation (standard deviation). Comparison of science learning result of students who use mobile learning and direct learning can be seen in table 1 as follows.

Table 1. Recapitulation of Motivation Score Achievement and Natural Sciences

Learning Result in All Research Groups

Visual Learning Style(B)		Learning Aproach (A)				Σ	
		Mobile Learning (A_1)		Direct Learning (A_2)			
		Xi	Yi	Xi	Yi	Xi	Yi
High (B_1)	n	16	16	16	16	32	32
	/	129,75	85,19	117,25	75,13	123,50	80,16
	s	8,83	5,17	10,84	6,73	11,61	7,81
Low (B_2)	n	16	16	16	16	32	32
	/	121,06	77,25	127,13	81,06	124,09	79,16
	s	13,54	6,08	12,36	6,56	13,12	6,52
	n	32	32	32	32	64	64
Σ	/	125,41	81,22	122,19	78,09	123,80	79,66
	s	12,08	6,86	12,48	7,20	12,29	7,15

Explanation:

X : Motivation Achievement Y : Science Learning result

n : Number of students per-group

: Motivation Achievement average (variabel covariat)

: Science Learning result average (variabel dependent)

s : Standard Deviation

Hypothesis test

A two-path covariance analyst followed by a t-test (Kadir, 2010: 246) was used to test the hypothesis. After calculating the data taken frrom the data of science learning result and motivation achievement, it is obtained that the results are as in Table 2 below.

Table 2. ANACOVA Calculation Results

Varians Resources	dk	JKres	RJK_{res}	Fcounting	FTable	
					α = 0.05	α = 0.01
Coloumn (A)	1	39.89	39.89	4.90^{*}	4.00	7.08
Line (B)	1	26.28	26.28	3.23^{ts}	4.00	7.08
Interaction (AxB)	1	87.10	87.10	10.69^{**}	4.00	7.08
In Group (*Error*)	59	480.53	8.14	-	-	-
Total	62	633.80	-	-	-	-

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Explanation:
* = significancy ** = very significant
ts = not significant
JK_{res} = the amount of the residual squared amount
RJK_{res} = Average of the residual squared amount

Differences of Science Learning Result between Students Using the Mobile Learning and Direct Learning Approaches After Controlling Achievement Motivation.

The ANACOVA accounting results showed that $F_{count} = 4{,}90 > F_{Table} = 4$ pada $\alpha = 0{,}05$, it means that the null hypothesis is rejected. This means that there is a significant difference between the learning result of science students who use the mobile learning approach with the

direct learning approach. While based on the data obtained $_1$ = 81,22 > $_2$ = 78,09; means that the learning result of science students who use a mobile learning approach is higher than the direct learning approach.

Differences of Science Learning Result between Students Who Have High and Low

Visual Learning Styles After Controlling Achievement Motivation.

Based on the ANACOVA accounting results which showed that $F_{count} = 3{,}23 < F_{Table} = 4$ pada $\alpha = 0{,}05$, means that the null hypothesis is accepted. This means that there is no significant difference between the science learning result of students who have high visual

learning styles and low visual learning styles. While based on the data obtained $_1$ = 80,16 >

$_2$ = 79,16, this shows that although the average value of student learning result that have high visual learning styles is greater than students who have low visual learning styles statistically the difference is not significant. In other words, the learning result of students who have high and low visual learning styles are not much different or the same.

Interaction between Learning Approaches and Learning Styles on Science Learning

Result after Controlling Motivation Achievement.

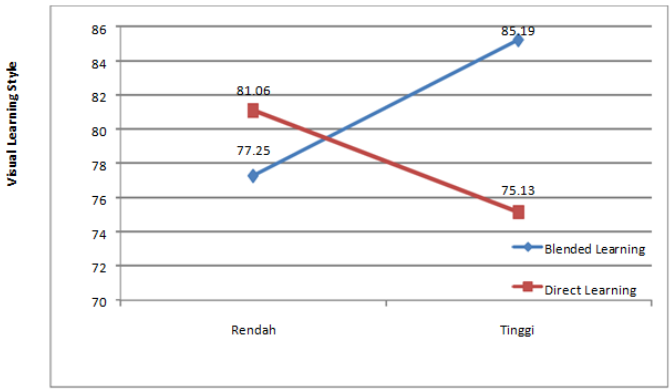
Obtained the results of research data as follows: (1) on high visual learning styles,

student learning result of science using mobile learning ($_{11}$ = 85,19) higher than direct

learning ($_{21}$ = 75,13); and (2) in low visual learning styles, student learning result in

science using direct learning ($_{22}$ = 81,06) higher than mobile learning ($_{12}$ = 77,25). While calculations with ANACOVA were obtained $F_{count} = 10{,}69 > F_{Table} = 4$ pada $\alpha = 0{,}05$, means the null hypothesis is rejected. This means that there is an interaction between learning approaches and learning styles on the learning result of Natural Sciences.

In the graphs of interaction between learning approaches and learning styles on learning result of science can be seen in Figure 1 below.



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Science Learning Outcomes

Gambar 1. Graphic of Interaction of Learning Approaches and Learning Styles on

Science Learning Result.

To see the effect of these interactions, and the t-test results can be seen in Table 3.

Table 3. T-Test Summary Results in the Treatment Group

Compareded Group		tcount	tTable	Conclusion
A_1B_1	with A_2B_1	4,08**	1,67	thit > ttab
A_1B_2	with A_2B_2	0,92*	1,67	thit < ttab
A_1B_1	with A_1B_2	3,78**	1,67	thit > ttab
A_2B_1	with A_2B_2	1,22*	1,67	thit < ttab

Explanation:

* = H_0 rejected on $\alpha = 0,05$, $db_{res}(D) = 59$

** = H_0 received at $\alpha = 0,05$, $db_{res}(D) = 59$

A_1B_1 = Students who use a mobile learning approach that have a high visual learning style

A_1B_2 = Students who use a mobile learning approach that have a low visual learning style

A_2B_1 = Students who use the direct learning approach that have a high visual learning style

A_2B_2 = Students who use the direct learning approach that have a low visual learning style

Differences of Science Learning Result among Students Using the Mobile Learning and Direct Learning Approaches toward Students who Have a High Visual Learning Style after Controlling Motivation Achievement.

Science learning result of students who use a mobile learning approach ($_{(11)}$ = 82,36) was higher than the science learning result of students who use the direct learning

approach ($_{(21)}$ = 78,24) in students who have high visual learning styles after controlling motivation achievement, with score $t_{count} = 4,08 > t_{Table} = 1,67$ at $\alpha = 0,05$.

Differences of Science Learning Result among Students Using the Mobile Learning and Direct Learning Approaches toward Students who Have a Low Visual Learning Style after Controlling Motivation Achievement.

Science learning result of students who use a mobile learning approach ($_{(12)}$ = 78,55) was not different or the same as the science learning result of students who use the

direct learning approach ($_{(22)}$ = 79,48) in students who have low visual learning styles after controlling achievement motivation, with score $t_{count} = 0,92 < t_{Table} = 1,67$ pada $\alpha = 0,05$.

Differences in Science Learning Result of Students Who Have High and Low Visual Learning Styles toward Students Using the Mobile Learning Approach after Controlling Achievement Motivation.

Science learning result of students who have high visual learning styles ($_{(11)}$ = 82,36)

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higher than the science learning result of students who have low visual learning styles

((12) = 78,55) in students who use the mobile learning approach after controlling achievement motivation,with score $t_{count} = 3,78 > t_{Table} = 1,67$ at $\alpha = 0,05$.

Differences in Science Learning Result of Students Who Have High and Low Visual Learning Styles toward Students Using the Direct Learning Approach after Controlling Motivation Achievement.

Science learning result of students who have high visual learning styles ((21) = 78,24) no different or the same as science learning result of students who have low visual

learning styles ((22) = 79,48) in students who use the direct learning approach after controlling achievement motivation, with score $t_{count} = 1,22 < t_{Table} = 1,67$ at $\alpha = 0,05$.

DISCUSSION

The first hypothesis shows that there was a significant different influence between the mobile learning and direct learning approach, in which the learning result of science students who use a mobile learning approach was **higher than** the direct learning approach. Students who use the mobile learning approach were better at understanding and mastering the science subjects, because they had the opportunity to understand what was learned, motivate them to study harder and develop their thinking skills by utilizing internet media, so that learning result are obtained maximally002E

This is in line with the theory put forward by Clark (Plomp and Ely, 1996: 59) and supported by research by Ibrahim and Zainudin (2014: 45) that there are five functions of the media (internet) in learning, namely: (1) the internet as a technology or tools, (2) the internet as a tutor or teacher, (3) the internet as a social agent, (4) the internet as a motivator, and (5) the internet as a learning problem solver.

The second hypothesis shows that the science learning result of students who have a high visual learning style are no different from a low visual learning style. The reality in the class shows that students have not only one preferred learning style but two preferred learning styles, one of which reinforces the main learning style. This means that students who have low visual learning styles, also have other learning styles such as auditory, so that the learning process with lecture and discussion methods can improve student learning result with low visual learning styles in addition to the use of internet / web-based media via smartphones.

The third hypothesis shows that there is an interaction between learning approaches with learning styles on learning result of Natural Sciences. This means that the learning approach has an influence on science learning result depending on learning styles and vice versa. To improve science learning result, students are better off using a mobile learning

approach especially for groups of students who have high visual learning styles. Whereas for groups of students with low visual learning styles more suited to the direct learning approach.

The fourth hypothesis shows that the science learning result of students who use the mobile learning approach are higher than the direct learning approach, in students who have high visual learning styles. This is because the mobile learning approach is a learning approach

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that utilizes internet media and web-based technology in computer laboratories in supporting classroom learning. Learning material available on the internet or the web is displayed in various formats such as online modules, animated images, videos and audio-videos that are interesting and innovative, so students with high visual learning styles will more quickly understand and understand science material.

The fifth hypothesis shows that the science learning result of students who use the mobile learning approach are not different or the same as the direct learning approach, in students who have low visual learning styles. This is because students with low visual learning styles also have other learning styles such as auditory that prioritizes face-to-face learning with lecture and question-and-answer methods, so students who have low visual learning styles understand and understand science material that is delivered directly by the teacher in addition utilizing internet media and web-based technology. These results are consistent with the opinions expressed by Rita and Kenneth Dunn (Denig, 2004: 103) and Honey and Mumford (Pritchard, 2009: 43) that most students have more than one main learning style, namely secondary learning styles that can be used to strengthen the main learning styles effectively, so that the learning result obtained are more optimal.

The sixth hypothesis shows that the science learning result of students who have high visual learning styles are higher than low visual learning styles, on students who use the mobile learning approach. This is because for students with high visual learning styles, science materials will be more quickly understood and understood if they use a mobile learning approach that utilizes internet media and web-based technology, so that learning result are obtained optimally.

The seventh hypothesis shows that the science learning result of students who have high visual learning styles are not different or the same as low visual learning styles, on students who use the direct learning approach. This is because the direct learning approach also uses the display of silent visual media such as photographs, still images, graphs and maps in books and / or power points and allows students who have high visual learning styles to be able to understand natural science material so that learning result can be optimized. The results of this research are in line with the opinion of Chambers (Dabbagh and Bannan-

Ritland, 2005: 3) about one of the seven aspects of the direct learning environment (conventional) is known technology. What is meant by known technology is the media used in the face-to-face learning process, namely books, still images, graphics, photos and / or power points. The media allows students with high visual learning styles to be able to understand the science material taught with a direct learning approach.

CONCLUSION

After conducting the research, it is concluded that:

1. Students' science learning result who used a mobile learning approach was higher than direct learning after controlling thier motivation achievement. This means that the use of an appropriate learning approach during the learning process can affect students' learning result in science especially the mobile learning approach. Integrating various methods, sources and media in a mobile learning approach can help teachers to increase students' motivation achievement which ultimately increases their learning achievement.

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2. Students' science learning result who have high visual learning styles were not different than low visual learning styles after controlling thier motivation achievement. This shows that students' learning styles do not really affect the learning result of science.

3. There was an interaction between the learning approach by using learning styles on the learning result of science after controlling students' motivation achievement. This means that the effect of the mobile learning approach on science learning result is different in students who have high visual learning styles with low visual learning styles. For this reason, teachers must be able to choose a learning approach that is appropriate to the learning styles of students and utilize media and methods of learning or learning that are interesting and innovative according to the characteristics of their students, so that the learning or learning process can run effectively and student learning result can be optimized.

4. Students' science learning result who used a mobile learning approach is higher than the direct learning approach, in students who have a high visual learning style after controlling student achievement motivation. This means that the learning approach for students who have high visual learning styles that have been using the direct learning approach can be replaced with the mobile learning approach.

5. Students' science learning result who used the mobile learning approach are not different or the same as the direct learning approach, in students who have a low visual learning style after controlling student achievement motivation. This means that students with low visual learning styles have other learning styles such as auditory that reinforces visual learning styles, so the teacher needs to adjust the learning approach used with student characteristics.

6. Students' science learning result who have high visual learning styles are higher than low visual learning styles, on students who use the mobile learning approach after controlling student achievement motivation. This means that high visual learning style students are better suited to the mobile learning approach, so teachers need to accommodate low visual learning style students.

7. Students' science learning result who have high visual learning styles are not different or the same as low visual learning styles, on students who use the direct learning approach after controlling student achievement motivation. This means that the direct learning approach also uses the display of silent visual media such as maps, still images, graphics and photographs, so that students with high visual learning styles are able to understand and understand the science material being studied.

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