

Relationship Analysis ICARE-Oriented Students Worksheet Development With Learning Styles To Improve Learning Outcomes

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ABSTRACT

This study is the first year of three years. This study aims to describe the relationship of the development of teaching materials to learning styles in improving learning outcomes. The type of research used in the entire study is Research and Development (R & D). Research subjects are lecturers and Students in Basic of Mathematics and Sciences Group. The first year's study contains the need assessment, and the drafting of the initial draft of textbooks for high school physics courses with ICARE-oriented Students Worksheet. Data collection techniques used were questionnaire, observation, interview, and documentation study, and supported by logbooks and focus group discussion (FGD). The results shown in the development of the device indicate that the development of ICARE-based teaching materials is not influenced and does not have a significant relationship in one of the learning styles.

Keywords: Development ICARE, Learning Outcomes, Learning Styles

INTRODUCTION

Relation to the application of the block system curriculum, Dekan FMIPA Unimed (2017), explains that the learning approach in lectures using scientific approach is equipped with six tasks: (a) routine task (TR), (b) critical book report (CBR), (c) critical research / journal review (CRR / CJR), (d) mini research (MR), (e) Project (Pr), and idea engineering (RI). Scientific approach (scientific) in this research called scientific method (scientific method) is a learning technique to formulate questions and answer questions through activities: observation, try to make activities, or carry out experiments. Therefore, the implementation of the scientific method is structured in seven steps: (1) formulating the problem, (2) formulating the research background, (3) formulating the hypothesis, (4) designing the experiment, (5) data collection, (6) analyzing results and drawing conclusions, and (7) reporting results (Majid & Rochman, 2013; Motlan, Sinuraya, J., & Tarigan, R. (2012)).

One of the courses contained in the KKNi-based block system curriculum is school physics. Learning tools that are needed, among others, is a school physics textbook that is oriented to a scientific approach (scientific). The textbook is not yet available. Therefore, it is necessary to

develop a school physics textbook in accordance with the demands of the KKNI based block curriculum system.

The textbook is a collection of printed materials printed in book form. Teaching materials are lectures arranged systematically used by lecturers and students in lecturing process (Pannen, 2001). According to Sungkono, et al. (2003) teaching materials are teaching materials that are "designed" to achieve learning objectives. Poerwati, et al. (2013) explained that the textbook is a handbook for a course written and composed by related field experts and meet the rules of textbooks and published officially and disseminated. The principle of textbook development can be used through: (1) classroom-oriented models, (2) product-oriented models, and (3) system-oriented models (Gustafson, 2002). Classroom-oriented models, are models related to the learning process that takes place in the classroom.

To optimize the use of high school physics textbooks in learning activities, the textbooks are accompanied by ICARE-oriented Students Worksheets. The Students Worksheet is one of the teaching materials used as a guide to conduct investigation or problem-solving activities (Trianto, 2008). The Students Worksheet is one of the teaching materials used as a guide for conducting investigation or problem-solving activities. The inclusion of Students Worksheets, in the textbook, lecturers can direct students to engage in aspects of knowledge, skills, and attitudes together. The connection in the teaching of textbooks, Dick & Carey (2009) explains that the first step must be processed to develop textbook is a needs analysis (need assessment). Aspects studied through requirement analysis activities include: (a) student learning styles, (b) model needs or learning approaches, (c) student learning characteristics, (d) facilities and infrastructure, (4) availability of worksheets and so forth. People who have a visual learning style tend to use more vision; they have a strong sensitivity to color, and only have sufficient understanding of artistic problems (Sinuraya, J. (2004)). Weaknesses for visual styles according to Uno, H. B. (2008) are difficulty in following verbal suggestions and often misinterpret words or utterances.

Characteristics of visual learning style according to De Porter, B & Hernacki, M. (2001) are not generally distracted by the commotion, (a) tend to remember what is seen than what is heard, (b) prefers to read rather than read, (c) readers are quick and diligent, (d) often know what to say, but are not good at picking words, (e) remembering visual associations, (f) having problems remembering verbal instructions unless written, and often asking help people to repeat it, (g) careful attention to detail.

Auditoria learning style is a learning style that utilizes the sense of hearing to facilitate the learning process. De Porter, B & Hernacki, M. (2001) easily disturbed by noise or commotion, (a) enjoy reading aloud and listening, (b) finding it difficult to speak to oneself at work; writing, but great in storytelling, (c) prefers to learn by listening and remembering things by way of discussion rather than by seeing, (d) liking to talk, discuss and explain things at length.

Kinesthetics learning style is a learning style that more easily absorbs information by moving, doing, and touching something that provides certain information so that he can remember it. De Porter, B & Hernacki, M. (2001), student characteristics with kinesthetics learning styles: a) speaking slowly, b) difficulty remembering the map unless he / she has been there, c) memorizing by walking and seeing, d) using the finger as a guide while reading, e) unable to sit still for long, f) the possibility of writing is ugly, g) always physically oriented and moving a lot, h) wanting to do everything.

In addition to considering the style of learning, it is also necessary selection of learning approaches in accordance with student learning styles and the scientific approach set forth in school physical school textbooks. One of the learning approaches that is consistent with the scientific approach is the ICARE approach, ie the learning Phases contain: Introduction (I), connecting (C), applying (A), reflecting (R) and extending (E)

Phase I: Introduction at this Phase the outline of the overall subject matter, the objectives to be achieved, the prerequisite material, the time required, the activities and the evaluation to be performed, as well as the necessary reading material. At this Phase is also intended to determine the extent of understanding and interest of students in following the lesson to be given.

Phase II: Connecting, at this Phase it is introduced facts, concepts, principles, and / or processes related to the material to be studied. In this activity gives students the opportunity to discover facts, concepts, and principles. There are 4 steps suggested by Pastor (Wahyudin & Susilana (2012)) at this Phase: 1) divide the material into sub-topics to make it easier for students to understand new information; 2) linking information to tasks related to the real world and prior knowledge; 3) facilitate students with information in Phases and continuous so that is a meaningful learning series; 4) presents the material to be presented more pleasantly with various approaches and media usage.

Phase III: Applying, This Phase provides challenges and activities that enable students to apply the knowledge they gain in phase II by providing real-world issues. Simulation, game, or guessing activities are very well done at this Phase. Another activity that can also be done at this Phase is to ask students to find other relevant sites.

Phase IV: Reflecting at this Phase students are asked to reflect on what they have learned, what they gain and experience gained from the connected to apply Phase. This can be done in several ways including: discussing about online learning, asking students to create concept maps, visually represent relationships between concepts. Concept maps are very useful for students to help expand new information.

Phase V: Extending, at this Phase it gives students the opportunity to extend the knowledge gained by challenging the wider problem. There are two main activities in this final phase, namely: 1) Provide enrichment and remediation activities; 2) Provide evaluation on the mastery of student materials and evaluation of instructional materials or learning design. In train students' science skills, support tools are required, including textbooks, ICARE oriented student workbooks. ICARE stands for introduction, connect, apply and reflect and extend. ICARE is one of the effective learning strategies in e-learning environment (Salyers, et al., 2010). ICARE's learning strategy put forward the following characteristics: active, creative, and fun (joyful learning) (Wahyudin, 2010). The ICARE strategy is designed for online learning. According to Pastor (Wahyudin & Susilana (2012)), ICARE is designed to help students learn online effectively. The ICARE principle is to present the essential material for each topic. NSES (1996) explains that students study science through science skills such as observing concluding and experimenting. Science is concerned with how to systematically find out about nature, so science is not just the mastery of a collection of knowledge in the form of facts, concepts or principles but also a knowledge of the process of discovery. These skills are: observing, classifying, measuring, summarizing, forecasting, and communicating. With the result of the school physiology textbook that contains the physics material that refers to the learning style of the students, as well as complement the ICARE-oriented Students Worksheet

is expected to train the students to carry out scientific skills that impact on improving process quality and student learning outcomes in the range of school physics material.

RESEARCH METHODS

The location of this research is done by Universitas Negeri Medan Faculty of Mathematics and Natural Sciences. The research was conducted for 3 (three) years i.e. Academic Year 2017/2018 and 2018/2019. The development target is the third semester students who are taking high school physics course of Physics Education Study Program of FMIPA Universitas Negeri Medan in Academic Year 2017/2018 and 2018/2019. The main activity of this research is needs analysis in the development of textbook based on ICARE. This study involved an assessment of student learning styles on the ICARE approach. Implementation of this research is still limited to the preliminary study (need assessment) related to the lecturer's perception of the need to use the concept of ICARE in the development of teaching materials of high school physics course, and description of student learning style. Steps for Development of Textbooks In the previous section it has been pointed out that Gall & Borg (2007) explain that: the system approach model designed by Dick and Carey, consisting of 10 steps as in Figure 1. The data collected in this study is data qualitative, which is then analysed descriptively.

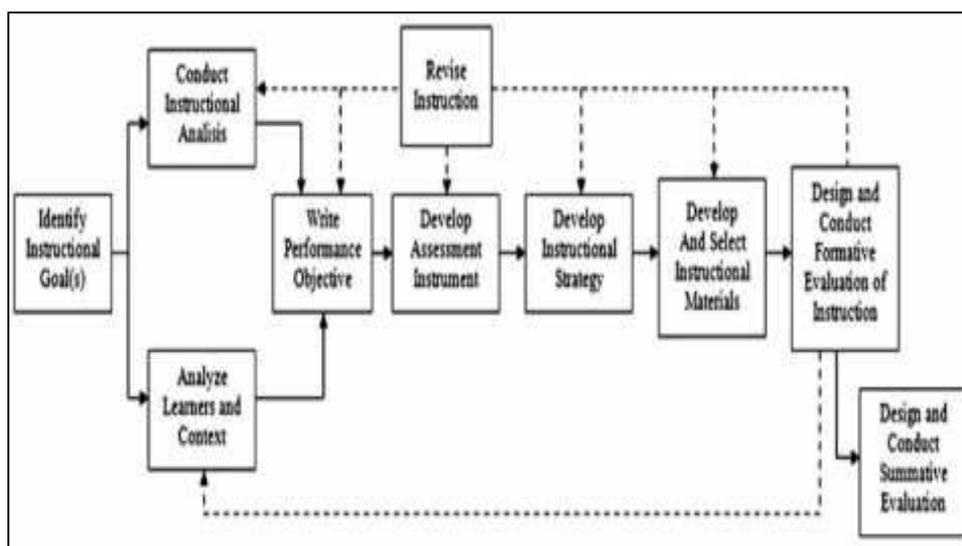


Figure 1. Development Stages of Dick & Carey Design (2009)

Research on development of high school physics textbooks with ICARE oriented LKM begins with needs analysis as a reference for developing textbook will be developed. The analysed aspects are limited to: (1) the need to use the concept of ICARE in textbooks, (2) student learning styles, and (3) students' self-responsiveness to learning. After doing the needs analysis continued the development of textbook draft by considering the results of needs analysis. The completed draft of the textbook was continued with validation by 3 (three) experts, materials experts, media experts, and strategists, 3 (three) student formative tests, and a small group test of 15 (fifteen) students.

RESULTS AND DISCUSSION

Based on Table 1 it can be seen that the result of instrument testing in assessing student learning style is more dominated by Visual learning style. For the other two learning styles does not mean not to play but to have an influence in learning. This is because in every learning conducted the use of ICARE also requires students not only on sight but also with the other two learning styles. It is proven that the comparison or difference of the three learning styles is very low.

Table 1. Distribution of Instrument Items Based on Student Learning Styles

VISUAL		AUDITORY		KINESTHETIC	
No Item	Score	No Item	Score	No Item	Score
3	175	1	115	4	158
4	159	5	94	6	170
8	142	8	116	9	166
11	156	11	132	12	92
15	97	13	106	15	97
17	164	18	110	17	114
20	140	21	101	20	133
23	151	24	111	23	134
Total	1184		885		1064
Score Max	1600		1600		1600
Average	74,00		53,44		66,50

The result of data analysis showed that the difference of learning styles and the application of ICARE in the learning showed a positive correlation to the responsiveness of the students who implemented the learning (Sinuraya, J., Simatupang, S. & Wahyuni, I. (2014)). Learning tools developed can help the implementation of learning become more interesting to do in this learning style used kinesthetic (Trianto, (2008), Motlan, Sinuraya, J., & Tarigan, R. (2012)).

Hypothesis test results (Table 2) show that for both tests conducted as a test of learning outcomes there is no influence of learning styles on learning outcomes. This is because in the submission of the test composition test given is not based on one of the learning styles that want to be emphasized as the basis for development. This is indicated by the value of Sig. > 0.05. Test development is given with the aim to improve competencies that support the quality of teaching materials development and achieve learning objectives of teaching materials that are developed not on improving certain learning styles (Cassidy, 2004; Duckett & Tatarkowski, n.d.; Husain, 2000; Sadler-smith & Riding, 1999; Sastromiharjo & Pd, 2008).

Table 2. Hypothesis Test

Model	Sum of Squares	Mean Square	F	Sig.
1 Regression	107.143	107.143	0.884	0.364 ^a
Total	1683.333			

a. Predictors: (Constant), Learning Style

b. Dependent Variable: pretest

Model	Sum of Squares	Mean Square	F	Sig.
2 Regression	10.971	10.971	0.319	0.582 ^a
Total	457.733			

a. Predictors: (Constant), Learning Style

b. Dependent Variable: posttest

Table 3. Regression Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
1	0.252 _a	0.064	-0.008	11.011	0.064	0.884	0.364

a. Predictors: (Constant), Learning Style

b. Dependent Variable: pretest

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
2	0.155 _a	0.024	-0.051	5.862	0.024	0.319	0.582

a. Predictors: (Constant), Learning Style

b. Dependent Variable: posttest

From Table 3 regression test obtained the value of correlation coefficient on the initial test (R) of 0.252 with the reliability value (R Square) of 0.064; for the correlation coefficient (R) of 0.155 with the reliability value (R Square) of 0.024. Based on this, it can be explained that the use of learning outcome tests used is the basis for the development of teaching materials. Teaching materials developed with the results of the proposed test have a significant effect but not for learning styles (Felder & Henriques, 1995; Mazlan, Harun, & Zainuddin, 2012; Sadler-smith, 1996). Learning style does not become a basic influence of development in improving learning outcomes. This is because learning style is one of the development of ways of learning that students do in developing themselves. This is also evidenced from the correlation test of learning style with the results of learning tests in Table 4.

Table 4. Correlation Test

		pretest	Learning Style
Pearson Correlation	pretest	1.000	-0.252
	Learning Style	-0.252	1.000
Pearson Correlation	posttest	1.000	-0.155
	Learning Style	-0.155	1.000

Based on Table 4 it is known that the correlation coefficients of learning style variables and pretest $r_{xy} = -0.252$; for the correlation coefficient of learning style variables and posttest $r_{xy} = -0.155$. With this coefficient, the negative r indicates that the relationship between the two variables has no relationship. Learning styles have a significant influence on learning outcomes. Learning style is used as the basis for a person to get information to make a memory that can facilitate students to develop themselves. This is not used as an improvement in teaching materials produced with the aim of improving the quality of learning through teaching materials (Al-arfaj, 2016; Ali, Nur, & Rubani, 2009; Mazlan et al., 2012; Restami, Suma, & Pujani, 2013; Zajacova, 2013). In addition, the instructional material produced leads to the generalization of the students learning styles and does not specialize in certain learning styles.

CONCLUSION

The results shown in the development of the device indicate that the development of ICARE-based teaching materials is not influenced and does not have a significant relationship in one of the learning styles. This is because the development of teaching materials is focused on learning outcomes and activities in learning in the self-development of students. This aims to optimize learning and learning outcomes.

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