Conference Paper

The Validity and Practicality of the Integrated Learning Model: Physics, Digital, and Local Wisdom

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Abstract.
Local wisdom is created through the process of integrating humans with nature or the environment for a long time, from generation to generation to form a value system (customs, beliefs, and culture). Local wisdom can be integrated into physics learning because it studies natural phenomena and all their interactions. Local wisdom will be investigated and digitally represented so as to support understanding concepts for solving physics problems, scientific literacy, and digital literacy. The purpose of this research is to design digital learning that is integrated with local wisdom to improve students' physics problem-solving skills, scientific literacy, and digital literacy. This study uses a development research design with phases consisting of the preliminary phase, prototype phase, and assessment phase. However, in this paper, the validity and practicality of the developed learning are represented. The results showed that the content validity of the digital learning model which was integrated with local wisdom in very valid criteria, the validity of the construct in the criteria is very valid, and the model developed is in the practical category, in terms of the implementation of learning with good and very good categories, as well as student activities that are relevant in learning have increased. This model is expected to be an alternative model for learning physics according to future needs.

Keywords: Integrated learning, physics, digital learning, local wisdom, validity, practicality

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1. Introduction

Local wisdom comes from the interaction between humans and the environment through a long (long-lasting) and hereditary internalization process. In this process, there is an evolution of values crystallized in the form of customary law, local beliefs, and culture. The perspective and translation of the local wisdom of the community need to be reviewed from various sides to obtain comprehensive knowledge. Local wisdom needs to be conveyed in schools, even though most learning enters the digital era so that it is not lost by the times. In addition, to strengthen character education, local wisdom can be considered in learning.

Physics is one of the fields of natural science that studies natural phenomena around. Looking at the initial process of internalized local wisdom from human interaction with the environment, it is related to physics. Therefore, physics learning needs to be developed with the aim of equipping mastery of content and also equipping the ability to understand surrounding natural phenomena, including local wisdom, by adapting digital technology (integrated learning). Integrated learning is learning that connects various concepts from several disciplines (1). Integrated learning is oriented to student activity and students' prior knowledge is very helpful in understanding concepts, as well as determining learning success. For this reason, teachers must be creative in designing enjoyable and meaningful learning for students so that students can relate the concepts they learn to events or phenomena in everyday life.

In this study, learning is designed that integrates indigenous knowledge of local wisdom, scientific knowledge in physics, and learning technology, with mixed learning meetings (face-to-face and online instructions) (2, 3, 4). Face-to-face learning takes place in the classroom and online instruction also offers additional learning opportunities through digital platforms. Digital learning supplements are open to every student and can be accessed anytime and anywhere via the internet. This learning also provides convenience for teacher and student interactions that can be done anytime, not limited by space and time. The learning syntax developed consists of 1) Orientation: directing students to local wisdom which will be explained with the concept of physics; 2) Seeking: seeking learning information from various sources of information available online, books, as well as delivering/demonstrating empirical phenomena of science in local wisdom through face to face in class; 3) Investigation: Provide opportunities for students to conduct scientific investigations and interpret and elaborate information personally and in groups; 4) Synthesizing: reconstructing knowledge through the process of assimilation and accommodation from the results of analysis, discussion and formulation of conclusions from the information obtained; and 5) Evaluation: Examine the knowledge obtained from the process of investigating physical phenomena on local wisdom that has been presented previously.

Integrated learning models (physics, digital, local wisdom) were further validated through focus group discussions (FGD). The specification of the validity of the learning model developed consists of 1) content validity (indicator: the need for model development and design based on the latest knowledge); 2) construct validity (indicators: an overview of the model and syntax, theoretical and empirical support, learning objectives, and learning environment) (5, 6). While the practicality of learning includes implementing learning models and relevant student activities in learning (7, 8).

2. Method

The research development design was used in this study. The research stages consist of 3 phases, namely introduction, prototype, and assessment (9). In the preliminary phase, a review of the latest literature and a field study of integrated learning is carried out. In this research, integrated learning is physics, digital, and scientific literacy. In the prototype phase, prototypes are made in the form of learning models to be implemented in classroom learning. In this phase, an assessment of the validity of the integrated learning model (physics, digital, scientific literacy) was also carried out (hypothetical model). In the assessment phase, the implementation of the learning model is carried out to obtain practicality and effectiveness. However, in this paper, only the validity and practicality of the developed learning model are presented.

Practical trials of the learning model were conducted at SMA N 12 Semarang. The research subjects were students of class XI, totaling 32 students.Data collection methods and instruments in this study are presented in Table 1.

Table 1: Data collection method.

Criteria	Required data	Method of collecting data	Research Instruments
Validity	Quality of learning model prototype	Focus group discussion	Learning model validity assessment sheet
Practicality	Implementation of learning, student activities	Observation	Observation sheet on the implementation of learning and student activities

Learning is done for static fluid material. The data from the assessment of the validity of the learning model and its practicality were analyzed descriptively and quantitatively, namely, the answer score was calculated using an assessment rubric. The results obtained are then adjusted to the assessment criteria: 1 (Invalid); 2 (Invalid); 3 (Valid); and 4 (Very Valid). Based on the rating scale, on average the assessment results are categorized: "Very Valid" if the average score of $3.25 \leq P$ ⊠ 4.00; "Valid" if the average score is $2.50 \leq P$ ⊠ 3.25; "Invalid" if getting an average score of $1.75 \leq P$ ⊠ 2.50; and "Invalid" if getting an average score of $1.00 \leq P$ ⊠ 1.75 (7, 8).

3. Result and Discussion

The results of the assessment of the validity of the learning model developed are presented in Table 2.

Table 2: Validity of learning model.

No	Aspect	Validity	
		Score	Criteria
1	Content validity		
	Need for model development	3.66	Very Good
	Designed based on cutting-edge knowledge	3.70	Very Good
2	Construct validity		
	Overview of models and syntax	3.64	Very Good
	Learning objectives	3.72	Very Good
	Theoretical and empirical support	3.56	Very Good
	Learning environment	3.53	Very Good

Table 2 shows that the content and construct validity of the integrated learning model developed has very valid criteria. Content and construct validity got a score > 3.25. Although the hypothetical model is stated to be very valid in terms of content and constructs, there are suggestions for improvement given by the validators. These suggestions do not change the shape of the hypothetical model building. The suggestions are: 1) the need for time effectiveness for each learning phase; and 2) it is necessary to explain the interaction between students and students and teachers, either in groups or individually. Based on the suggestions from the validators, further improvements were made in the form of additional learning activities, especially in phases 2, 3, and 4.

The results of the practicality learning model developed are presented in Table 3 and Table 4.

Table 3: Implementation of the Learning model.

No	Phase	Learning 1		Learning 2	
		Score	Criteria	Score	Criteria
1	Orientation	3.50	Very good	3.60	Very good
2	Seeking	3.00	good	3.00	good
3	Investigation	3.50	Very good	3.70	Very good
4	Synthesizing	3.00	good	3.50	Very good
5	Evaluation	3.50	Very good	3.60	Very good

Table 4 shows the relevant and irrelevant student activities for each phase of the learning model. Actively relevant student activities are focusing and taking notes on

Table 4: Student Activities in Learning.

No	Students Activity	Learning 1						Learning 2					
		relevant-active		relevant-passive		not relevant		relevant-active		relevant-passive		not relevant	
		score	%	score	%	score	%	score	%	score	%	score	%
1	Focus and note on orientation	22,50	75	5,50	18	2,50	8	23,50	78	4,50	15	2,00	7
2	Seeking activity	22,50	75	5,50	18	2,00	7	24,00	80	4,00	13	2,00	7
3	involved in investigation	21,00	70	6,00	20	3,00	10	24,00	80	4,00	13	2,00	7
4	synthesizing activity	25,00	83	3,00	10	2,00	7	26,00	87	2,00	7	2,00	7
5	involved in evaluation	20,00	67	8,00	27	2,00	7	20,50	68	6,50	22	3,00	10
	Average	22,20	74	5,60	19	2,30	8	23,60	79	4,20	14	2,20	7

orientation, seeking activities with groups, being involved in investigations, synthesizing activities, and being involved in the evaluation. Passive relevant student activities are looking for information/reading books and listening to information/explanations. While the irrelevant activities are daydreaming, sleeping, and talking that are not related to the lesson, and doing other activities that are not related to learning. As shown in Table 4, the relevant student activities in each learning phase have increased.

The increase in relevant student activities in learning is in accordance with the theory that underlies the integrated learning model developed, namely the constructivist learning theory. Constructivist learning theory consists of individual constructivists (cognitive) and social constructivists. Cognitive constructivists review the knowledge of individuals in their minds, while social constructivists examine interactions between individuals in obtaining knowledge. In cognitive constructivism, individuals tend to seek understanding when interacting with the environment naturally, and social interactions are not dominant. While social constructivists, students will improve their understanding by interacting with teachers and other students (10). In addition, each phase of the integrated learning model developed provides an overview of the sequence of learning activities logically and systematically, and consistently to achieve goals. One of the requirements of the learning model is to have a rational and logical syntax, with theoretical and empirical support (5). Empirical support for the learning model includes that although most students come with non-scientific ideas, a supportive learning environment positively improves students' non-scientific ideas (11).

Student activities during learning indicate that the relevant activities that are expected to appear in learning have been achieved. Students pay attention to the teacher's explanation (writing explanations and physics concepts related to local wisdom), do seeking activities, engage in investigations, synthesizing activities, and engage in evaluation. In learning in group settings, activities are divided into two, namely relevant (active and passive) and irrelevant. Active relevant activities correspond to tasks at each stage of learning, while passive relevant activities are in the form of reading or seeking information from books or teaching materials and listening to information or explanations. Irrelevant activities are activities outside the task or not in accordance with each stage, such as daydreaming, sleeping, talking that is not in accordance with learning, and doing activities not related to learning (8). Every interaction made with students will affect other students (12). This is in accordance with the class management theory that organizes learning activities in classrooms, teaching, physical structures, and other things in order to use time efficiently, create positive learning experiences, and minimize behavioral problems or other disturbances (13).

4. Conclusion

Based on the results of the research and discussion, it can be concluded that the integrated learning model (physics, digital, and local wisdom) has to content and construct validity with very valid criteria. The content validity of the digital learning model which is integrated with local wisdom in very valid criteria, constructs validity in very valid criteria. The learning model developed is in the practical category, in terms of the implementation of learning with good and very good categories, as well as student activities that are relevant in learning have increased. This model is expected to be an alternative model for learning physics according to future needs.

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