



Strategies for integrating a web-based learning environment based on authentic learning in distance learning for elementary school students

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Abstract

This research aimed to find a strategy to integrate web-based learning based on authentic learning by identifying the dominant factors regarding teachers' authentic activities. The research method was a teacher survey that used web-based learning. Questionnaires were given to 100 teachers regarding the use of authentic activities. The questionnaire was tested for validity and had a high load factor of more than 0.6. Authentic learning had an effect of 0.689. The data was processed by factorial analysis to obtain the dominant value. Furthermore, a strategy to integrate web-based learning was developed in learning. The results showed that the dominant authentic learning activities used were real-world activities, integrated assessment, various sources and final product design. It can be concluded that using web-based learning applications based on authentic learning provides real-life experiences for students and supports learning to be more meaningful.

Keywords: Authentic learning, Distance learning, Environment, Integration, Learning process, Web-based learning.

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Contribution of this paper to the literature

This research has made a significant contribution to the development of literature related to the integration of web-based learning based on authentic learning in schools. The findings of this study are expected to help teachers in elementary schools deliver their learning materials in an interesting way that can encourage students to participate in the teaching and learning process by using a technological approach.

1. Introduction

Web-based learning has been widely implemented at all levels of education. One of the advantages of web-based learning is that it can integrate authentic learning through designed activities that activate students (Stefaniak, 2020). Authentic learning aims to increase the accuracy of educational activities (Hidayati & Bentri, 2022). In online learning, it needs to consider a better support system including the development of web-based learning. Previous research has developed web-based learning in the learning process.

It has been used in various web studies' teaching and learning processes (Maulida, Rahman, Handrianto, & Rasool, 2022; Utami, Prihantoro, Apriani, Hidayah, & Handrianto, 2021). Web-based learning became popular during the COVID-19 pandemic when integrated with authentic learning activities. The term "authentic activity" refers to the method of providing students with real learning experiences related to activities that may be carried out inside and outside the classroom. Teachers can design authentic activities by using learning media in videos containing instructions and activities. Authentic activities allow students to construct their knowledge to improve their competence.

Knowledge construction can be done through mental processes at the students' cognitive level through assimilation and accommodation. Assignments and exercises included in the web-based learning will enable students through the design of activities under the guidance of teachers (Zainil, Kenedi, Rahmatina, Indrawati, & Handrianto, 2023).

Web-based learning consists of three support systems: learning tasks, learning support and learning resources (Hidayati & Bentri, 2022). A learning task is a set of tasks given by the teacher to students aimed at achieving competence. Learning support is a learning system designed and developed on a learning website that is easily understood by students. Understanding these features should be easy for students. Learning resources dominantly developed in web learning are videos and relevant learning resources. Teachers still use the results of observations from several web-based learning activities as learning resources. The material made primarily moves reading texts in printed books to online forms (Pradana, Setyosari, Ulfa, & Hirashima, 2023). Web-based learning will maximize students' learning potential. Text should be independent of web-based learning. Most schools are currently using web-based learning to conduct distance learning. Web-based learning can be equipped with activities that support students' learning. Many studies have found that authentic activities are developed in the context of conventional learning. The novelty of this study is the adoption of strategies for integrating web-based learning based on the analysis of the most dominant factors teachers use in web-based learning.

1.1. Authentic Learning Activity Design

Authentic learning is based on the real world and requires students to define the tasks and subtasks needed to finish the activity. It includes complex tasks that students must investigate over a long period of time. Moreover, it allows students to look at the task from different perspectives using different resources (Handrianto, Jusoh, Syuraini, Rouzi, & Alghazo, 2022; Herrington, Reeves, & Oliver, 2014). Authentic learning is mainly implemented in conventional learning. The authentic activity design can also be done online which will provide meaningful experiences for students.

1.2. Technology Integrated with Web-Based Learning

Technology integration can use various media in web-based learning such as images, graphics, text, video, etc. In addition, web-based learning can be practiced using interactive quizzes, instructional games and virtual reality (Handrianto et al., 2021; Sailin & Mahmor, 2018). This technology is widely used in web-based learning. The next technology that can be used is students' involvement in learning. Students can also collaborate online with friends through teacher guidance. The following figure describes an authentic learning design framework integrating online learning resources.

Figure 1 shows three factors that support authentic learning on the web system: learning tasks, learning resources and learning support. These three components are further developed by integrating authentic learning (Marcus, Atan, Jumaat, Junaidi, & Said, 2018; Marull & Kumar, 2020). One of the interactions is web-based learning using learning videos. Uploaded learning videos in a web-based learning environment allow student interaction. Students are allowed to repeat the material presented by the teacher whenever needed. The interaction between students and teachers will be more accurate because students can deal directly with teachers. This is very effective because even though the number of students is vast, they seem to be treated individually by the teacher (Xin, Katuk, & Arif, 2021). Communication tools developed using web-based learning include discussion forums and chat rooms (Devine, Bourgault, & Schwartz, 2020; Khurniawan, Irmawaty, & Erda, 2022; Swaramarinda, Isa, Yusof, Kadir, & Rahman, 2022; Syafi'i, 2020; Tjilen et al., 2018). Students can ask the teacher and their peers' questions directly with a quick response. It is the most effective one compared to the conventional class in terms of the factor of limited time. Discussion rooms are also effective for students because they can exchange ideas and improve their competence (Al Hashimi, Al Muwali, Zaki, & Mahdi, 2019). In addition, students can also consult directly with experts. This activity makes the learning process more enjoyable.

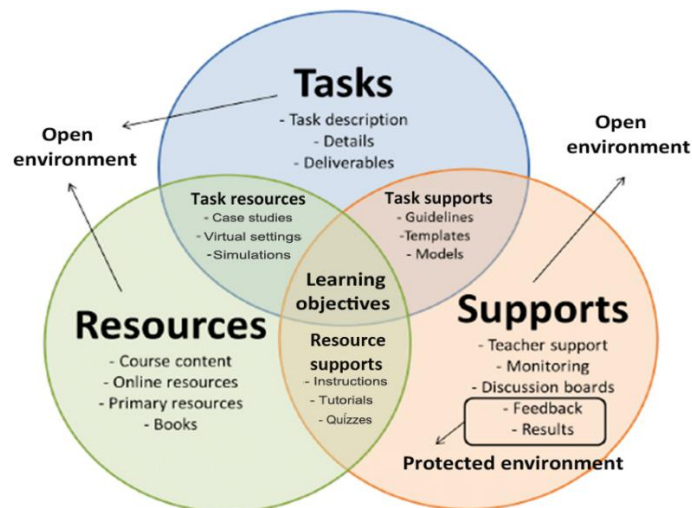


Figure 1. The extended authentic learning design framework.

1.3. Strategy for Distance Learning Implementation

Distance learning for elementary school students generally uses web-based learning as a support system. Many distance learning activities occur during the pandemic (Ghomi & Redecker, 2019; Syafi'i, 2020; Volkovitchkaia, Tikhonova, & Kolosova, 2020). Distance learning for elementary school students is currently used as a supplement to prior classroom learning. Web-based learning helps students obtain relevant learning resources with information technology facilities. Several parents encourage distance learning by using web-based learning (Devine et al., 2020). Distance learning can be done both synchronously and asynchronously. Teachers can design synchronous activities by using the Zoom meeting application and asynchronous activities with various events such as viewing teacher explanation videos, doing online quizzes and collecting online portfolios. The strategy for implementing distance learning can be done by designing authentic activities through learning tasks, learning resources and learning support. This research tries to identify situated learning in web-based learning.

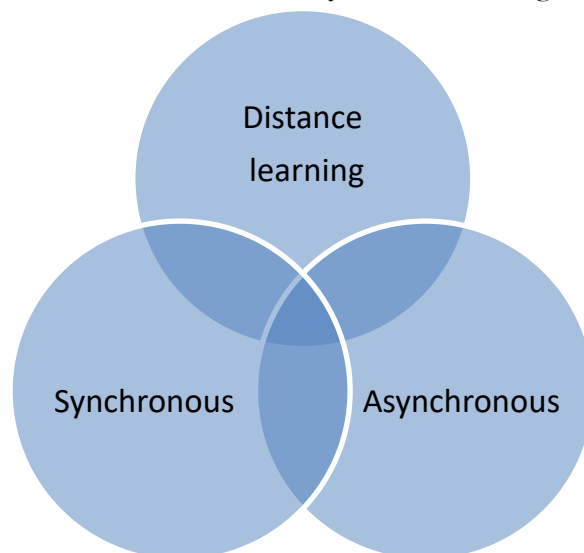


Figure 2. Distance learning strategy

Figure 2 illustrates distance learning which can be conducted synchronously or asynchronously. The teacher can select these methods to conduct distance learning depending on the available resources.

2. Methodology

2.1. Type of Research

A survey is used in this research to obtain data that supports the implementation of web-based learning in distance learning that occurred in the past when there was COVID-19 which resulted in learning being carried out from home.

2.2. Research Respondents

The research respondents were teachers who carried out distance learning in the Province of West Sumatra, Indonesia. 100 teachers were randomly selected representing two school characteristics, namely schools with ordinary and superior accreditation.

2.3. Data Collection Techniques and Tools

The data were obtained through a survey using a questionnaire that had been developed by the researcher. The questionnaire has been tested for validity and practicality so it is feasible to use. Target teachers were given a questionnaire and filled it out online. Teachers are contacted directly and made to fill in according to what they have experienced. In this case, the researcher was assisted by three research assistants to contact the teacher and fill out a questionnaire through the Google form that had been made.

2.4. Data Analysis

The data from the questionnaire that has been received is then processed using the Smartpls application and analyzed by combining data from direct interviews with teachers so as to obtain consistent results. The research data were then also analyzed using focus group discussions to obtain relevant and useful data.

3. Results

According to the survey results on questionnaires developed by researchers, grid questions and developed questions to learn more about authentic learning activities were used. The information that the teacher has explored is shown in the following table:

Table 1. Grid questionnaire survey.

Characteristics of authentic learning	Implementation	Situated learning for web-based learning
Have real-world relevance (RW)	<ul style="list-style-type: none"> Linking learning information with the outside activities of students. Clarify student activities through videos. Provide relevant examples from students' lives. Prepare student worksheets. 	Learning support
Ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity (DF).	<ul style="list-style-type: none"> Detailing the steps to do the task. Facilitate students' choice of the steps in solving the problem. Provide many online learning resources. 	Learning tasks
Comprise complex tasks to be investigated by students over a sustained period of time (IS).	<ul style="list-style-type: none"> Provide complex tasks. Give a long duration to the task. Facilitate student investigation. 	Learning tasks
Provide the opportunity for students to examine the task from different perspectives using various resources (VR).	<ul style="list-style-type: none"> Provide a variety of sources. Facilitate relevant resources. Facilitate task completion. 	Learning resources
Provide the opportunity to collaborate (OC).	<ul style="list-style-type: none"> Facilitate collaborative tasks. Guide group discussions. Provide online collaboration tools. 	Learning tasks
Provide the opportunity to reflect and involve students' beliefs and values (RI).	<ul style="list-style-type: none"> Give chance to reflect. Facilitate students' beliefs and values. Give students freedom of opinion. 	Learning support
Can be integrated and applied across different subject areas and leads beyond domain-specific outcomes (AA).	<ul style="list-style-type: none"> Involve other learning subjects. Generate specific output. Implement in different contexts. 	Learning resources
Are seamlessly integrated with assessment (IA).	<ul style="list-style-type: none"> Assessment is based on process not on result. Provide various assessment rubrics. Assess during the learning process. Assessment involves students and teachers. 	Learning support
Create polished products that are valuable in their own right rather than as preparation for something else (CP).	<ul style="list-style-type: none"> Learning activities lead to product creation. Prepared with learning steps and activities. Provide the means to make products. 	Learning tasks
Allow competing solutions and a diversity of outcomes (CS).	<ul style="list-style-type: none"> Learning activities can provide solutions. Facilitate diversity in learning outcomes. 	Learning support

Table 1 shows the grid questionnaire developed in this research which contained characteristics of authentic learning, implementation and situated learning for web-based learning. Next, the researcher analyzed the questionnaire on authentic learning activities conducted by the teachers to find the most dominant factor in getting authentic activities. Furthermore, the data can be used to develop strategies for integrating authentic web-based learning into distance learning for elementary school students. The results of the loading factor analysis are described in the Table 2.

Table 2 shows the initial analysis results stating that the measurement model used is acceptable because of the reliability of individual items, internal consistency between items, convergent validity and discriminant validity. The table above shows the loading factor, Cronbach's alpha, CR and AVE. Cronbach's alpha is more significant than 0.7. This means that all indicators can be considered for further measurements. The AVE value of 0.648 to 0.766 is acceptable. Convergent Validity (CR) is more significant than 0.5 so all indicators are acceptable.

The data in Table 3 shows that the square of the AVE value (bold) is greater than the square correlation of construction in pairs. This shows that the measurement had acceptable discriminant validity. After testing, the factorial quantities of each indicator that had been formulated were identified to determine the dominant factors that affected authentic learning in web-based learning. The results of each factor are described in Figure 3.

Table 2. Construct reliability and validity of the measurement model.

Construct	Items	Loadings	A	CR	AVE
AA	AA2	0.835	0.696	0.832	0.712
	AA3	0.852			
CP	CP1	0.740	0.905	0.926	0.717
	CP2	0.781			
	CP3	0.886			
IA	IA1	0.788	0.742	0.867	0.766
	IA2	0.707			
	IA3	0, 802			
	IA4	0.762			
IS	IS2	0.893	0.727	0, 849	0.648
	IS3	0.866			
	IS4	0.856			
OC	OC1	0.913	0.784	0.849	0.658
	OC3	0.836			
RW	RW1	0.758	0.795	0.862	0.677
	RW2	0.920			
	RW4	0.781			
SC	SC1	0.803	0.628	0.843	0.729
	SC2	0.880			
	SC3	0.921			
	SC4	0.886			
	SC5	0.729			
VR	VR1	0.921	0.849	0.905	0.760
	VR2	0.888			

Based on Figure 3, it was obtained that variable data that had significant contributing factors to authentic learning were created products (6.114), integrated assessment (3.155), variety resources (1.264), and the real world (1.051). If described in real-world indicators, the items were connecting learning information with student activities outside the classroom (10,500), clarifying student activities through videos (35,934) and providing examples that are relevant to students' lives (8,803). The created product indicator was learning activities leading to product creation (40,508), preparing with steps and learning activities (20,639) and providing facilities for making products (13,622). The integrated assessment item indicator was integrated into the process compared to the results (18,966), providing various assessment rubrics (22,197), assessing during the learning process (7,827) and involving students and teachers (14,059). The indicator used various sources in learning including providing various sources such as files, quizzes, videos and articles (32,550) and facilitating relevant sources (16,709). The influence of these factors on authentic learning can be seen as follows:

Table 4 reveals the effect of the dependent variable on the independent variable (0.689) which means it is very strong. It is based on the theory by Chin (1998) that the R-Square value is categorized as vital if it is greater than 0.67. A strategy for implementing web-based learning in the learning process is formulated as described in the Figure 3.

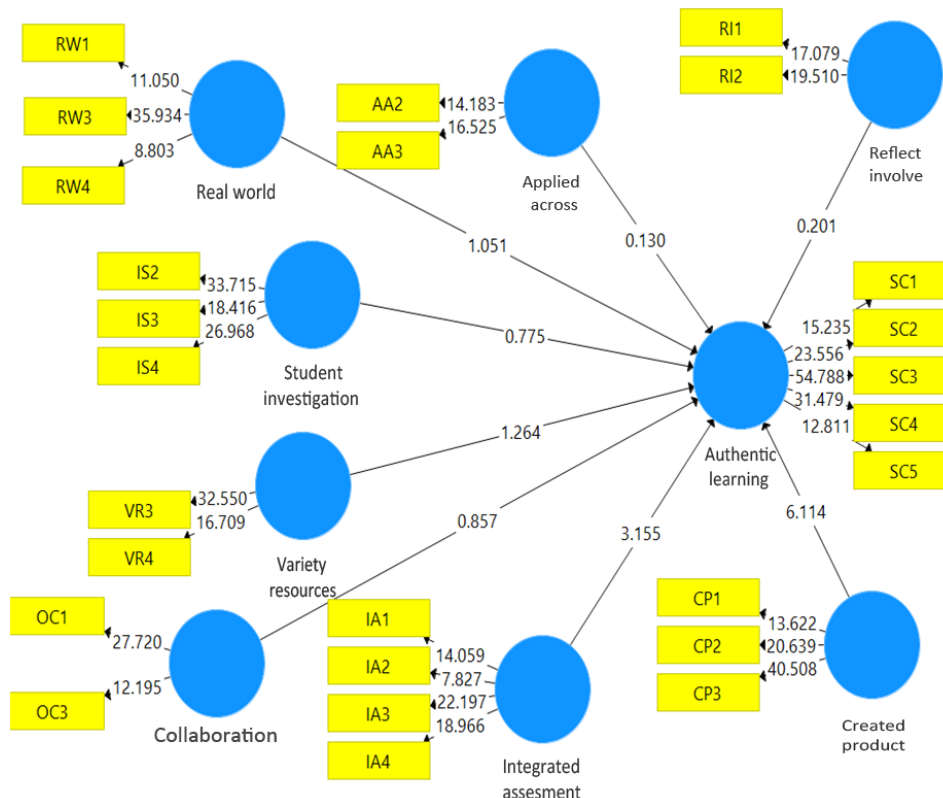


Figure 3. Factorial analysis of authentic learning.

Table 3. Discrimination validity

Construct	Applied across	Authentic learning	Collabo ration	Created products	Integrated assessment	Real world	Reflect involve	Student investigation	Variety resources
Applied across	0.844								
Authentic learning	0.575	0.847							
Collaboration	0.673	0.510	0.875						
Created products	0.612	0.784	0.550	0.805					
Integrated assessment	0.660	0.713	0.626	0.669	0.765				
Real world	0.551	0.440	0.564	0.428	0.492	0.823			
Reflect involve	0.668	0.572	0.667	0.611	0.652	0.483	0.854		
Student investigation	0.576	0.477	0.627	0.518	0.590	0.559	0.605	0.872	
Variety resources	0.494	0.459	0.642	0.421	0.531	0.341	0.542	0.552	0.904

Table 4. R square.

Matrix	R square	R square adjusted
Authentic learning	0.698	0.661

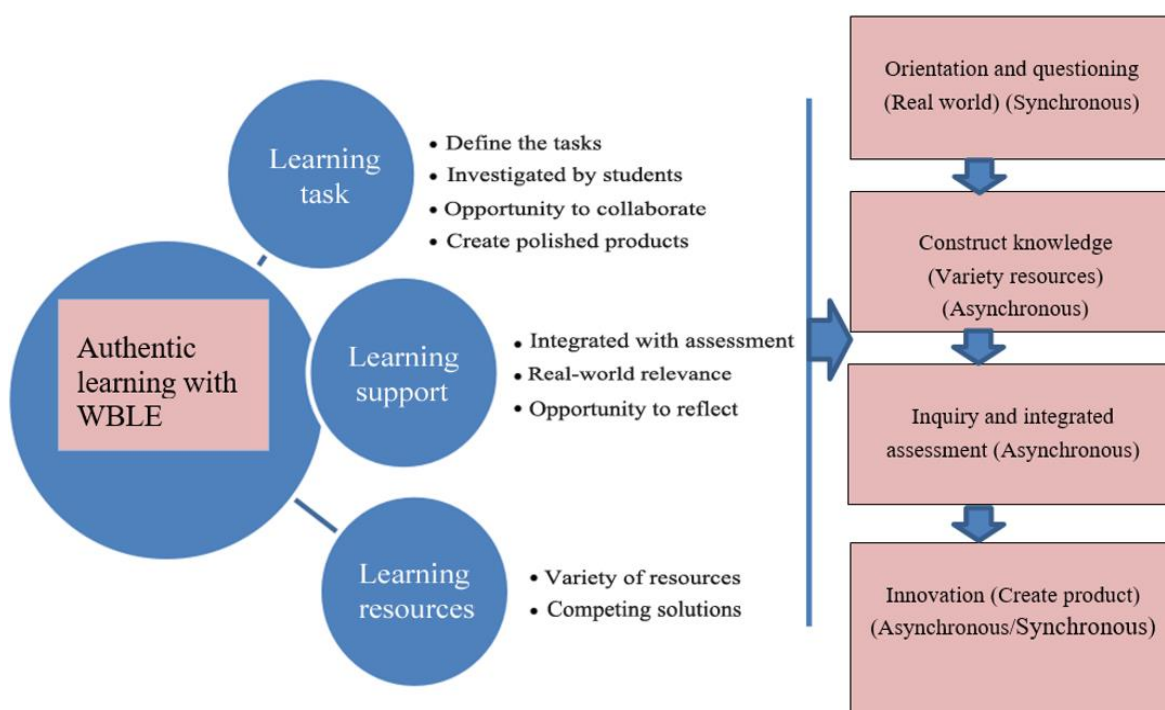


Figure 4. WBLE integration strategy for authentic learning.

A series of activities that teachers can do in the learning process are developed. Analyzing the teacher's real-world activities provided the basis for the strategy formulation based on Figure 4.

Table 5. Activities in authentic strategies.

Authentic strategy	Activity
Orientation and questioning (Synchronous).	At this stage, orientation is carried out by linking what students learn with real conditions in the learner's environment and determining questions that become key indicators that will be developed in the learning process.
Construct knowledge (Asynchronous).	The knowledge construction stage is carried out using various relevant learning resources provided through the learning web such as articles, files, links, videos, quizzes and games.
Inquiry and integrated assessment (Asynchronous).	In this section, activities are carried out to answer the key questions that have been asked previously. At this stage, an integrated assessment is also carried out. Assessment is done by providing comments on student activities.
Innovation (Asynchronous/synchronous).	Innovation can be done by developing relevant learning products.

Table 5 explains the strategy to be applied by the teachers in the learning process. The stages start with orientation questioning, constructing knowledge, inquiry, integrated assessment and innovation. According to students' characteristics, learning activities can be developed by teachers. For example, at the orientation stage, the teacher can propose a basic question relating to a real-life condition experienced by the students. At the innovation phase, the teacher can provide relevant learning media and resources either self-designed or available relating to the topics.

4. Discussion and Conclusion

Integrating web-based learning based on authentic learning in distance learning for elementary school students was developed by providing three web-based support systems, such as learning tasks, learning support and learning resources. These three support systems integrated authentic learning activities (Atan, Tasir, Ali, Rosli, & Said, 2021; Bektas, 2019; Hamzah, Ariffin, & Hamid, 2017).

The support systems on learning websites must be appropriately designed by web developers to provide a meaningful learning experience and increase students' competence. In this article, authentic activities have been discussed. The most important aspect of all authentic activities that teachers typically carry out in authentic learning served as the foundation for the stages of learning (Petchtone & Chajaroen, 2012). Based on the above factors, authentic learning could be integrated into web-based learning in four parts: the real world, using various sources, integrated assessment and creating products (Permana & Widodo, 2022; Titin, Panjaitan, & Widiyatmoko, 2022).

The research results show that authentic activities are related to the real world. Assignments and learning instructions must be directly related to students' daily lives. Learning web developers can design these activities to create more optimal student interactions (Al Hashimi et al., 2019; Febliza & Okatariyani, 2020). The use of various learning resources shows that using various learning resources is needed to increase students' competence (Ghomi & Redecker, 2019). Web-based learning makes it possible to provide various learning resources that will also manifest students' independence in choosing their learning resources.

The loading factor with a high value is also in the integrated assessment section. One of the advantages of assessment in web-based learning is an integrated evaluation that provides immediate results to students (Hamzah

et al., 2017; Volkovitchkaia et al., 2020). The results of an integrated assessment of student competence can be immediately known so that improvement procedures can be considered. Creating a product is the final stage that gets a high loading factor in implementing web-based learning (Alawamreh & Elias, 2015). Web-based learning can be used to accommodate students' work. Students are allowed to create assignments given to them and publish them widely.

One of the recommendations in this study is the creation of videos from students' assignments. The initial stage in authentic activities was the strategy designed called the orientation stage and the giving of key questions. Teachers could stimulate students by asking questions relevant to the problem. The next stage was the knowledge construct (Al Hashimi et al., 2019; Tan, Kwok, Neo, & Neo, 2010). This stage was to develop students' knowledge abilities by facilitating cognitive strategies through a series of activities designed for students. The inquiry process followed this stage. Cognitive development (knowledge) can be a way to acquire new knowledge, provide alternative problem-solving strategies and learn using tools available in a web-based learning environment (Tjilen et al., 2018). Activities that teachers could carry out were facilitating students' exploration of previously developed knowledge as a means to seek initial information through schemes that students already owned. This would be useful for solving problems (Pardiñan & Loremia, 2020; Toktarova & Semenova, 2020). At this stage, collaboration was developed involving other students in the learning process. The provision of electronic learning resources and other facilities would support the process of constructing students' knowledge. To realize authentic learning, teachers must use multimedia, interactive quizzes, online modules and learning videos related to the problems discussed (Salsa, Sari, Muhar, & Gusmawati, 2022). The designed learning management system would help students construct knowledge (Hidayati, 2020). The final stage of developing this strategy was the ability of students to create innovation in the learning process. However, creating a product through simple experiments is an innovation in learning.

A strategy for integrating web-based learning based on authentic learning in distance learning for elementary school students could be developed by analyzing the factors contributing to and dominantly used by teachers in web-based authentic activities. The factor analysis findings demonstrated that teachers primarily used created products, integrated assessments, real-world scenarios and various resources in web-based learning. These components were the main activity used to develop authentic strategies which consisted of several stages such as (1) orientation and question formulation. (2) Knowledge construction stage. (3) Inquiry stage. (4) Innovation stage.

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