Development of a Guided Inquiry Model Based on Blanded Learning (Moriblend) as an Effort to Strengthen Scientific Literacy

Ayu Solihatul and Anatari Desstya(✉)

Faculty of Teacher Training Education, Universitas Muhammdiyah Surakarta, Surakarta, Indonesia
ad121@ums.ac.id

Abstract. The research aims to produce a blended learning (moriblend) guided inquiry learning model design, as well as to determine the validity of the moriblend design. This type of research is RnD with the ADDIE development model, which is limited to three stages, namely analysis, design, and development. The research subjects were four grade 5 educators from different elementary schools in Blado District, Batang Regency. Data obtained through in-depth interview techniques and questionnaire techniques. Quantitative data is in the form of a moriblend design validation value that refers to a four interval Likert scale. While the qualitative data is in the form of needs analysis results through in-depth interviews with four educators. The data analysis technique consists of an interactive model in needs analysis and a quantitative descriptive technique in the moriblend design validation test. Data validity test was carried out by source triangulation. The research resulted in a moriblend design composed of seven components associated with indicators of scientific literacy, including goals, social systems, syntax, reaction principles, instructional impacts, and accompaniment impacts. Moriblend's design was validated through due diligence on experts, and resulted in an average score of 92.6%. The average value is interpreted qualitatively using a conversion table, and shows "very valid" results. Keywords: Guided Inquiry Model, Moriblend, Science Literacy. Moriblend's design was validated through due diligence on experts, and resulted in an average score of 92.6%. The average value is interpreted qualitatively using a conversion table, and shows "very valid" results. Keywords: Guided Inquiry Model, Moriblend, Science Literacy. Moriblend's design was validated through due diligence on experts, and resulted in an average score of 92.6%. The average value is interpreted qualitatively using a conversion table, and shows "very valid" results.

Keywords: Guided Inquiry Model · Moriblend · Science Literacy

1 Introduction

Safrizal (2021) states that scientific literacy skills are one of the urgencies in acquiring knowledge that needs to be developed in the education system, especially at the elementary school level. This relates to the need for global economic growth and increasingly

M. H. Hikmat et al. (Eds.): ICOLAE 2022, ASSEHR 757, pp. 352–368, 2023.
https://doi.org/10.2991/978-2-38476-086-2_30

integrated technological advances. Scientific literacy skills are needed with the aim of being able to solve problems and make decisions with an attitude and high sensitivity to oneself and the environment in accordance with technological developments (Setiawan 2020). The assessment carried out by the Program for International Students Assessment (PISA) in the period 2006–2019, produced data that students in Indonesia only had the ability to understand the material read by 30%. Provision of guidance has also not been implemented optimally, so they have not been able to achieve scientific literacy skills (Rusilowati, 2016). The OECD also stated that in 2018, Indonesian education in PISA had a score of 396, ranking 73 out of 79 countries (Avvisati, 2018). The Covid-19 pandemic has also had a significant impact on the education sector. Starting from the spread of Covid-19 from the city of Wuhan, China to all corners of the world, one of which is Indonesia (Cheng, 2020). The regulation in the form of Decree of the Minister of Education of Indonesia No. 15 of 2020 contains rules regarding the learning process carried out at home as a step in reducing the spread of Covid-19. This causes the learning process to be carried out remotely, making learning that requires scientific analysis and critical thinking skills hampered, making it difficult to strengthen scientific literacy skills (Naila 2021). Learning activities by applying investigative methods have proven to be effective in developing and strengthening scientific literacy skills. So in this case, it is necessary to apply a learning model that is able to adapt the characteristics of science learning and produce more meaningful learning, especially in the circumstances of the co-19 pandemic (Alman, 2020). In science learning, an alternative that uses the inquiry method is the inquiry learning model, one of which is guided inquiry (Ilmi, 2016). The guided inquiry model makes students the core and center of activity, through training in carrying out the investigation process, and creating structures and organizing the search process independently, (Arifuddin, 2020). Christinsenia (2018) also mentioned other activities, namely developing self- confidence, critical thinking in analyzing how to solve problems, and building conceptual understanding of the search process which is carried out in a structured manner, so as to obtain more meaningful learning.

But the reality on the ground shows something else, the results of in-depth interviews with 4 grade 5 elementary school educators in Blado District, Batang, show low scientific literacy because the efforts of educators have not fully led to strengthening scientific literacy. This is influenced by the lack of application of scientific literacy ability indicators in teaching materials, teaching materials have not adapted to current environmental conditions. Educators only use LKS (student worksheets) as the main teaching material, resulting in students lacking knowledge and information about the surrounding environment, and less meaningful learning. Educators are more dominant in carrying out learning with the lecture method. So that the interest and enthusiasm of students is low.

In addition, the guided inquiry learning model at the four elementary schools had not been implemented according to the guidelines, this was due to delays in carrying out investigative activities. Educators only use LKS as a guide for the learning process through the WhatsApp platform. Meanwhile, when learning is carried out on a home visit basis, it only uses lecture and assignment methods.

Kristina (2020) states that the application of the guided inquiry learning model to distance learning has several obstacles, including reduced student interest in participating in learning, not all students have high enthusiasm, the internet network is not always smooth causing low enthusiasm and motivation to learn. Less able to provide meaningful learning experiences because the process of investigation, identification and analysis is not implemented through observation and experimentation. Limitations of tools in experimental activities.

Based on these potential problems, it gives an urgency to develop a guided inquiry learning model by accommodating inquiry activities in distance learning. The development of the guided inquiry learning model is carried out by modifying the blended learning model or in other terms, namely hybrid learning (Kade, 2019). Blended learning is a learning model which in the process combines learning methods, including e-learning, face-to-face learning and carrying out practices as part of strengthening meaningful learning (Chaeruman, 2019).

Risniani (2019: 74) explains that the advantages of blended learning include being flexible because it can be carried out anywhere and anytime by utilizing the internet network, students can learn material before learning begins, being able to practice skills in online discussions, and being able to practice developing an independent attitude and responsible for the effort in the learning process implemented. The advantages of the blended learning model are appropriate when modified with the guided inquiry learning model. The results of the two models aim that students can still carry out investigative activities in distance learning. In addition, it aims as a step to strengthen students' scientific literacy in distance learning. Based on the explanation above.

2 Method

Research using the Research and Development (RnD) method. The ADDIE model is used in the development of this design. However, not all stages of ADDIE are implemented, because it only results in the design of a guided inquiry learning model based on blended learning (moriblend). The stages used in the research process include the analysis, design, and development stages. The analysis phase serves to analyze problems and potential in the field that can support the need for moral development. Furthermore, the design stage functions to produce a moriblend design. While the development stage functions to realize the design, and carry out validation of the moriblend design to expert validators.

Collecting data using in-depth interview techniques and questionnaire techniques. In-depth interviews were conducted with four grade 5 educators in four elementary schools, which included SD N Bawang with accreditation status A, SD N 3 Wonobodro with accreditation status B, MI Cokro with accreditation status A, and MI Islamiyah Islamic Boarding School with accreditation status B. Meanwhile, the questionnaire technique used in the validation process of assessing the feasibility of the moriblend design to expert validators, namely PGSD lecturers with Doctors and Masters degrees who are experts in the field of Natural Sciences. Source triangulation is used to test the validity of the data. The process of data analysis was carried out using interactive model techniques and descriptive qualitative. Interactive modeling techniques are used to analyze needs analysis data. The interactive model stage includes data collection, data reduction, as

well as data presentation. While descriptive qualitative techniques are used to analyze the data validation of the feasibility assessment of the moriblend design through a questionnaire technique. The descriptive qualitative technique stage includes data validation recapitulation and conversion of quantitative data to qualitative. Recapitulation of validation data in the form of a four-point Likert Likert scale includes values of 4 (very good), 3 (good), 2 (poor), and 1 (very bad). Acquisition of value refers to a four-point Likert interval scale (a four-point Likert scale) then the average value will be calculated, with the following formula: The descriptive qualitative technique stage includes data validation recapitulation and conversion of quantitative data to qualitative. Recapitulation of validation data in the form of a four- point Likert Likert scale includes values of 4 (very good), 3 (good), 2 (poor), and 1 (very bad). Acquisition of value refers to a four-point Likert interval scale (a four-point Likert scale) then the average value will be calculated, with the following formula: The descriptive qualitative technique stage includes data validation recapitulation and conversion of quantitative data to qualitative. Recapitulation of validation data in the form of a four-point Likert Likert scale includes values of 4 (very good), 3 (good), 2 (poor), and 1 (very bad). Acquisition of value refers to a four-point Likert interval scale (a four-point Likert scale) then the average value will be calculated, with the following formula (Fig. 1)

Information:

X = average value.

$\sum x$ = amountacquisition value.

n = total maximum value.

The average value is interpreted into qualitative data using the conversion table in Table 1.

$$X = \frac{\sum x}{n}$$

Fig. 1. Formula

Table 1. Quantitative to Qualitative Conversation

Criteria	Validity Level
81.0%-100%	Very valid, can be used without revision.
61.0%-80.9%	Valid enough, can be used but needs revisio small.
41.0%-60.9%	Invalid, it is recommended not to use it because it needs major revisions.
21.0%-40%	Invalid, may not be used

3 Result and Discussion

3.1 Result

Moriblend design is obtained through three stages, namely analysis, design, and development.

3.1.1 Analysis

At this stage, researchers analyzed data regarding the level of scientific literacy, as well as the process of applying the guided inquiry model during distance learning. Data from in-depth interviews with four grade 5 elementary school educators in Table 2.

The needs analysis data shows that the level of scientific literacy ability of grade 5 SD in the Blado District, Batang Regency is still relatively low, because of the four SDs, only public SD and private SD accredited A have carried out the measurement, in its implementation through a scientific literacy ability test by adjusting scientific literacy indicators, but the implementation is not optimal because only 2 indicators of scientific literacy are measured, namely identifying information in a reading, and giving opinions regarding the information identified. This is because students still lack confidence. The process of investigation, discussion and question and answer is still very rarely carried out. The teaching materials used are also not adapted to the development and environment of students, as well as indicators of scientific literacy abilities.

The needs analysis table also describes that the guided inquiry model in grade 5 at four elementary schools in the Blado District, Batang Regency, has not been successfully applied to distance learning. The application of the guided inquiry learning model is not optimal, especially in public and private SD accredited.

B. The data shows that there have been efforts from public and private SD accredited A in implementing the guided inquiry learning model, even though it is still not in

Table 2. Needs Analysis

ASPECT	**Country**A			**Country**B			**Private**A			**Private**B		
	S	K	Q	S	K	Q	S	K	Q	S	K	Q
Measurement scientific literacy	√				√		√					√
Scientific literacy skills		√				√		√				√
The linkage of the guided inquiry model with indicator of scientific literacy		√				√		√			√	
Application of the guided inquiry model on study on line		√				√		√				√

Information: S: Appropriate, K: Not suitable, T: Not suitable.

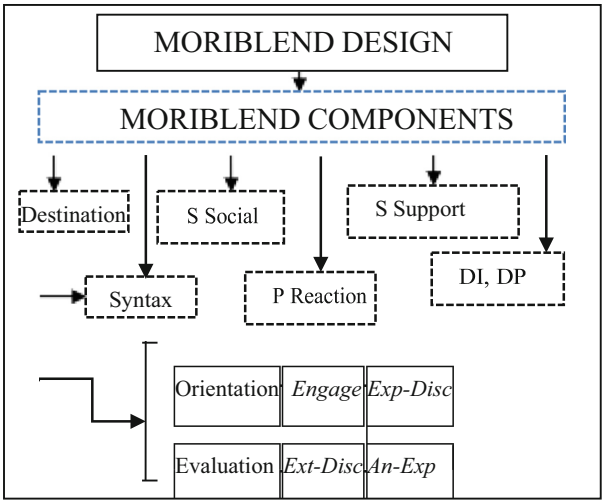

Fig. 2. Moriblend Design

accordance with the guidelines. In this case, public and private SD accredited A have not completely adjusted the syntax. The activities carried out were still limited to questions and answers on teaching materials. Teaching materials still use worksheets, educators only focus on giving assignments from worksheets which are coordinated through the WhatsApp platform. Discussion and question and answer activities are not routinely carried out, the implementation of learning by home visit is more dominant in applying the lecture method. So that the investigation process has not been able to be carried out.

3.1.2 Design

Needs analysis data used as a basis for research and design development. Next, the researcher carried out the second stage, namely the design stage, which was based on the urgency as needed. Moriblend is the result of a modification between the guided inquiry learning model which is synonymous with self- seeking activities through analysis and observation activities, and the blended learning model which is synonymous with mixed learning which includes face- to-face learning with an emphasis on face-to-face learning. Practice, as well as online learning. The two processes synergize with each other to form a learning process. In this study, the moriblend component consists of seven components, contained in the moriblend design, in Fig. 2.

Moriblend design contains a series of elements and processes, which support each other, with the hope that it can be developed and applied in the distance learning process, and achieve the expected goals of strengthening scientific literacy skills.

3.1.3 Development

Moriblend design development is carried out by design validation tests on learning model design experts with doctoral and master degrees who are competent in the field of Natural Sciences from PGSD lecturers at the University of Muhammadiyah Surakarta. Model

Table 3. Moriblend Design Validation Data

NO	ASPECT	SCORE
1.	Science Literacy Indicator	17.7%
2.	Moriblend Composition Components	43.7%
3.	Moriblend syntax	31.2%
AMOUNT		**92.6%**

design validation aims to determine the validity of Moriblend's design from the aspects of scientific literacy indicators, Moriblend's constituent components, and Moriblend's syntax. The results of the design validation were obtained through a validation questionnaire in the form of a score that refers to a four-point Likert interval scale. Moriblend design validation test data in Table 3.

Through the validation of the moriblend design which refers to the four interval Likert scale, the average overall value of the three aspects is 92.6%. The average number of these values is then interpreted qualitatively using a conversion table, and produces "very valid" data.

3.2 Discussion

Development of a guided inquiry learning model based on blended learning (moriblend) is carried out in three stages, including the analysis, design, and development stages.

3.2.1 Analysis

Needs analysis data in the research results section explains that the scientific literacy abilities of grade 5 students in four elementary schools in the Blado District, Batang Regency, are still relatively low. This is because students still lack the confidence to develop their abilities, besides that educators lack understanding and the ability to carry out learning by adjusting the nine indicators of scientific literacy ability, which consists of 1) understanding and analyzing scientific information in a science reading, 2) identifying information and giving opinions about science, 3) providing an assessment of scientific information, 4) identifying questions, 5) scientifically exploring the questions given, 6) changing data from one representation to another, 7) evaluating arguments from various sources, 8) synthesizing the results of data analysis 9) being able to adapt to existing demands and problems The results of this study are in line with previous research which stated that the factors that influence students' low scientific literacy skills include the low knowledge of educators about scientific literacy (Nana, 2021). In addition, Kurnia (2014) also stated that the low ability of scientific literacy was caused by the lack of interest of students in reading and analyzing readings, the selection of learning methods and models that had not led to strengthening scientific literacy skills, besides that the use of media and teaching materials had not adapted to scientific literacy skills. Based on this, it can be concluded that students' scientific literacy skills are still relatively low.

The ability of students' scientific literacy is relatively low, especially in the indicators of exploring scientific questions, synthesizing the results of analysis, and adapting understanding of concepts to existing demands and problems. This is because educators do not adjust the learning tools and stages with indicators of scientific literacy ability. The learning process is dominant in assignments given through worksheets.

The application of the guided inquiry learning model has also not been implemented optimally and accordingly. In this case it hasn't adjusted the syntax thoroughly yet. So that the investigation process has not been able to be carried out. Discussion and question and answer activities are not routinely carried out, students also tend to be passive. The data from the results of this study are in line with the results of previous research, which stated that the application of the guided inquiry learning model to grade 5 students was only able to carry out learning using the lecture method and structured question and answer. Meanwhile, the learning process which involves investigative activities cannot be carried out, so students do not have direct experience in learning (Ramdani, 2021).

This problem creates an urgency to develop a blended learning guided inquiry learning model design. as moriblend. Research has developed a moriblend design which consists of direct or face-to- face learning with an emphasis on practice, as well as online learning. Although designed in a blended learning manner, moriblend is believed to be able to strengthen students' scientific literacy skills because the moriblend design facilitates students to carry out investigative activities.

3.2.2 Design

The design stage produces a moriblend design which contains 7 components consisting of objectives, syntax, social systems, reaction principles, support systems, instructional impacts, and accompanying impacts. This is in accordance with research conducted by Abidin (2016) which states that in developing a Portfolio-Based Mathematics Learning model (PMBP) requires constituent components which include, social systems, syntax, reaction principles, support systems, instructional impacts, accompaniment impacts.

This is also in accordance with Putra's statement (2012) which states that in developing a learning model it requires constituent components consisting of syntax (stages in the learning process), reaction principles (attention, directions given by educators to students), social systems (reciprocal relationships between educators and students), support systems (tools that support the ongoing learning process), instructional impacts (learning outcomes obtained by students both in terms of cognitive, affective, or psychomotor), as well as accompaniment impacts (benefits obtained by students after carrying out the learning process with the applied model). Based on this, it can be concluded that the development of moriblend consists of seven constituent components.

The development of a learning model requires these constituent components, because each component is interrelated. Instructional impact (learning outcomes obtained by students both in terms of cognitive, affective, or psychomotor), as well as accompaniment effects (benefits obtained by students after carrying out the learning process with the applied model). Based on this, it can be concluded that the development of moriblend consists of seven constituent components.

The development of a learning model requires these constituent components, because each component is interrelated. Instructional impact (learning outcomes obtained by

students both in terms of cognitive, affective, or psychomotor), as well as accompaniment effects (benefits obtained by students after carrying out the learning process with the applied model). Based on this, it can be concluded that the development of moriblend consists of seven constituent components. The development of a learning model requires these constituent components, because each component is interrelated.

If in applying moriblend, one of these components is not appropriate, it will not be able to accommodate the learning process with blended learning investigation activities for students.

The first component is the goal, the development of the moriblend design aims to produce a guided inquiry learning model design that can be applied to distance learning, in this case modified with blended learning. This is to strengthen students' scientific literacy abilities in distance learning systems. Scientific literacy ability is measured by paying attention to 10 indicators of scientific literacy ability.

Yuliati (2017) states that scientific literacy is assessed based on its indicators, including the ability to understand and analyze scientific information, identify information, provide an assessment of information, identify questions, explore the results of identifying questions, change data obtained from one representation to another, evaluate opinions. Based on scientific evidence, produces a synthesis of understanding, and is able to adapt to the demands of blended learning. The second component is syntax, Moriblend's design contains a syntax component the times.

These indicators of scientific literacy can be strengthened through learning activities by applying learning models that facilitate students to develop critical thinking and analytical skills in scientific investigation activities. A'yuna (2017) explains that the guided inquiry learning model has an effect on scientific literacy skills, this is because students who have poor thinking skills are still able to participate in the investigation process, besides that students who have better thinking abilities do not dominate activities. Based on this, it can be concluded that the guided inquiry learning model provides opportunities for students to develop thinking skills through investigative activities.

This research modifies the guided inquiry learning model with blended learning. Even though it is modified using blended learning, moriblend is believed to be able to strengthen scientific literacy skills, because students are able to carry out scientific inquiry, discussion, and analysis activities using consisting of the stages of implementing the learning process in Fig. 3.

Based on this figure, it can be concluded that the syntax in the moriblend design consists of orientation, engage, exp-disc (explore-discussion), an- exp (analysis-explain), ext-disc (extend-discussion), and evaluation stages. The onboarding, and engaging stages, can be implemented online. The engage stage can be accompanied by online discussion activities. The exp-disc stage can be carried out face-to-face with an emphasis on practice, but in this case it is implemented by fulfilling certain requirements, while the an-exp, ext-disc, and evaluation stages can be carried out online and accompanied by online discussion activities, in addition also facilitates the process of adapting understanding of concepts through online educational games.

This is in accordance with research that has been carried out by Nafis (2021) which explains that online discussion activities are able to liven up the atmosphere of distance

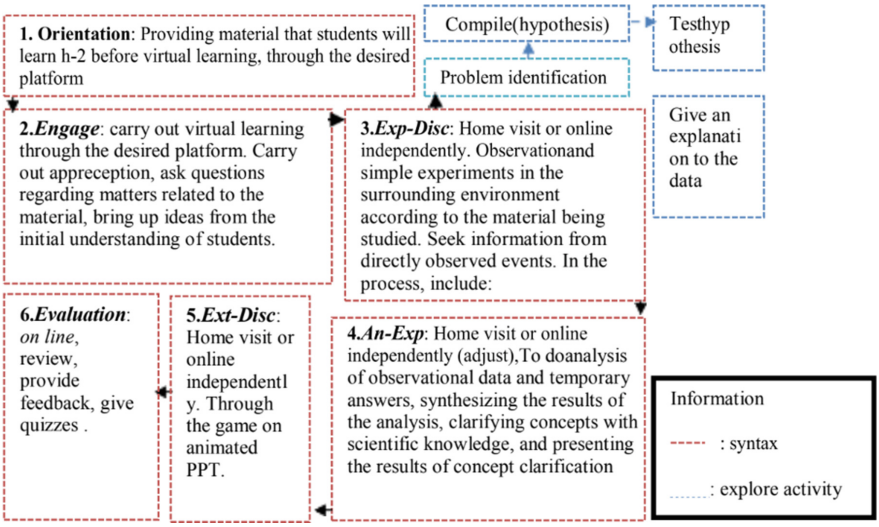

Fig. 3. Moriblend Syntax

learning starting from the elementary school level. And can stimulate students to participate in the learning process. Based on this, it can be concluded that the syntax in moriblend accompanied by online discussion activities is a stage that contains question and answer activities based on personal experience that can be discussed between students.

Syntax in moriblend which is accompanied by online discussion activities is believed to be able to facilitate students to develop self-confidence in discussing and developing the results of initial knowledge related to the material being studied. Even though it is online, appreciation activities can still be carried out through the desired platforms. Appreciation process can be carried out in a structured manner, by carrying out questions and answers, conditioning students to express opinions about the information obtained or known, then proceed with discussion.

Research that is in accordance with the activity process from the moriblend syntax is Saraswati (2020) which explains that the implementation of practical activities can be carried out online with several requirements, including practical activities carried out online and face to face with a ratio of 1: 2 learning duration.

Based on this statement, it can be concluded that investigative activities at the exp-disc stage which include observations and simple experiments can be carried out in a blended learning manner through the application of moriblend by taking into account the agreed requirements.

Educational games are very interesting to apply to the learning process because they present a visualization of real problems. The Massachusetts Institute of Technology (MIT) proves that educational games can increase logic and understanding of a new problem or problem through an educational game called Scratch. Based on this statement, it can be concluded that game activities at the ext-disc stage facilitate students to place the understanding gained on the new problem Maulana (2017).

Educational games at the ext-disc stage are able to support the learning process, because they are believed to be able to increase students' interest in adapting the understanding of concepts obtained to new problems through the games given. Through this process, it is believed that educational games can strengthen scientific literacy, namely being able to adapt to existing demands and problems.

Each syntax in moriblend adapts to indicators of scientific literacy ability. The indicator of scientific literacy at the orientation stage is analyzing scientific information in a text. At the engage stage, namely identifying information with scientific opinion, giving value to scientific information. The exp-disc stage is the identification of questions, as well as scientific exploration of the results of identifying questions. The an-exp stage is changing the data representation, evaluating arguments based on scientific sources, and synthesizing the results of the analysis. The ext-disc stage is adapting to existing demands and problems. While the evaluation stage does not adjust to indicators of scientific literacy.

The third component is the principle of reaction, which is the educator's way of paying attention to, accompanying, and appreciating students. This is in accordance with Putra's statement (2012) which explains that the principle of reaction is referred to as a pattern of activities to be carried out, describing the response, which is aimed at educators in treating participants. Educate in the learning process. The principle pattern of the reaction on the application of moriblend is presented in Table 4.

Table 4. Reaction Principles

Stage	**Reaction Principle**
Orientation	Explain the learning activities that will be carried out, discuss learning schedule, providing e-materials.
engage	Conditioning students, providing guidance to students in appreciative activities, explaining e-material from animated ppt which is packaged in video form, and encouraging students to discuss.
Exp- Disc	Providing opportunities for students to formulate hypotheses on the questions/problems given, providing guidance to students in carrying out simple observations and experiments, giving directions for students to discuss
An-Exp	Directing students to carry out concept confirmation, by comparing observations with existing knowledge concepts, synthesizing conceptual understanding, encouraging students to confidently explain the understanding of concepts that have been obtained, guiding students to carry out discussions (questions and answers).
Ext-Disc	Facilitating students in adapting their understanding of concepts to new situations or problems through games presented in the form of animated ppt, encouraging students to carry out discussions (questions and answers).
Evaluation	Reviewing the results of the learning process together with students, provide feedback on the material that has been studied, facilitate students to work on quizzes

Based on the description of the principle of the reaction to the moriblend, it is believed to be able to support the strengthening of students' scientific literacy skills through the application of moriblend. This is due to the principle of reaction, providing views on the response of educators to students, both in terms of giving directions, giving motivation, and paying attention to students. This response is able to influence the attitudes and interests of students to carry out the learning process, in this case the application of moriblend that adapts to indicators of scientific literacy ability. The fourth component is the social system, which is the interaction and relationship between educators and students that is intertwined in the implementation of learning using the guided inquiry learning model based on blended learning (moriblend). Putra (2012) explained that the social system is a pattern that exists between educators and students during the learning process. Based on this, it can be concluded that a social system is needed in the development of a learning model so that the application of the developed learning model can adjust the pattern that should exist between educators and students. Moriblend social system is presented in Table 5.

Based on the description of the moriblend social system, it is believed to be able to support the process of strengthening scientific literacy skills in the application of moriblend, through patterns that exist between educators and students. The patterns that exist between educators and students influence the implementation of the learning process in each of the moriblend syntaxes. The social system can be well intertwined with the principle of reaction and other moral components.

The fifth component is the support system, in the moriblend design, the support system is in the form of the tools needed to apply the guided inquiry learning model based on blended learning (moriblend). Putra (2012) who explained that the support system provides assistance in carrying out the implementation of Moriblend. Based on this, it can be concluded that the support system is able to support strengthening cyan literacy abilities, this is because students are able to identify and place the understanding of the concepts obtained.

The Moribend support system is believed to be able to support strengthening scientific literacy skills. This is because the RPP that has been prepared has adjusted to the indicators of scientific literacy. In addition, teaching materials and learning media in the form of animated ppt packaged in video form have adjusted indicators of scientific literacy, moriblend syntax and developed so as to be able to attract students' interest in carrying out the learning process.

The sixth component is instructional impact, in the form of measurable learning outcomes after carrying out learning activities by applying morals. Putra (2012) states that instructional impact is the result obtained from the implementation of learning in terms of learning content. Based on this, it can be concluded that instructional impact is expected to be achieved through the application of moriblend, in this case the learning outcomes of students.

The seventh component is the accompanying impact, the benefit in the form of scientific literacy skills that are obtained after applying moriblend in the learning process. Putra (2012) explains that the impact of accompaniment is a learning result obtained as a result of using a learning model. Based on this, it can be concluded that the accompanying effect of applying moriblend is strengthening scientific literacy skills.

Table 5. Moriblend Social System

Stage	Activities Carried Out		(ILS) ind. Science literacy
	Educator	**Participant**	
Orientation	Invite to discuss the schedule and plan of activities. Provide e-Theory.	Listen and participate in discussing the schedule and planned activities Understanding e-materials.	Understanding and analyzing scientific information in a science text. (ILS1).
Engage	Guiding appreciation activities Discuss e-material with questions and answers. Guiding to develop understanding through experience	Carry out appreciative activities. Listen and discuss e-materials Traindevelop an understanding of that experience owned	Identify information and provide opinions about science (ILS2), Provide judgment on science information (.ILS3)
Exp- Disc	Guiding the preparation of hypotheses. Guiding observations and simple experiments Guiding discussion activities	Trainformulate hypotheses Carry out simple observations and experiments Carry out discussion activities	Identifying questions (ILS4), Exploring scientifically the questions given (ILS5)
An-Exp	Guiding students to compare the results of observations and experiments with existing knowledge concepts. Guiding students to synthesize the results of observations into understanding the concept. Give directions to students explaining the results of understanding the concept Give directions to students for discussion	Train comparedata from observations and experiments with existing knowledge concepts Practice synthesizing results of observations with existing knowledge concepts. Train presentresults of understanding the concept Carry out discussion activities to strengthen understanding of the concept which is obtained.	Transform (data representation) (ILS6), Evaluating arguments with multiple sources (ILS7), Synthesize data analysis results (ILS8)
Ext-Disc	Guiding students to adapt their understanding of concepts to new situations/problems through games presented in pt animation. Give directions to students to discuss	Train develop the ability to place and adjust the conceptual understanding obtained in new situations/problems Discussthe process of adapting conceptual understanding to new problems.	Able to adapt to existing demands and problems (ILS 9)
Evaluation	Provide reinforcement for the learning process that has been implemented. Carry out a review of the learning process that has been carried out with students. Give quizzes online	Listen to the teacher's explanation in providing reinforcement of the material that has been studied Carry out a review of the learning process with educators Take quizzes	

It is believed that science learning outcomes from the instructional impact and strengthening scientific literacy skills from the accompanying impact are believed to be achieved by applying moriblend. Although the guided inquiry learning model is implemented in blended learning, it is believed that it can be achieved, because the implementation of the learning process applies investigative activities, analytical activities, and adaptation of conceptual understanding to a new problem through educational games.

Based on this explanation, it can be concluded that the development of moriblend results from the components that compose it, consisting of objectives, syntax, social systems, reaction principles, support systems, instructional impacts and accompanying impacts. The seven constituent components are mutually related to form a complete moriblend with proper and practical tools.

3.2.3 Development

The development stage is the process of developing a Moriblend design by carrying out a validity test of the Moriblend design. The implementation of the validity test was obtained through an assessment of the model design validation questionnaire which refers to a four-point likert scale to learning model experts with a doctorate who are competent in the field of natural sciences. The design validation questionnaire contains three aspects which include aspects of scientific literacy indicators, moriblend constituent components, and moriblend syntax. From the results of the assessment of the moriblend design validation questionnaire, it shows that the average overall score of the three aspects is 92.6%.

These results were obtained from the average score on the aspect of the scientific literacy indicator of 17.7% of the maximum average value of 20.8%. The indicator aspect of scientific literacy consists of five statements, which include, the relationship between the orientation stage syntax and scientific literacy skills, namely understanding and analyzing scientific information in a science text. The relationship between the engage stage and the ability to carry out identification of information, provide opinions about science and provide an assessment of the scientific information obtained.

Relevance of the exp-disc stage with the ability to identify questions from a given scientific research, as well as carry out scientific exploration of a question. The linkage of the an-exp stage with the ability to change data from one representation to the next, provide evaluation of arguments from various sources, as well as synthesize the results of scientific data analysis with reading sources. As well as the linkage of the ext-disc stage with the ability to adapt to the demands and problems that exist in people's lives by utilizing communication and participation by adjusting to phenomena that occur in the surrounding environment.

The average score on the aspects of the components making up the moriblend is 43.7% of the average maximum value of 45.8%. The aspects of the components that make up the moriblend consist of 11 statements that contain the availability of the seven components that make up the learning model. In addition, it also contains the availability of parts of the support system in the form of lesson plans, animated PPT media in video form, and assessment instruments.

The average score on the aspect of moriblend syntax is 31.2% of the maximum average value of 33.4%. The moriblend syntax aspect consists of eight statements, which contain the accuracy of steps in the orientation, engage, exp-disc, an-exp, ext-disc, and evaluation stages. Besides that, it also contains about the interrelationships in each syntax and the ease of understanding the order of syntax. From the description of the average value of the three aspects, the total average value is 92.6% of the maximum average value of 100%.

Tiurma (2020) explains that the validation value of the research modifications carried out, obtained from the conversion table used in Tiurma's research, includes 81.0% - 100.0% in a very valid category, can be used without revision, 61.0% -80 .9% in the quite valid category, can be used but needs revision, 41.0% -60.9% in the less valid category, it is recommended not to use it because it needs major revisions. 21.0% -40.0% with an invalid category, may not be used.

Based on this, it can be concluded that the results of the moriblend design validation of 92.6% which are interpreted into qualitative data using the conversion table show "very valid" results. So that the moriblend design is feasible to be developed into a moriblend product.

4 Conclusion

This research and development aims to produce a blended learning (moriblend) based guided inquiry learning model design. Moriblend is designed according to the rules of constructing a learning model, consisting of seven constituent components, including objectives, syntax or learning stages, reaction principles, support systems, social systems, instructional impacts, and accompaniment impacts.

The components of goals, principles of reaction, and social systems are interrelated and support the process of applying morale. The syntax component of the guided inquiry learning model based on blended learning (moriblend) consists of orientation, engage, exp-disc, an-exp, ext- *disc,* as well as evaluation. The syntax is the result of a modification between the syntax of the guided inquiry learning model and the syntax of the blended learning model. The support system components are in the form of tools that support the application of moriblend in this case in the form of lesson plans, teaching materials, and learning media, while the instructional and accompaniment impact components are in the form of expectations to be achieved after applying moriblend in the learning process.

The eligibility of the moriblend design is through a validation test of the moriblend design by learning model experts with doctors and masters degrees who are competent in the field of natural sciences. Obtained an average value of all aspects of the moriblend design of 92.6%. It consists of three aspects which include aspects of scientific literacy indicators with an average score of 17.7%, aspects of the moriblend component components with an average score of 43.7%, and aspects of moriblend syntax with an average score of 31.2%.. The average value is interpreted to qualitative data through the conversion table and shows "very valid" results.

References

Abidin, Zainal. Zulkifley, Mohamed., Sazelli, Abdul Ghani. 2016. Development of a Portfolio-Based Mathematical Learning Model (PMBP). Journal of Mathematics Education, 2 (1), 79-102.

Alman, Umm., Suryadin, Hasyda., Uslan. (2020). The Influence of Process Oriented Guided Inquiry Learning (POGIL) Model Assisted by Realia Media to Improve Scientific Literacy and Critical Thinking Skills of Primary School Students. International Research Article, Department of Elementary Teacher Education, 9(4), 1635–1647. https://creativecommons.org/licenses/by/4.0/

Arifuddin, M., M, Aslamiah., M, Misbah., D, Dewantara. (2020). The Implementation of Guided Inquiry Model on the Subject Matter Harmonious Vibration. International Journal of Physics: Conference Series, 1(1), 1-6.

Avvisati, F., Ecazarra, A., Givord, P., & Schwabe, M. (2018). Country note: Program for International Student Assessment (PISA) Result from PISA 2018(Indonesia).OECD. https://www.oecd.org/pisa/publications/PISA2018_CN_IDN.pdf.

A'yuna, Qori. 2017. The Effect of Learning Models in Guided Inquiry on Scientific Literacy Ability. Journal of Biology Education, 11(3), 14- 18.

Chaeruman, Anis Uwes. (2019). DESIGN BLENDED LEARNING MODELS. Technodic Journal, 17(4), 399–408. South Tangerang: Pustekkom Ministry of Education and Culture.

Cheng, Xiaoqiao. 2020. Challenges of "School's Out, But Class's On" to School Education: Practical Exploration of Chinese Schools during the COVID-19 Pandemic. Sci Insight Edu Front, 5(2), 501–516. Nanjing 210097, Jiangsu: China. Doi. https://doi.org/10.15354/sief.20.ar043

Christinsenia, Seranic., Agus, Abhi Purwok., Oand, Aliefman, Hakim. (2018). Influence of Guided Learning Model to Critical Thinking Skills. International Journal of Research & Method in Education(IOSR-JRME), 8(1), 28–31. https://www.iosrjournals.org.

Ilmi, Miftakhul S Putra. (2016). Implementation of Guided Inquiry Model Science Learning to Improve Science Literacy Skills of MI Teacher Candidates. Journal of Islamic Management & Education, 1(2), 263–284. Darul 'Ulum Islamic Boarding School University: Jombang.

Kade, Amiruddin., Syamsu., Muh Syarif, Gratitude. (2019). The Effect of the Blended Learning Model on Scientific Literacy and Learning Outcomes. Journal of Physics Education Tadulako Online, 7 (3), 51–55. Tadulako University: Central Sulawesi.

Kristina, Jessica. (2020). The Role of the Inquiry Method in Student Learning Activeness in online learning in science subjects for class VIII students. Tangerang: Bachelor Thesis, Pelita Harapan University. http://repository.uph.edu/id/eprint/12354.

Kurnia, F. 2014. Analysis of Teaching Materials in North Indralaya District Based on the Science Literacy Category. Journal of Physics Innovation and Learning. 1 (1), 43-47.

Maulana, M., S. Palah., A, N Aeni. 2017. The Effect of an Open-Ended Approach with the M-RTE Strategy on Students' Mathematical Creative Thinking Ability. Journal of the Scientific Pen, 2(1), 1161-1170.

Nafis, Evan. 2021. The Effectiveness of the Discussion Method in Distance Learning for Islamic Religious Education Subjects for Junior High School Students During the Covid-19 Pandemic, University of Muhammadiyah Surakarta.

Naila, Ishmatun., Fenny, Tanalinal Khansa. (2021). The Effect of Online Learning on the Science Literacy Ability of Prospective Elementary School Teachers: A Preliminary Study. Journal of Basic Education Review: Journal of Educational Studies and Research Results, 7 (1). http://journal.unesa.ac.id/index.php/PD.

Nana, Sutrisna. 2021. Analysis of Students' Scientific Literacy Capability in Sungaipuh City. Journal of Research Innovation, 1(12), 2683–2694. https://doi.org/10.47492/jip.v1i2.530.

Nirasari, Nadya. 2020. Analysis of Learning Implementation during the Covid-19 Pandemic (Research at Manding Public Elementary School, Temanggung District, Temanggung Regency). Thesis: Elementary School Teacher Education Study Program, Muhammadiyah University of Magelang, 17-75.

Son, Adita Widara. 2012. Role-playing Learning in Subjects by using Learning Models. Bandung: UPI.

Ramdani, Nurul Hikmah. 2021. The Effect of the Guided Inquiry Learning Method on Student Learning Outcomes in Class V Science Lessons at SD Islam Khalifah Palu. Journal of Mathematics and Science Learning, 2 (1), 25-30.

Risniani, Yusi Listika, Arief, Husein. (2019). BlendedLearning:ItsDevelopmentand Implementation. BIODUSCIENCE,3(2),7383.https://doi.org/10.29405/j.bes/3274.834007.

Rusilowati, Ani., Lina, Kurniawati., Sunyoto, E Nugroho., Arif, Widiyatmoko. (2016). Developing an Instrument of Scientific Literacy Assessment on The Cycle Theme. International Journal of Environmental & Science Education, 11(12), 5718-5727.

Safrizal., Resti, Yulia., Desty, Ayu Anastasha., Husnani., Silfis, Rahmi. (2021). Description of Elementary School Students' Scientific Literacy Ability in Padang City (Case Study at Accredited School A). El-Ibtidaiy: Journal of Primary Education, 4(1), 55–64.

Safrizal., Resti, Yulia., Desty, Ayu Anastasha., Husnani., Silfis, Rahmi. (2021). Description of Elementary School Students' Scientific Literacy Ability in Padang City (Case Study at Accredited School A). El-Ibtidaiy: Journal of Primary

Saraswati, 2018. The Effect of the Guided Inquiry Learning Model on Students' Critical Thinking. Journal of Physics and Technology Education, 4(1), 98-102.

Setiawan, Adib Rifqi., Wahyu, Eka Saputri. (2020). Learning Scientific Literacy for Basic Education. Educational Research Media: Journal of Research in the Field of Education and Teaching: Journal of Research in the Field of Education and Teaching, 14 (2), 144–152. https://doi.org/10.26877/mpp.v14i2.5794.

Tiurma, B, Siregar. 2020. Validity of Student Worksheets (LKPD) Based on Problem Based Learning. Journal of Basic Education, 12(2), 23- 27.

Yuliati, Yuyu. 2017. Scientific Literacy in Learning Science. Journal of Basic Education Horizon: 3 (2), 21-28.