

## Development of Digital Student Worksheets with the Discovery Learning Model to Improve Collaboration Skills and Results for Elementary School Students: Literature Review

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### ABSTRACT

**Objective:** This research reviews the literature regarding the development of Digital Student Worksheets based on the discovery learning model to improve collaboration skills and student learning outcomes in elementary schools. This review article is a literature review research. **Method:** used is a narrative review, which consists of four stages: selecting the topic to be reviewed, selecting national journals and international journals that are relevant to the latest five years, namely 2018-2023, totaling ten articles, conducting literature analysis and synthesis, and compiling review results. **Results:** The results of the literature review show that e-LKPD can improve collaboration skills and improve student learning outcomes. **Novelty:** this research provides a new color for the literature review on e-LKPD, specifically on the discovery learning model for Natural and Social Sciences (NSS) subjects in elementary schools.

### INTRODUCTION

The development of technology in the era of Industrial Revolution 4.0 is a concept where students are required to learn and discover various things based on experiments and refer to the use of technology in the learning process. Technological developments in the Industrial Revolution 4.0 era require the education sector always to innovate and adapt to technological developments. Education in the era of the Industrial Revolution 4.0 requires learning that suits students' needs and optimization of technology, not the transfer of knowledge. Education in the industrial era 4.0 aims to develop 21st-century century skills through strengthening character (moral and performance) and four competencies, namely 4C (critical thinking, creative, communication, collaboration), problem-solving, innovation, and literacy skills. It can be said that students are required to have various skills, one of which is collaboration.

Collaboration is a learning process carried out in groups to discuss differences in views and knowledge through discussions such as giving suggestions, listening and listening to the discussion and respecting existing differences of opinion (Greenstein, 2012; Trisdiono et al., 2019). Collaboration skills are students' skills in working together to achieve one goal in the process of solving a problem (Council, 2011; Fitriyani et al., 2019; Hughes & Jones, 2011).

The independent learning curriculum is a curriculum concept that demands independence for students. Independence means that each student is given the freedom to access the knowledge obtained from formal and non-formal education. This curriculum allows the concept of learning that takes place at school or outside school and also demands creativity from teachers and students.

Risdianto (2019) also said that the presence of the independent learning curriculum also aims to answer the challenges of education in the era of the Industrial Revolution 4.0, where in its implementation, it must support skills in critical thinking and problem-solving, creativity, and innovative, as well as skilled in communicating and collaborating, for students.

NSS is a combination of Natural Sciences (NS) and Social Sciences (SS) subjects. The aim of learning sciences in the independent curriculum is to be able to develop students' curiosity and interest, be able to play an active role, develop knowledge, master themselves and their environment, and develop an understanding of the concepts in the sciences learning (Agustina & Widyastuti, 2022).

NSS learning should be presented in a pleasant situation and use a variety of approaches, media, and learning resources because science and science, especially learning about economic activities, is important learning for students. However, in reality, teachers teach NSS with inadequate preparation because they need clarification about making student worksheets that are creative and interesting for students and that can enable students to learn independently.

Digital student worksheets are one solution to attract students' attention to learning. Digital student worksheets can also display colorful pictures and videos about the material. So that students stay energized while studying. This electronic development will make it easier for students and educators to participate in learning activities. With the development of learning applications, it is hoped to increase benefits in the field of education. This Digital student worksheet is one of the learning student worksheets that is deemed suitable for the conditions of the current generation of information technology because teaching will attract more students' attention so that it can foster learning motivation and reduce the level of student boredom in the learning process.

The innovation of printed LKPD, namely electronic LKPD or e-LKPD, has features that give students a different learning experience. Some of the e-LKPD features include short material videos, pop-up quizzes, and virtual laboratories. Learning that is different from usual occurs because what is usually printed material is then innovated into electronic form. The purpose of e-LKPD as teaching material for students is to support students in playing an active, independent and creative role in participating in classroom learning (Umriani & Suparman, 2019 in Fina et al., 2023). The use of e-LKPD also has an impact on increasing critical thinking skills or the ability to find solutions to problems (Fitria & Suparman, 2019 in Fina et al., 2023).

Student worksheets that have been adapted to the material and basic competencies to be achieved are equipped with structured directions and questions with the aim that students can study them independently (Prastowo, 2014). Therefore, in the student worksheets, there is material, summaries, and tasks related to the competency achievements to be achieved. The use of student worksheets is very important in the learning process, so it can make learning easier for students. Student worksheets are said to be good if they meet the requirements, namely active requirements, which means that the student worksheets must follow the principles of effective teaching and learning,

construction requirements relating to language, sentence structure, vocabulary, level of difficulty and appropriate clarity and has technical requirements relating to writing, images and appearance (Widjajanti in Widodo 2017).

The discovery learning model is one of the appropriate models in the Merdeka curriculum, this model provides an opportunity for students to find their own concepts in learning. Through discovery learning models, students are expected to be independent, critical, and have creative attitudes. The discovery learning model directs students to be able to find something through the learning process they carry out. They not only act as consumers but are also expected to play an active role, even as actors from the creators of science. The learning discovery model is part of the scientific approach framework. The application of the discovery learning model is carried out in groups so that students' social skills can be improved through group activities because students are allowed to work together with the group to solve problems in an investigation activity they do (Wahida et al., 2018).

The purpose of discovery learning models as teaching and learning models is (1) the ability to think to be more responsive and careful and exercise reasoning (critical, analytical, and logical); (2) fostering and developing behaviors of curiousness; (3) develop cognitive, affective, and psychomotor aspects; and (4) developing students' behavior, skills, beliefs in deciding things accurately and objectively. The discovery learning model is another name for the model of the invention. Corresponding with this name, this model directs students to find something they do through a learning process. Students are trained to be a scientist. The discovery learning model is an important component in the constructivist approach that has a long history in the world of education. The idea of discovery learning arises from the desire to give a sense of pleasure to children or students in "finding" something by themselves and following the footsteps of scientists. Thus, the discovery learning model is a learning that involves students in the process of mental activities through exchanging opinions, discussing, reading on their own, and trying by themselves. Learning by employing discovery learning models encourages students to think critically and creatively (Wahida et al., 2018).

Based on the results of previous research, including research conducted by Al-hayati (2019) with the title "Development of Digital Student Worksheets to Improve Learning Outcomes on Optical Equipment Material". The results of the research showed that this digital student worksheet was deemed appropriate by 20 experts (material experts, media experts, learning design experts, and guided inquiry model experts), effective in assisting the learning process, with 75% of students having achieved a Minimum Completeness Criteria (MCC) and N-Gain of 0.6 (medium), and practical with a score of 94%.

With electronic student worksheets based on the discovery learning model, the material and practice questions will be more concrete because electronic student worksheets can function as interactive multimedia. Electronic student worksheets based on the discovery learning model are able to make students no longer feel bored because of learning and can be more skilled in collaborating when carrying out assignments in

groups. Another advantage of electronic student worksheets based on discovery learning is that student activities are varied because students are trained in higher-level thinking, which can stimulate students to find their knowledge of problem-solving.

Based on the description of the problem above, an innovation is needed in a student worksheet that is innovative and capable of fostering collaboration skills in the learning process and learning outcomes that are in accordance with the criteria for complete learning objectives (CLO). From the results of this study, researchers are interested in developing electronic student worksheets based on the discovery learning model.

The novelty of this research is that the literature review used comes from Google Scholar and Scopus, so the results of the review can provide information on the level of success in developing e-student worksheets based on the discovery learning model in improving collaboration skills and student learning outcomes.

## RESEARCH METHOD

This article review is a review of literature study articles. The method used is narrative review. The review of this article begins by reviewing the article according to the title of the research to be conducted. Literature study means looking for and reading lots of books, journals, and other publications related to a topic to write about something. (Abraham & Supriyati, 2022).

The criteria for scientific articles used as data are scientific articles sourced from national journals and international journals within the last five years, namely from 2018 to 2023. The scientific article data used is a minimum of 20 articles. The steps taken to search for this article were to visit Google Scholar and Scopus by entering the search keyword development of e-student worksheets discovery learning model.

In searching for these articles, 198 articles that matched the keywords via Google Scholar and 54 articles in Scopus were found. In total, the number of articles obtained was 252 articles, and then validation of scientific articles was carried out by eliminating scientific articles with similar titles in each article. Scientific articles were also eliminated based on the last five years. Of the 252 selected articles, 60 articles that were closest to the research topic were re-selected. Of the 60 selected articles related to e-student worksheets based on the discovery learning model, ten articles were then analyzed using qualitative descriptive data.

According to Miles & Huberman in (Rijal Fadli, 2021) there are three types of activities in data analysis, namely data reduction, data display, and conclusions. Qualitative data analysis involves four stages, namely: 1) Data collection is the process of collecting data in the field (both from journal studies and trials) to obtain the data needed for research purposes; 2) Data reduction involves summarizing, selecting important elements, and focusing on important elements to create a clear picture of the data collected and to make it easier for researchers to access further data; 3) The type of data presentation most often used in qualitative research is narrative text, which consists of brief descriptions, charts and relationships between individuals; 4) New discoveries require verification and conclusions.

## RESULTS AND DISCUSSION

### Results

Student worksheets are one of the teaching materials. Digital student worksheets or d-student worksheets are activity sheets presented in a computer language that contains the learning process to discover material concepts either through demonstration, theory, or investigation accompanied by clear instructions or work procedures to train thinking skills and learning process skills in completing tasks in accordance with the learning indicators to be achieved (Prastowo, 2012).

Digital student worksheets or d-student worksheets are very important to determine students' success in absorbing and mastering material during the learning process. With d-student worksheets, teachers can observe students who have and who have yet to understand the material that has been given. Apart from that, d-student worksheets are also able to provide other benefits, including an attractive appearance and various complete features so that students can study independently. Students must discuss with their group members to practice identifying problems, collecting data, and processing data to come to conclusions when collaborating. This is in accordance with the syntax of the discovery learning model. The results of the literature review obtained from Google Scholar and Scopus selected ten articles that were appropriate to the research topic. The following is the data obtained:

**Table 1.** Results of literature review journals

| No | Citation | Author                     | Title                                                                                                                                                                            | Year | Literature Review Results                                                                                                                                                                                                                                                                                                                                              |
|----|----------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | 2        | (Lestari, 2022)            | Development of e-student worksheets learning media based on discovery learning in social studies lesson content for class V SD No. 4 Mengwitani for the 2022/2023 academic year. | 2022 | The results of the research showed that effectiveness based on the t-test results obtained t count = 11.427 for db = 56 and a significance level of 5% = 2.003. This means t count > ttable, so H0 is rejected and H1 is accepted, meaning there is a significant difference (5%) before and after using discovery learning-based e-student worksheets learning media. |
| 2  | 4        | (Hikmah et al., 2021)      | Development of student worksheets based on discovery learning for class VII students on photosynthesis material                                                                  | 2021 | The results of the research showed that student worksheets were declared valid with a validity value of 3.47 which was categorized as very valid by the validator.                                                                                                                                                                                                     |
| 3  | 1        | (Subariyanto et al., 2022) | Development of e-student worksheets based on discovery learning to optimize critical thinking abilities of elementary school students                                            | 2022 | The results of the research show that e-student worksheets based on discovery learning effectively optimizes the critical thinking abilities of fifth grade elementary school students with an N-Gain score of 0.12 (fairly good category).                                                                                                                            |

| No | Citation | Author                   | Title                                                                                                                                                                                        | Year | Literature Review Results                                                                                                                                                                                                                                                    |
|----|----------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4  | 1        | (Sari, 2021)             | Development of student worksheets based on discovery learning assisted by tracker software on circular motion material to improve students' understanding of concepts                        | 2021 | Student worksheets based on discovery learning assisted by tracker software are very valid, very practical, and have potential effects for students, namely by providing evidence of increased students' understanding of physics concepts.                                  |
| 5  | 0        | (Fitni et al., 2023)     | Development of electronic student worksheets based on discovery learning to improve mathematical literacy skills                                                                             | 2023 | The research results show that the electronic student worksheets developed are very good or practical and suitable for use in the learning process and have the ability to increase students' mathematical literacy.                                                         |
| 6  | 1        | (Indah, 2023)            | Development of Interactive student worksheets with live worksheets based on discovery learning models on additives and addictive substances to improve science process skills.               | 2023 | The results of the research show that the developed e-student worksheets have a big influence in improving students' science process skills with an n-gain value of 0.72.                                                                                                    |
| 7  | 1        | (Augustha et al., 2021)  | Development of e-student worksheets based on discovery learning using the Adobe Acrobat 11 Pro Extended application on ionic balance and pH of salt solutions for class IX SMA/MA equivalent | 2021 | The results of the data analysis can be concluded that the e-student worksheets based on discovery learning using the Adobe Acrobat 11 Pro Extended application have been validated and can be used in SM chemistry subjects regarding ion balance and pH of salt solutions. |
| 8  | 3        | (Pratama et al., 2021)   | Development of e-student worksheets Based on the Discovery Learning Model on the Main Material of Acids and Bases                                                                            | 2021 | The e-student worksheets media with the discovery learning model is very effective to use. Completion or achievement of the e-student worksheets pretest KKM was 5 people (13.89%) and increased to 36 students (100%).                                                      |
| 9  | 1        | (Ramadhana & Hadi, 2022) | Effectiveness of implementing an e-learning based learning model assisted by electronic student worksheets                                                                                   | 2022 | The research results stated that learning outcomes before implementing the electronically assisted e-learning based learning model student worksheets were very low with                                                                                                     |

| No | Citation | Author       | Title                                                                                                                                                                                                                                   | Year | Literature Review Results                                                                                                                                                                                  |
|----|----------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 | 32       | (N.F., 2022) | on student learning outcomes<br>Development of e-student worksheets based on live worksheets to improve social studies learning outcomes material on events surrounding the proclamation of independence for class V elementary schools | 2022 | an average of 49.46, while after implementing the results were 86.11 in the very high category.<br>Worksheet-based E-STUDENT WORKSHEETS can be easily accessed so students can learn anywhere and anytime. |

### Discussion

A student worksheet is one source of learning as a guide for learners in achieving learning objectives during the investigation or problem-solving. Practical tools with digital displays will assist the investigation process (Melati et al., 2019). Digital student worksheets based on discovery learning make it easy for students to understand concepts and make students play the main role in learning. Students can independently carry out assignments according to instructions from each stage of the discovery learning model. The teacher's role in the learning process is as a facilitator and director of learning activities (Ramadia et al., 2023). The advantage of digital student worksheets based on the discovery learning model is that learning is more interesting and fun and is able to challenge students to reason and think critically. It can be concluded that the worksheets are interesting for students (Ariyati et al., 2019) and the activeness of students in each meeting also increased (Ichsan et al., 2023).

This research is still limited to the development of digital student worksheets based on the discovery learning model. From the results of the journal literature review above, digital student worksheets based on the discovery learning model can be applied with various software and can also be applied to various subjects at both elementary and high school levels.

Based on the results of the literature review analysis research, it can be concluded that the development of digital student worksheets is to improve student collaboration skills and improve student learning outcomes as well as to meet the demands of 21st-century learning, namely the development of digital student worksheets based on the discovery learning model.

### CONCLUSION

**Fundamental Finding:** This research highlights the importance of digital student worksheets in elementary schools. **Implication:** The results suggest that the development of digital student worksheets improves student collaboration skills and

student learning outcomes as well as meets the demands of 21st-century learning, namely the development of digital student worksheets based on the discovery learning model. **Limitation:** This research only discusses literature studies and has yet to see its application in the field. **Future Research:** With this article, we can see that it is necessary to develop digital student worksheets and conduct research in elementary schools.

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