JPPIPA 10(SpecialIssue) (2024)

Jurnal Penelitian Pendidikan IPA

*Journal of Research in Science Education*

http://jppipa.unram.ac.id/index.php/jppipa/index

# Development E-Student Worksheet Using Guided Inquiry Learning Model

Dilla Maidaliza[1*], Ramalis Hakim[1], Zuwirna[1] , Abna Hidayati[1]

[1] Master of Educational Technology Program, Padang State University, Padang, Indonesia.

Received: November 19, 2023
Revised: July 21, 2024
Accepted: August 25, 2024
Published: August 31, 2024

Corresponding Author:
Dilla Maidaliza
maidalizadilla1205@gmail.com

DOI: 10.29303/jppipa.v10iSpecialIssue.5996



**Abstract:** Based on observations of science subject teachers, several obstacles were encountered in learning activities, the teaching materials used by the school did not support the needs of the student learning process which resulted in low student learning outcomes. The purpose of this study was to produce teaching materials in the form of E-Student Worksheet in science subjects for grade VII of SMP/MTs that were valid, practical, and effective. This type of research is Research and Development with the ADDIE development model. The results of the study obtained validation in the media aspect with a percentage of 89.6% in the material aspect with a percentage of 84.4% and the language aspect with a percentage of 86.9%, so E- Student Worksheet using a guided inquiry learning model was stated as very valid. Practicality assessment was obtained through a questionnaire assessment by teachers with a percentage of 97.14 % and by students with a percentage of 91.43%, so E- Student Worksheet using a guided inquiry learning model was stated as very practical. The effectiveness test was conducted at SMP Negeri 23 Padang through pretest and posttest, obtaining a gain score of 0.8 classes with a very high category. The average learning outcomes of students after using E- Student Worksheet using guided inquiry learning model in class VII.3 is 93% with a very effective category. Based on the data above, it can be concluded that E- Student Worksheet using guided inquiry learning model in science subjects in junior high schools/Islamic junior high schools is valid. Practical, and effective to use in learning activities.

**Keywords:** Development; E- Student Worksheet; Guided Inquiry, Science.

## Introduction

The current era of globalization demands very tight competition in various fields, for that quality human resources are needed, so that all countries in the world demand to be able to compete in various changes. One of the determining factors in efforts to improve the quality of human resources is through education (Fetra Bonita Sari, Risda Amini, 2020). Education is a learning process for students to be able to understand, comprehend, and make humans more critical in thinking. To achieve this change, there are teaching and learning activities in the field of education that require manpower and expertise. Of course, a learning process involving students is needed to realize this, and the government's task is to continue to implement educational reform. Provision of infrastructure and facilities in the form of technology-based media or tools is one of them (AlAjmi, 2022). Technological developments can be utilized for learning. Students are positioned as learning subjects who play the main role, so that in the teaching and learning process students are required to be fully active, even individually studying the learning materials (Sya'idah et al., 2020). The improvement of the quality of education in Indonesia, which has now undergone many changes, one of which is the development of the curriculum, from the 2013 Curriculum to the Merdeka Curriculum which is

**How to Cite:**
Maidaliza, D., Hakim, R., Zuwirna, Z., & Hidayati, A. (2023). Development E-Student Worksheet Using Guided Inquiry Learning Model. *Jurnal Penelitian Pendidikan IPA*, *10*(SpecialIssue), 685–690. https://doi.org/10.29303/jppipa.v10iSpecialIssue.5996

currently being implemented in several schools. (Sherly et al., 2020). Independent curriculum is defined as a learning design that provides students with the opportunity to learn calmly, relaxed, fun, stress-free and pressure-free, to show their natural talents. Independent learning focuses on freedom and creative thinking (Rahayu et al., 2022). In the Independent Curriculum, one of the compulsory subjects at the junior high school level is Natural Sciences.

Science learning can provide students with direct experience in carrying out the observation process in science subjects and can improve students' critical thinking (Khasanah et al., 2020), so that in science learning, educators need to design learning activities using methods, models and equipment as well as teaching materials to improve students' understanding of a concept (Rahman & Limatahu, 2020).

teaching materials in the learning process can help students master the lesson (Kosasih, 2021). One form of teaching material is Student Worksheet. Student Worksheet is a learning tool whose use plays a role in facilitating and directing the implementation of the learning process to students. Student Worksheet is usually made in the form of duplicate copies or printed, (Anggraini et al., 2016).

E- Student Worksheet is a teaching material that is displayed in electronic format that can be viewed from a desktop, computer, netbook, smartphone or mobile phone with a presentation form that contains animation, images, videos, and navigation so that users are more interactive with the program. E- Student Worksheet provides questions that support students to think critically because there are materials, practice questions, and worksheets and utilize technology to design them (Melina et al., 2021; Nur Hidayah et al., 2020). E- Student Worksheet is compiled by combining practical electronic principles and is easy to learn anywhere, anytime using a guided inquiry learning model.

Guided inquiry is a learning model that trains students' skills in carrying out the investigation process, which allows them to collect data, process it, and build conclusions independently to answer questions asked by the teacher (Puspitasari et al., 2019). The guided inquiry learning model consists of five steps; 1) Asking a problem or question, 2) Formulating a Hypothesis, 3) Collecting data, 4) Analyzing data, 5) Making conclusions (Trianto, 2007). During the implementation of this model, the teacher provides guidance, instructions and planning so that students tend to gain in-depth knowledge and understanding of the material being studied (Maknun, 2020).

Based on initial observations and interviews with the researcher with the science subject teacher of class VII at SMPN 23 Padang, with the resource person Mrs. Sri Muliana, S.Pt., the researcher found learning problems, especially in science learning for class VII, namely students' lack of focus in learning because in the learning process the teacher only uses teaching materials presented using power points and LKS in printed form which causes students to be less active in learning. In order for students to understand the material that has been given by the teacher, of course the teacher also needs interactive learning tools to make students interested in participating in learning. However, at that school the teacher had not utilized learning tools using technology and the teacher had not improved the quality of effective and enjoyable learning (Rani Nurafriani & Mulyawati, 2023). This has an impact on science learning outcomes that have not reached the learning achievement standards. Seen from the assessment results of two classes, namely class VII3 with an average of 63.67 and class VII4 with an average of 64, which average has not delivered the expected learning achievement results.

Based on these problems, the author developed an E- Student Worksheet. This study aims to reveal how the E- Student Worksheet process using a guided inquiry learning model meets the criteria of valid, practical, and effective to improve the learning outcomes of grade VII junior high school students in science subjects on the topic of temperature and heat.

## Method

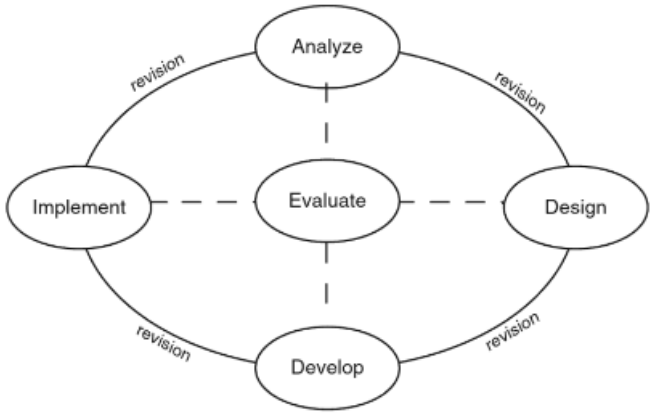


**Figure 1.** ADDIE Model (Sogiyono)

The type of research used in the study is Research and Development (R&D). This development research uses the ADDIE model (Sugiyono, 2017) which consists of five stages, including: (1) Analysis stage including curriculum analysis, teaching material analysis, student analysis, and needs analysis; (2) Design stage, which aims to determine how E- Student Worksheet is designed in its entirety according to the main material, then compile learning objectives that will be designed into E- Student Worksheet; (3) Development stage, which is the stage of changing the script into a program containing

text, sound, images, videos in an E- Student Worksheet product. At this development stage, a validation process is also carried out on the developed product. Validation is carried out by media experts, material experts, and language experts; (4) Implementation stage, including testing the validation product results to grade VII students. The E- Student Worksheet trial is expected to make students achieve learning objectives as evidenced by increased learning outcomes and make it easier for teachers to benefit from E- Student Worksheet. The steps in this implementation stage are to conduct field trials, practicality tests and effectiveness tests; (5) Evaluation stage, namely the evaluation process which will determine the success of product development objectives and obtain data on what can help students achieve learning outcomes.

The data in this study were obtained by conducting validation, practicality, and effectiveness tests on E- Student Worksheet. The validation carried out in this study was validation of E- Student Worksheet using an instrument in the form of an observation sheet formed from the assessment of the validation questionnaire list. Validation data was obtained through a validation sheet assessed by media experts, material experts, and language experts, which were then analyzed using a Likert scale with a positive category (Hasrawati et al., 2019). Data on the practicality of E- Student Worksheet was obtained through a response questionnaire with a Likert scale, while data on the effectiveness of E- Student Worksheet was obtained from student learning outcomes through pre-tests and post-tests. The results obtained are calculated using the N-Gain formula.

## Results and Discussion

This research produces teaching materials in the form of E- Student Worksheet which can be accessed via laptop, PC, and *smartphone.* This E- Student Worksheet can be used for grade VII junior high school students. E- Student Worksheet is suitable for use in learning based on aspects of validation, practicality and effectiveness for students (Fitriasari & Yuliani, 2021 . The validation carried out in this study was the validation of E- Student Worksheet using an instrument in the form of an assessment questionnaire sheet (validation) and was carried out by validators, namely media, materials, and language. This E- Student Worksheet assessment is in line with previous research conducted by (JK & Yuliani, 2021) which produced E- Student Worksheet with a valid category based on an assessment of aspects of content feasibility, material aspects, and language aspects. The appearance of the E- Student Worksheet product can be seen in Figures 2 and 3.

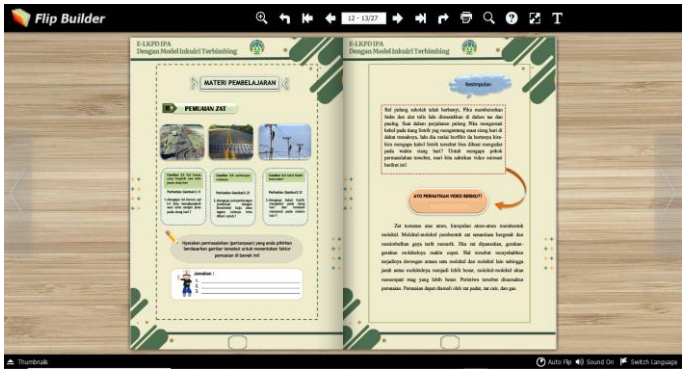


**Figure 2.** View material page


**Figure 2.** View material page

*Validation Results*

Validation in the study was conducted by several experts, namely two media experts, one material expert, and two language experts. The following are the results of the E- Student Worksheet validation obtained.

**Table 1.** Media Validation Results

| Rated aspect | Item | Total Validators 1 | Total Validators 2 |
|---|---|---|---|
| E- Student Worksheet content components | 6 | 29 | 25 |
| E- Student Worksheet Content | 9 | 43 | 40 |
| Student suitability components | 3 | 14 | 12 |
| E- Student Worksheet Interface | 7 | 34 | 32 |
| Technology | 2 | 10 | 7 |
| Amount | | 130 | 116 |
| Average | | 4.8 | 4.3 |
| Percentage | | 96% | 86% |
| Average of Both Validators | | | 91% |
| Assessment criteria | | | Very Valid |

Based on Table 1 shows the validation results of 1 media expert obtained an average of 4.8 with a percentage of 96% and validation of 2 media experts

obtained an average of 4.3 with a percentage of 86%. From the assessment of the two validators obtained an average of 91% with a very valid category. The results of the validation of the material in E- Student Worksheet are shown in Table 2.

**Table 2.** Material Validation Results

| Rated aspect | Item | Total Validators 2 |
|---|---|---|
| Content components | 9 | 38 |
| Presentation Components | 6 | 24 |
| Encouraging Curiosity | 5 | 22 |
| Pushing Graphics | 4 | 17 |
| Amount | | 101 |
| Average | | 4.2 |
| Percentage | | 84% |
| Assessment criteria | | Very valid |

Based on Table 2, the results of the material validation obtained an average of 4.2 with a percentage of 84% in the very valid category. The results of the language validation on E- Student Worksheet are shown in Table 3.

**Table 3.** Language Validation Results

| Rated aspect | Item | Total Validators 1 | Total Validators 2 |
|---|---|---|---|
| Language Rules | 2 | 9 | 8 |
| Consistency of sentences | 4 | 19 | 16 |
| Suitability to learners | 6 | 29 | 24 |
| Amount | | 57 | 48 |
| Average | | 4.8 | 4 |
| Percentage | | 95% | 80% |
| Average of Both Validators | | | 88% |
| Assessment criteria | | Very Valid | Valid |

Based on table 3. Shows the validation results of 1 linguist obtained an average of 4.8 with a percentage of 95% categorized as very valid and validation of 2 linguists obtained an average of 4 with a percentage of 80% categorized as valid. From the assessment of the two validators obtained an average of 88% with a very valid category.

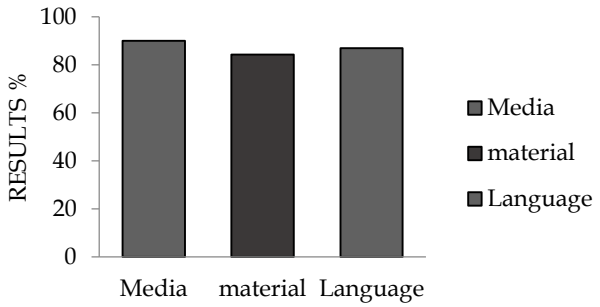


**Figure 4.** Validity test result graph

Referring to the validity category, the validation results of the E- Student Worksheet product are included in the very valid category where the results of the validation analysis can be seen in Figure 4.

*Practical Results*

Practicality tests were conducted on teachers and students. The practicality of E- Student Worksheet using the guided inquiry learning model in science subjects can be seen in Table 4.

**Table 4.** Recapitulation of Practicality Test Results

| Practicality | Percentage | Category |
|---|---|---|
| Teacher | 97% | Very practical |
| Student | 91% | Very practical |

The practicality test was conducted by involving a science subject teacher who assessed the indicators of readability, use, and benefits. From the results of this practicality test, the results were obtained with a category of very practical use in the learning process.

Practicality tests were also conducted on 30 students with indicators consisting of readability, use, and benefits. The results of the practicality test obtained by students were in the very practical category. The practicality of learning media is included in the practical category if the results of observations from the implementation of learning are at least in the good category. (Jannah et al., 2012). If the implementation of learning using E- Student Worksheet is included in the practical category, then this indicates that the activities in the E- Student Worksheet that were developed have been carried out completely (Masruhah et al., 2022).

Referring to the practicality category, the results obtained for teacher and student practicality are in the very practical category where the results of the practicality analysis can be seen in Figure 5.

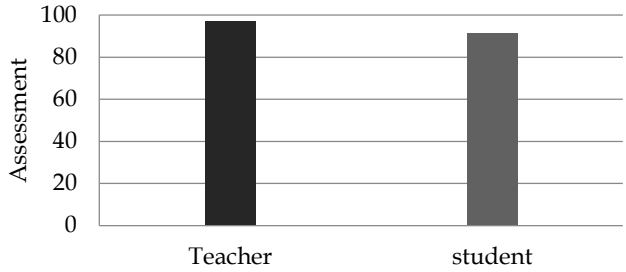


**Figure 5.** Practicality test for teachers and students

*Effectiveness results*

The effectiveness test of E- Student Worksheet using this guided inquiry learning model is seen from the results of student learning obtained through the results of the knowledge test by conducting a *pretest* and *posttest*

so that the level of success of the E- Student Worksheet developed in improving student outcomes is known. This study is seen from previous research where the study had not reached the KKM, after the study was conducted, an increased posttest value was obtained (Wahyudi et al., 2024) . This average indicates a significant increase in student learning outcomes after using Student Worksheet based on the inquiry model. Before the implementation of this model, student learning outcome scores tended to be lower, but after implementing Student Worksheet based on inquiry, there was a significant increase (Dewi & Putri, 2024) . Data on the results of the pretest and posttest before and after using the E- Student Worksheet product can be seen in Table 5.

**Table 5.** Comparison Results of *Pretest* and *Posttest*

| Class | Information | Meeting 1 | Meeting 2 |
|---|---|---|---|
| | | *Pretest* | *Posttest* |
| VII3 | Total | 1920 | 2795 |
| | Average | 64 | 93.2 |
| | N-Gain | | 0.8 |
| | Category | | High (N-Gain ≥ 0.7) |

Based on the calculation, it can be seen that there was an increase in the average post-test value, which shows that in general, E- Student Worksheet uses a guided inquiry learning model that is effective in improving student learning outcomes.

This research is in line with previous research. Based on research by (Ariyansah et al., 2021), the results obtained that the developed E-Student Worksheet received a validity percentage of 87.6% with a valid category, the average practicality result was 78.8% and the effectiveness result obtained an average N-Gain score of 0.71 with a high category so that the developed E- Student Worksheet is suitable for use in the physics learning process. Furthermore, the results of relevant research prove that Student Worksheet is effective for use in learning (Abd. Rachman et al., 2017).

## Conclusion

Based on the results of the research and development conducted, a product was produced in the form of E- Student Worksheet using a guided inquiry learning model in the subject of science for grade VII of junior high school which is valid, practical, and effective. The validity test was carried out by involving several experts, namely media experts, material experts, and language experts so that the results were obtained with a very valid category. Practicality test shows very practical criteria after being tested on teachers and students. Effectiveness test is obtained from student learning outcomes through pretest and posttest data which shows an increase in student learning outcomes after using E- Student Worksheet. The use of E- Student Worksheet using this guided inquiry learning model shows the achievement of the research objectives that have been set.

**Acknowledgements**

The author would like to thank the supervisor, Mr. Dr. Ramalis Hakim, M.Pd., to the examiners, namely Mrs. Dra. Zuwirna, M.Pd., Ph.D and Mrs. Prof. Dr. Abna Hidayati, M.Pd., who have provided encouragement and motivation as well as useful discussions in this research. The author would also like to thank the teachers and students at SMPN 23 Padang who have helped the author obtain research data.

**Author Contributions**

The lead author, Dilla Maidaliza, contributed to designing the research, conducting the research, analyzing the data, and writing the research article. The second author, Ramalis Hakim, who also took part in guiding the research from the beginning of the research to writing the article. The third and fourth authors, Zuwirna and Abna Hidayati, who also contributed input to the author in completing the research process.

**Funding**

This fund does not accept external funding.

**Conflict of Interest**

The authors declare no conflict of interest.

## References

Abd.Rachman, F., Ahsanunnisa, R., & Nawawi, E. (2017). Development of LKPD Based on Critical Thinking on Solubility and Solubility Product Materials in Chemistry Subjects in High School. *ALCHEMY : Journal of Chemical and Applied Sciences*, *1*(1), 16–25. https://doi.org/10.19109/alkimia.v1i1.1326

AlAjmi, M.K. (2022). The impact of digital leadership on teachers' technology integration during the COVID-19 pandemic in Kuwait. *International Journal of Educational Research , 112* (October 2021), 101928. https://doi.org/10.1016/j.ijer.2022.101928

Anggraini, W., Anwar, Y., & Madang, K. (2016). Development of student worksheets (LKPD) based on learning cycle 7E on the human circulatory system for class XI SMA. *Journal of Biology Learning: Biology Studies and Learning* , *3* (1), 49–57.

Ariyansah, D., Hakim, L., & Sulistyowati, R. (2021). Development of e-LKPD for Physics Practical on Simple Harmonic Motion Material Assisted by Phyphox Application to Improve Students' Conceptual Understanding. *Journal of Physics Learning Research*, *12* (2), 173–181.

https://doi.org/10.26877/jp2f.v12i2.9052

Dewi, PS, & Putri, RE (2024). *Effectiveness of Student Worksheets (LKPD) in Science Subjects Based on Inquiry Models in Elementary School Grade V*. *4* , 13640–13648.

Fetra Bonita Sari, Risda Amini, M. (2020). *Basicedu Journal. Basicedu Journal, . 4* (4), 3(2), 524–532.

Fitriasari, DNM, & Yuliani, Y. (2021). Development of Electronic Student Activity Sheets (E-LKPD) Based on Guided Discovery to Practice Integrated Science Process Skills on Photosynthesis Material for Grade XII High School. *Scientific Periodical of Biology Education (BioEdu)* , *10* (3), 510–522. https://doi.org/10.26740/bioedu.v10n3.p510-522

Hasrawati, Adnan, & Hartati. (2019). Validity Test of Student Worksheet Development (LKPD) Based on Discovery Learning for Senior High School Students on the Concept of the Digestive System. *Proceedings of the VI National Biology Seminar* , *6* , 299–305.

Jannah, M., Sugianto, & Sarwi. (2012). Development of Character Value-Oriented Learning Devices Through Guided Inquiry on Light Material for Grade VIII Junior High School Students. *JISE: Journal of Innovative Science Education* , *1* (1), 54–60. http://journal.unnes.ac.id/sju/index.php/jise

JK, AKR, & Yuliani, Y. (2021). Development of Inquiry-Based Electronic Student Worksheets (E-LKPD) on Photosynthesis Sub-Material to Improve Students' Argumentation Skills. *Scientific Periodical of Biology Education (BioEdu)* , *10* (3), 663–673. https://doi.org/10.26740/bioedu.v10n3.p663-673

Kosasih. (2021). *Development of Teaching Materials*. Jakarta: PT Bumi Aksara.

Khasanah, U., Budiarso, AS, & Wahyuni, S. (2020). Development of Environmental Pollution Learning Videos to Improve Students' Critical Thinking Skills in Junior High School Science Learning. *Education Journal : Journal of Educational Research and Development* , *5* , 235–244.

Maknun, J. (2020). Implementation of Guided Inquiry Learning Model to Improve Understanding Physics Concepts and Critical Thinking Skills of Vocational High School Students. *International Education Studies* , *13* (6), 117. https://doi.org/10.5539/ies.v13n6p117

Masruhah, GD, Rusdianto, R., & Wahyuni, S. (2022). Development of E-LKPD Based on Guided Inquiry to Improve Science Process Skills of Junior High School Students. *SAP (Educational Article Arrangement)* , *7* (1). https://doi .org/10.30998/sap.v7i1.12935

Melina, I., Fitriyah, N., & Ghofur, MA (2021). *EDUCATIONAL : JOURNAL OF EDUCATIONAL SCIENCES Development of Android-Based E-LKPD with Problem Based Learning (PBL) Learning Model to Improve Students' Critical Thinking* . *3* (5), 1957–1970.

Nur Hidayah, A., Winingsih, PH, & Amalia, AF (2020). Development of Physics E-LKPD (Electronic Worksheets) Using 3D Pageflip Based on Problem Based Learning on Balancing and Rotation Dynamics. *Scientific Journal of Physics Education* , *7* (2), 36–43.

Puspitasari, DR, Mustaji, & Rusmawati, RD (2019). Guided Inquiry Learning Model Influences Understanding and Discovery of Concepts in PPKn Learning. *Jipp* , *3* (1), 96–107.

Rahayu, R., Rosita, R., Rahayuningsih, YS, Hernawan, AH, & Prihantini, P. (2022). Implementation of the Independent Learning Curriculum in Mover Schools. *Basicedu Journal* , *6* (4), 6313–6319. https://doi.org/10.31004/basicedu.v6i4.3237

Rahman, RA, & Limatahu, I. (2020). Training Science Process Skills of Students of State Senior High School 8 Ternarte City Through the Application of the Ccdsr Learning Model (Condition, Construction, Development, Simulation, Reflection). *JPPS (Journal of Science Education Research)* , *9* (2), 1783–1789. https://doi.org/10.26740/jpps.v9n2.p1783-1789

Rani Nurafriani, R., & Mulyawati, Y. (2023). Development of E-Lkpd Based on Liveworksheet on Theme 1 Subtheme 1 Learning 3. *Didactics : Scientific Journal of PGSD STKIP Subang* , *9* (1), 404–414. https://doi.org/10.36989/didactic.v9i1.711

Sherly, Dharma, E., & Sihombing, HB (2020). Independent Learning: Literature Review. *National Conference on Education* , 183–190.

Sugiyono. (2017). *Quantitative, Qualitative, and R&D Research Methods* . Alfabeta.

Sya'idah, FAN, Wijayati, N., Nuswowati, M., & Haryani, S. (2020). The Effect of Blended Learning Model (Kosasih, 2021)Assisted by E-LKPD on Salt Hydrolysis Material on Student Learning Outcomes. *Chemistry in Education* , *9* (1), 1–8. http://journal.unnes.ac.id/sju/index.php/chemined

Trianto. (2007). *Integrated Learning Model in Theory and Practice* . Pustaka Achievement.

Wahyudi, ZZ, Salsabila, K., Khairiyah, N., & Siagian, N. (2024). The Effectiveness of Inquiry-Based LKPD to Improve Students' Science Communication Skills. *El-Mujtama: Journal of Community Service* , *4* (2), 814–822. https://doi.org/10.47467/elmujtama.v4i2.483