JPPIPA 8(4) (2022)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

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

The Validation of Go-Lab Based Inquiry Learning Spaces (ILS) on Science Subject for Junior High School Student

Fuad Tamami[1], Joni Rokhmat[1*], Ahmad Harjono[1]

[1]Master of Science Education Study Program, University of Mataram, Mataram, Indonesia.

Received: September 9, 2022
Revised: October 20, 2022
Accepted: October 30, 2022
Published: October 31, 2022

Corresponding Author:
Joni Rokhmat
joni.fkip@unram.ac.id

DOI: 10.29303/jppipa.v8i4.2174

Abstract: Learning innovation in the midst of a situation like now needs to be done to adapt to the times. The times require teachers to continue to innovate by modernizing learning activities to suit the interests of students. The purpose of this research is to produce a learning innovation by combining inquiry learning and the use of information technology called Inquiry Learning Spaces (ILS) based on Go-Lab. The method used in this development research is 4D which has the stages of Define, Design, Develop, and Disseminate. This research will focus on the first three stages: Define, Design, Develop. At the Develop stage, validation is carried out on the product being developed. Validation was carried out by 3 experts in the fields of Physics Education, Media, and Learning Technology. Product reliability is also carried out using a percentage of agreement. From the results of expert validation, it was found that the product developed had an average score percentage of 88.31% with a very valid category. In addition, the percentage of agreement results show that each instrument's percentage has a value above 75% in the reliable category. Several criticisms and suggestions from the validator became a significant improvement to improve the Inquiry Learning Spaces (ILS) which was developed so that it could be used in science learning in junior high schools.

Keywords: Inquiry Learning Spaces; Go-Lab; Science; Physics.

Introduction

We are currently living in an era of disruption, an era where innovation continues to grow rapidly, those who adapt will survive and those who still use the old ways will be left behind. Thus, the faster the development of technology, the faster humans must think innovatively to solve problems and be creative (Koç & Büyük, 2021). Creativity and problem-solving are one of the 21st-century skills that are currently demanded by education (van Laar et al., 2020). This ability should be trained from an early age or starting from school. This is also in accordance with the implementation of the 2013 curriculum which is expected to train 21st-century skills, especially in science learning (Makhrus et al., 2019).

The 21st century brings the development of science and technology and changes in the educational paradigm in curriculum, media, and technology. Learning now cannot be separated from technology (Pujilestari, 2020), just like an educator who integrates technology into the learning process (Gunawan et al., 2020). Starting from the device, media and the assessment system involves technology in it. Changes in the education paradigm do not only occur in Indonesia but have occurred universally for a long time. This change is also reinforced by the condition of the Covid-19 pandemic that has occurred in the last two years to date. Although the pandemic situation is gradually improving, the learning process by utilizing technology must continue to be developed. This is not only for situations such as a pandemic but it will be an alternative to distance learning even for unexpected situations. The Learning Management System (LMS) is one of the distance learning solutions used during the pandemic. LMS makes it easier for educators and students to carry out learning activities without meeting face to face just by logging into the system (Anderson et al. 1987). In

How to Cite:
Tamami, F., Rokhmat, J., & Harjono, A. (2022). The Validation of Go-Lab Based Inquiry Learning Spaces (ILS) on Science Subject for Junior High School Student. *Jurnal Penelitian Pendidikan IPA*, *8*(4), 1724–1729. https://doi.org/10.29303/jppipa.v8i4.2174

addition, educators can also organize teaching and learning activities freely, equipped with discussion features, task collection, and virtual meetings. In addition to the advantages of LMS that have been mentioned, LMS has a weakness that is not facilitating activities for inquiry. Whereas the science learning process in particular will be meaningful if there is the involvement of students in it, such as conducting scientific investigations (Septiani & Susanti, 2021).

In essence, science or science is not just about knowing knowledge or memorizing but must understand how that knowledge is obtained (Septiani & Susanti, 2021), and solving problems (problem-solving) of an existing phenomenon (Koç & Büyük, 2021). The involvement of students in the learning process will foster activeness and a more meaningful learning experience. One approach that can be used to foster student activity is the inquiry approach. Inquiry learning is learner-centered learning by placing students like scientists and carrying out a systematic process including conducting investigations (Abdurrahman, 2017; Putri et al., 2021; Ramdani & Artayasa, 2020). Creagh & Parlevliet (2014) also state that inquiry-oriented learning will provide high opportunities for student involvement in solving problems in science learning if the teacher is able to create creative thinking in the classroom. So that by combining inquiry learning and the use of technology, Go-Lab facilitates teachers to make inquiry-based activities into an online platform. The facilities for conducting these inquiry activities are called Inquiry Learning Spaces (ILS) which contain teaching materials, media, virtual laboratories, and applications (de Jong et al., 2014; Rodriguez et al., 2020).

Therefore, given the lack of learning tools that combine inquiry and the use of ICT, it is necessary to develop Go-Lab-based Inquiry Learning Spaces in the hope of increasing the problem-solving abilities and creativity of students. Which can then be tested for validity and reliability.

Method

This research is development research or called R&D. This study uses a 4-D model developed by (Thiagarajan, 1976). This model can be said to be a simple model to apply because the stages are few, namely Define, Design, Develop, and Disseminate. At the develop stage, the product developed is validated by 3 experts. The validity score is determined using the equation referred to in (Suharsimi, 2013).

$$\text{Validation percentage} = \frac{\text{total score of the rater}}{\text{max score}} \times 100\% \quad (1)$$

The criteria for the validity of what was developed were determined based on Table 1.

Table 1. Instrument Validation Criteria

Validation Range	Validity Level
0 – 20	Very Invalid
21 – 40	Invalid
41 – 60	Enough valid
61 – 80	Valid
81 – 100	Very valid

In addition, the reliability value will also be calculated based on the results of expert validation. The reliability of the validation results is based on the agreement between validators. The analysis used is the percentage of agreement. Learning tools are said to be reliable if the percentage of agreement 75.00% (Borich, 1994). The percentage of agreement Formula 2.

$$\text{Percentage of Agreement } (PA) = 1 - \frac{A-B}{A+B} \times 100\% \quad (2)$$

Result and Discussion

The research has been conducted from January until now. This research is a Research & Development research using a 4-D development model, namely Define, Design, Develop, and Disseminate (Thiagarajan, 1976). The define stage has been carried out from January to March with preliminary study activities and problem analysis. Preliminary study activities go through several stages, such as literature study, early-late analysis, student analysis, task analysis, concept analysis, and analysis of learning objectives. The results obtained are the use of technology in learning is still not optimal. The current era requires students to have 21st-century skills. Every teacher is required to be able to provide or facilitate students to be able to develop these skills in their classrooms. Technology is now present to help teachers to be able to make this happen. By developing learning combined with the use of information technology, classroom learning will become more interesting and keep up with the times. Likewise, with science learning, more specifically on optical material. Conventionally, practicum activities are generally carried out in the laboratory. However, if there are obstacles such as lack of tools and materials then this will be a new problem. So that by providing reinforcement using technology, these problems can be resolved. In addition, teachers need to continue to look for ways to modernize their learning activities to suit the interests of students. This is nothing but done with the aim of increasing student involvement in learning. It is hoped that if the learning carried out involves students actively, the learning that is carried out will be more meaningful. Of course, with the development of learning that involves information technology, it can also train students' ability to solve problems and think creatively.

After the define stage is carried out, then the design stage is carried out, namely designing the product developed, namely Inquiry Learning Spaces (ILS) based on Go-Lab with several product support devices. The supporting devices for this product are Syllabus, lesson plans, Problem Solving Ability Test Instruments (known as KPM), and Creativity Test Instruments. At the stage of preparing the standard test, the researcher decided to use a description question that measured the two dependent variables, namely problem-solving ability and creativity. The format used in the test questions is based on the problem-solving ability test developed by Rokhmat (Harwati & Rokhmat, 2021; Tamami et al., 2017). The ILS itself was developed by following the phases of inquiry learning, namely Problem Orientation, Conceptualization, Investigation, Conclusions, and Discussion (Pedaste et al., 2015). The platform used for making ILS in this research is called Go-Lab. ILS can be accessed via the https://golabz.eu page for free. In addition to ILS, Go-Lab also provides virtual laboratories and applications that support inquiry activities. Go-Lab itself provides a platform for designing ILS for teachers, namely Grassp (https://graasp.eu) (de Jong et al., 2021). In addition, ILS is also designed so that students can log in using their names without having to use a password. This will make it easier for teachers to identify students entering their ILS. The ILS login page can be seen in Figure 1.

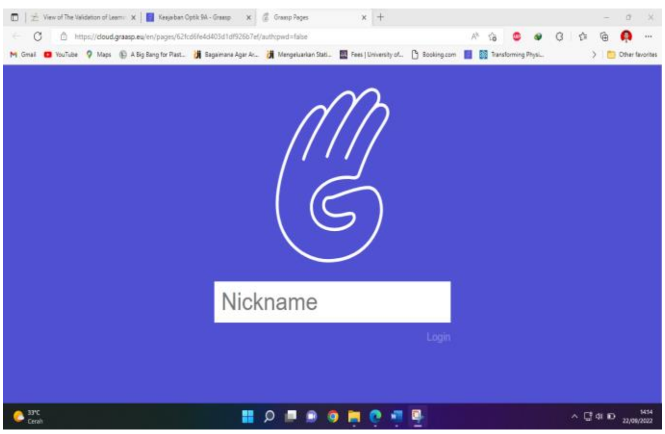

Figure 1. ILS Login Page

ILS is also equipped with a feature to see the process that students go through for each phase. For the conceptualization phase, ILS is equipped with a hypothesis-making feature with scaffolding in the form of terms that can be arranged into hypothetical sentences. This can be seen in Figure 2.

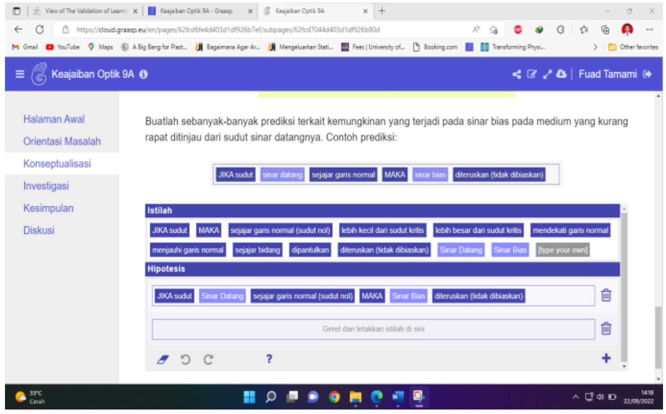

Figure 2. Conceptualization page equipped with a hypothesis generator application

As we know, Go-Lab provides ILS creation enriched with virtual laboratories, and applications supporting the inquiry process (Rodríguez-Triana et al., 2015). The investigative phase of ILS is complemented by a certified and trusted virtual laboratory such as PhET Colorado.

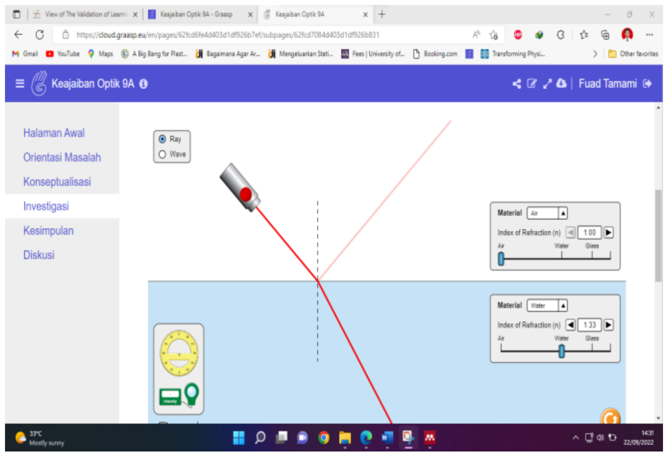

Figure 3. The investigation phase is equipped with a virtual laboratory

In the development stage, several things are produced, namely one main product and several supporting products. Its main product is Inquiry Learning Spaces (ILS) and its supporting products are Syllabus, lesson plans, and Problem Solving and Creativity Ability Instruments. The manufacture of this product is based on the results of the definition and design stages. The specifications of the product can be seen in Table 1.

Table 1. Developed product specifications

Product	Specifications
ILS	This ILS was developed and structured following the phases of inquiry learning on the Go-Lab platform. The compiled ILS is enriched with teaching materials, applications to support inquiry activities, and virtual laboratories.
Syllabus	The syllabus developed uses the syllabus format for science subjects in junior high school. Development is carried out by modifying several activities and learning objectives adapted to existing ILS action.
Lesson Plan	The RPP developed adapts the RPP that applies to junior high schools and adapts activities to activities carried out in the ILS.
Problem-Solving Ability (KPM) and Creativity Test Instruments	The test instrument was modified so that it could measure two things in one instrument. The test developed in the form of descriptive questions with KPM indicators, namely Understanding, Selecting, Differentiating, Determining, and Applying. As for creativity, the indicators are fluency, flexibility, originality, and elaboration.

After that, several product items that have been developed as initial drafts will be tested for validity, reliability, and practicality. Validation was carried out to assess the feasibility of the product developed in this study. This validation is carried out by experts who are experts in their fields, in this case, experts in product development. There are 3 validators used to assess the product developed. These three people generally hold Doctoral degrees with expertise in Physics Education, Media, and Learning Technology. Table 2 shows the data from the validation results of the three experts.

Table 2. Percentage of Expert Validation Results ILS Based on Go-Lab

Aspect	Validation Results			Average (%)	Criteria
	V1 (%)	V2 (%)	V3 (%)		
Content quality and purpose	100.00	90.00	100.00	96.67	Very Valid
Writing and drawing format	91.67	83.33	91.67	88.89	Very Valid
Language Usage	95.00	85.00	85.00	88.33	Very Valid
Display quality	75.00	81.25	93.75	83.33	Very Valid
Product Correlation with the dependent variable	100.00	75.00	75.00	83.33	Very Valid
Instructional quality	92.86	89.29	85.71	89.29	Very Valid
Average				88.31	Very Valid

Based on the average percentage of product feasibility in Table 2, it can be seen that every aspect of the product developed is in the range of values between 81-100%. Based on the instrument validity criteria in Table 3, it can be stated that ILS has a level of validity with very valid criteria.

Table 3. Expert Validation Result Data for Product Support Devices

Instrument	Validation Results			Average (%)	Criteria
	V1 (%)	V2 (%)	V3(%)		
Syllabus	97.73	88.64	86.36	90.91	Very Valid
Lesson plan	95.24	95.00	93.75	94.66	Very Valid
KPM Instruments	95.00	82.50	82.50	86.67	Very Valid
Creativity Instrument	97.50	85.00	92.50	91.67	Very Valid
Average				90.98	Very Valid

Furthermore, after expert validation tests have been carried out, a product should also be tested for reliability. The product reliability test is carried out by calculating the Percentage of Agreement, which is based on the agreement of the expert validator. Table 4 shows the results of calculations for reliability using the percentage of agreement.

Table 4. Percentage of Product Reliability Analysis Results and Supporting Devices

Instrument	Percentage of Agreement (PA)			PA Average (%)	Category
	$V_{1,2}$ (%)	$V_{1,3}$ (%)	$V_{2,3}$ (%)		
Syllabus	95.12	93.83	98.70	95.88	Reliable
Lesson plan	99.87	99.21	99.34	99.48	Reliable
KPM Instruments	92.96	92.96	100.00	95.31	Reliable
Creativity Instrument	93.15	97.37	95.77	95.43	Reliable
ILS	96.22	98.41	97.80	97.48	Reliable

Based on the analysis of the percentage of agreement, the average value obtained for each instrument is above 75.00%. This shows that the developed product can be categorized as reliable.

After the validity test has been carried out, the initial draft of the product developed will be improved according to suggestions and criticisms from the validator so that the resulting product will be better. With the improved product draft development, the product can be tested on a limited scale.

Conclusion

Go-Lab-Based Inquiry Learning Spaces (ILS) have obtained validity test results from expert validators and their reliability. Criticisms and suggestions from validators are used to improve the products developed to be better. Suggestions on the supporting components of the ILS are sought to make it easier to use for students later. Not to forget, the language aspect is also very important to note because the users of this ILS are students in junior high school.

Acknowledgments

We thank the Ministry of Education and Culture for funding this research. We also thank our research partner, the Mataram City Education Office, for facilitating our research.

References

Abdurrahman, A. (2017). Efektivitas dan Kendala Pembelajaran Sains Berbasis Inkuiri terhadap Capaian Dimensi Kognitif Siswa: Meta Analisis. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, *2*(1), 1–9. http://ejournal.radenintan.ac.id/index.php/tadris/article/view/1206

Creagh, C., & Parlevliet, D. (2014). Enhancing student engagement in physics using inquiry oriented learning activities. *International Journal of Innovation in Science and Mathematics Education*, *22*(1), 43–56. https://researchrepository.murdoch.edu.au/id/eprint/22645/

de Jong, T., Gillet, D., Rodríguez-Triana, M. J., Hovardas, T., Dikke, D., Doran, R., Dziabenko, O., Koslowsky, J., Korventausta, M., Law, E., Pedaste, M., Tasiopoulou, E., Vidal, G., & Zacharia, Z. C. (2021). Understanding teacher design practices for digital inquiry–based science learning: the case of Go-Lab. *Educational Technology Research and Development*, *69*(2), 417–444. https://doi.org/10.1007/s11423-020-09904-z

de Jong, T., Sotiriou, S., & Gillet, D. (2014). Innovations in STEM education: the Go-Lab federation of online labs. *Smart Learning Environments*. https://doi.org/10.1186/s40561-014-0003-6

Gunawan, Suranti, N. M. Y., & Fathoroni. (2020). Variations of Models and Learning Platforms for Prospective Teachers during the COVID-19 Pandemic Period. *Indonesian Journal of Teacher Education*, *1*(2), 75–94. https://journal.publication-center.com/index.php/ijte/article/view/95

Harwati, K., & Rokhmat, J. (2021). Development of student worksheet to improve creative and critical thinking ability of students in causalitic-learning model. *Journal of Physics: Conference Series*, *1816*(1). https://doi.org/10.1088/1742-6596/1816/1/012038

Koç, A., & Büyük, U. (2021). Effect of Robotics Technology in Science Education on Scientific Creativity and Attitude Development. *Journal of Turkish Science Education*, *18*(1), 54–72. https://doi.org/10.36681/tused.2021.52

Makhrus, M., Harjono, A., Syukur, A., Bahri, S., & Muntari, M. (2019). Analisis Rencana Pelaksanaan Pembelajaran (RPP) Terhadap Kesiapan Guru Sebagai "Role Model" Keterampilan Abad 21 Pada Pembelajaran IPA SMP. *Jurnal Penelitian Pendidikan IPA*, *5*(1). https://doi.org/10.29303/JPPIPA.V5I1.171

Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, *14*, 47–61. https://doi.org/10.1016/J.EDUREV.2015.02.003

Pujilestari, Y. (2020). Dampak Positif Pembelajaran Online Dalam Sistem Pendidikan Indonesia Pasca Pandemi Covid-19. *Adalah*.

Putri, A. M., Mahardika, I. K., & Nuriman, N. (2021). Model Pembelajaran Free Inquiry (Inkuiri Bebas) Dalam Pembelajaran Multirepresentasi Fisika Di MAN 2 Jember. In *Jurnal Pembelajaran Fisika* (pp. 324–327). https://jurnal.unej.ac.id/index.php/JPF/article/download/23179/9327

Ramdani, A., & Artayasa, I. P. (2020). Keterampilan Berpikir Kreatif Mahasiswa dalam Pembelajaran IPA Menggunakan Model Inkuiri Terbuka. *Jurnal Pendidikan Sains Indonesia*, *8*(1), 1–9. https://doi.org/10.24815/jpsi.v8i1.15394

Rodríguez-Triana, M. J., Govaerts, S., Halimi, W., Holzer, A., Salzmann, C., Vozniuk, A., De Jong, T., Sotirou, S., & Gillet, D. (2015). Rich open educational resources for personal and inquiry learning: Agile creation, sharing and reuse in educational social media platforms. *2014 International Conference on Web and Open Access to Learning, ICWOAL 2014*. https://doi.org/10.1109/ICWOAL.2014.7009219

Rodriguez, L. V., van der Veen, J. T., Anjewierden, A., van den Berg, E., & de Jong, T. (2020). Designing inquiry-based learning environments for quantum physics education in secondary schools. *Physics Education*, *55*(6). https://doi.org/10.1088/1361-6552/abb346

Septiani, D., & Susanti, S. (2021). Urgensi Pembelajaran Inkuiri di Abad ke 21: Kajian Literatur. *SAP (Susunan Artikel Pendidikan)*, *6*(1). https://doi.org/10.30998/sap.v6i1.7784

Suharsimi, A. (2013). Prosedur Penelitian : Suatu Pendekatan Praktik (Edisi Revisi). *Jakarta: Rineka Cipta*. https://doi.org/10.1017/CBO9781107415324.004

Tamami, F., Rokhmat, & Gunada, I. W. (2017). Pengaruh Pendekatan Berpikir Kausalitik Scaffolding Tipe 2A Modifikasi Berbantuan LKS Terhadap Kemampuan Pemecahan Masalah Optik Geometri dan Kreativitas Siswa Kelas XI SMAN 1 Mataram [The Influence of Scaffolding Causalitic-thinking Approach of Type 2A A. *Jurnal Pendidikan Fisika Dan Teknologi*, *3*(1), 76–83.

Thiagarajan, S. (1976). *Instructional development for training teachers of exceptional children: A sourcebook*. https://doi.org/10.1016/0022-4405(76)90066-2

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. In *SAGE Open* (Vol. 10, Issue 1). https://doi.org/10.1177/2158244019900176