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Design and Trial of Science Literacy-Based Practicum Guide Integrated With Local Wisdom on Hydrocarbon Material in Class XI IPA

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ABSTRACT. Research was instigated by the implementation of practical work constrained by the limitations of practical work guidelines and supply of materials in the school laboratory, a learning media was planned in the form of designing and establishing local wisdom-integrated science literacy-based practical work guidelines to know the Product quality based on the assessment by the media and material experts and the practicality by the teachers. The research and Development (R&D) method was used in this research with a 4-D development model, and this research was administered at the Senior High School of Muhammadiyah 1 Pekanbaru. The subjects of this research were the media design and learning material experts, the practicality of Chemistry subject teachers, and the eleventh-grade students of MIA 2. The objects were local wisdom-integrated science Steracy-based practical work guidelines on Hydrocarbon lessons. The collected data were in the form of interviews and questionnaire results. The instruments for collecting data were validity and response questionnaires. The obtained data were analyzed by using qualitative and quantitative descriptive analysis techniques. The practical work guideline developed was tested very validly with the percentages 95.8% by the material experts and 88.8% by the media experts, the practicality assessment was 94.0% by Chemistry subject teachers, and the guideline got very good response from students 89.2%. Based on the research findings, could be concluded that a learning media with local wisdom-integrated science literacy-based practical work guidelines on Hydrocarbon lessons was very valid and practical, so it Should be fised as a learning media at school.

Keywords: Practical Work Guideline, Science Literacy, Local Wisdom.

INTRODUCTION

Practical activities are an important part of the chemistry learning process (Umar et al., 2023). Through this activity, students can learn chemistry by observing chemical processes, practicing thinking skills, being scientific, and solving problems (Husain, 2024; Candra & Hidayati, 2020). For the implementation of practicum activities, a practicum guide is needed as a guideline for practicum implementation which contains procedures for preparation, implementation, data analysis, and reporting prepared by a person or group of teaching staff who handle the practicum and follow the rules of scientific writing. The function of the practicum guide is to teach material that can minimize the role of the teacher, make students more active and gain meaningful knowledge, and make students gain creative thinking and hand sports skills so that it makes it easier for educators to carry out teaching in the laboratory. In order for the practicum activities carried out by students to run smoothly, a practicum guide that is easy to understand and use is needed (Ningsi et al., 2021; Arianti et al., 2017).

For students implementing practicum, in addition to being able to train how to use the right tools and materials, it also increases their understanding of the chemical material studied in class. In addition, for students who have high curiosity, through this practicum they can get an answer to their curiosity in real terms (Lubis et al., 2016).The implementation of practicum activities requires a practicum guide, where the practicum guide is useful to make it easier to find practicum steps (Harahap et al., 2022).

In addition, practicum guides must also be able to develop students' scientific learning abilities and process skills.(S. O. Saputra et al., 2022; Ningsi et al., 2021).

Based on observations at SMA Muhammadiyah 1 Pekanbaru, several problems were found in the implementation of the practicum. namely the practicum guide used so far is only a photocopy of the printed book so that students can only follow the procedures contained in the chemistry printed book, the materials available in the school laboratory sometimes do not match those listed in the printed book so that the teacher is constrained in carrying out the practicum and the lack of funds to support the implementation of the practicum. Seeing this condition, an innovation is needed as a solution to overcome the limitations of practicum guides, the availability of materials that are economical and simple, but able to make students think critically and increase student knowledge. One way to get materials that are economical and simple is by utilizing local wisdom in Riau.

Thus, one of the efforts to overcome this is the need for a book in the form of a practicum guide based on science literacy integrated with local wisdom. Therefore, the author raised the title of the research that the author will conduct, namely "Design and Trial of Science Literacy-Based Practicum Guide Integrated with Local Wisdom on Hydrocarbon Material in Class XI IPA".

Science literacy is defined as the capacity to use scientific knowledge, identify questions and draw conclusions - based on facts and data to understand the universe and make decisions from changes that occur due to human activities. The concept of science literacy requires the ability to identify questions, acquire new knowledge, explain scientific phenomena and draw conclusions based on facts and scientific evidence related to science concepts (Muhammad Shohibul Ihsan & Siti Wardatul Jannah, 2021). Science literacy uses scientific knowledge to identify questions, explain scientific phenomena that occur using contextual facts (Hasasiyah et al., 2020).

Local wisdom can be described as local ideas that contain knowledge and moral values as the basis for shaping certain local cultures. Local wisdom is a form of cultural rules in the form of local knowledge, norms, regulations, and the ability of the community to meet life needs. Local wisdom is categorized into food, production technology, clothing, pharmaceuticals and home industries (Firdaus et al., 2021).

Integration or integrating is the process of integrating certain values into another concept so that it becomes a coherent and inseparable unity or the process of blending until it becomes a whole and unified whole (Hidayat & Mulyono, 2019). Local wisdom is a view of life and science as well as various life strategies in the form of activities carried out by local communities in answering various problems in meeting their needs. (Njatrijani, 2018 ; Putro et al., 2022).

METHOD

This research was conducted in even semester. This research was conducted at SMA Muhammadiyah 1 Pekanbaru because in this school there was no practicum guide based on science literacy integrated with local wisdom on hydrocarbon material. This research uses the 4-D development model which consists of the Definition, Design, Development, and Dissemination stages (Muqdamien et al., 2021). The 4-D model development research carried out only reached the Development stage, because the research objectives were limited to developing and producing a valid learning resource to be implemented.

The population in this study were 3 chemistry teachers at SMA Muhammadiyah 1 Pekanbaru and 145 students of class XI IPA SMA Muhammaadiyah 1 Pekanbaru.Sample used in this study were 1 chemistry teacher at SMA Muhammadiyah 1 Pekanbaru and 10 students of class XI IPA SMA Muhammadiyah 1 Pekanbaru. Based on interviews with chemistry teachers, it is known that the academic ability and learning motivation of students are generally heterogeneous.

There are students who have high, medium, and low academic abilities. The subjects in the study are those who validate the products produced, which include educational media experts, learning material experts, and practical test experts.

The object of this research is a science literacy-based practicum guide integrated with local wisdom on hydrocarbon material. The data for this study were obtained by observation and interviews (Alfansyur & Mariyani, 2020). The data obtained were then processed with qualitative descriptive techniques and described with qualitative descriptive to analyze data in the form of numbers obtained from questionnaires (A. Saputra et al., 2022). The data analysis techniques used are qualitative descriptive analysis techniques and quantitative descriptive analysis techniques qualitative and quantitative descriptive analysis techniques (Millah et al., 2023) which describe the results of validity tests and practicality tests using the Likert scale method. The results of the practicality percentage were then interpreted in qualitative research (Rahayu et al., 2022).

RESULT AND DISCUSSION

This research produces a product in the form of a science literacy-based practicum guide integrated with local wisdom on hydrocarbon material. The development model used is the development of the 4-D model but in this study it was only carried out up to the Development stage, because the research objectives were limited to developing and producing a valid learning resource to be implemented.

The purpose of define stage is to establish and define the learning requirements. The steps are as follows: (a) Front End Analysis, Based on the results of the interview, it is known that the practicum guide used so far is only a copy of the practicum from the printed book so that the practicum can only be done by following the procedures contained in the chemistry printed book; (b) Analysis of Student Characteristics, At this stage, children are able to think abstractly and logically and have the ability to interpret, develop hypotheses and draw conclusions; (c) Task Analysis**,** The indicators are, Conduct experiments to identify the elements carbon, hydrogen, and oxygen, Conduct an alcohol functional group analysis experiment, Summarize the results of the carbon, hydrogen, and oxygen element identification experiment, Summarize the results of the alcohol functional group analysis experiment, Present the results of the carbon, hydrogen, and oxygen element identification experiment, Present the result of alcohol functional group analysis experiment. Based on the basic competencies and learning indicators, a hydrocarbon practicum guide is designed in accordance with the task analysis so that the expected competencies can be achieved by students at the end of learning; (d) Concept Analysis, Identifying the science content that will be presented can be a reference in compiling the practicum guide systematically according to the title of each practicum activity; (e) Learning Objective Analysis, The expected learning objectives are : Students are able to conduct experiments to identify the elements carbon, hydrogen, and oxygen, Students are able to conduct alcohol functional group analysis experiment, Students are able to conclude the results of the carbon, hydrogen, and oxygen element identification experiment, Students are able to conclude the results of the alcohol functional group analysis experiment, Students are able to present the results of the carbon, hydrogen, and oxygen element identification experiment. 6) Students are able to present the results of the alcohol functional group analysis experiment.

The parts at the design stage are (a) Cover Page, The cover page contains the identity of the practicum guide, namely the title of the practicum guide, the author's name, and the target audience. The title of the practicum guide functions as a provider of information to users of the practicum guide to find out what material is discussed in the practicum guide; (b) Introduction Page, The introduction page is a page that is included before the material or main content of the practicum guide is presented, placing it right between the front page and the contents of the book; (c) Content Page, The contents page is the core page that contains practicum activities: Science

Content, science content refers to the key concepts of science needed to understand certain phenomena. The display of science content is as follows, Science process, the science process is aimed at identifying/explaining scientific phenomena based on scientific knowledge, and using scientific evidence to draw conclusions, Context of Science Application, the context of science application relates to science in everyday life, not only limited to school life, but also to the context of student life in general, Attitude, refers to the attitude of supporting scientific inquiry, confidence, interest in science and a sense of responsibility for resources and the environment; (d) The Closing Page, is the final page to close the contents of the practicum guide. This cover page contains a list of references, which lists the references used in the preparation of the practicum guide. The appearance of the reference list is as follows.

At the development stage, validation of the practical guide was carried out. The practicum guide that has been designed is then validated by material experts and media experts using a validation sheet. The validation sheet can be seen in the attachment. This validation aims to determine the validity of the practicum guide made is feasible or not to be tested on students.

The average percentage of the overall validity test results of the practicum guide by material experts and media experts was 92.3%. This shows that the practicum guide is very valid when viewed from 93 aspects of content feasibility, language feasibility, presentation feasibility, and graphic feasibility. The results of the validity test of the practicum guide in each aspect are presented in the graph (Sholikhah, 1970) as follows.

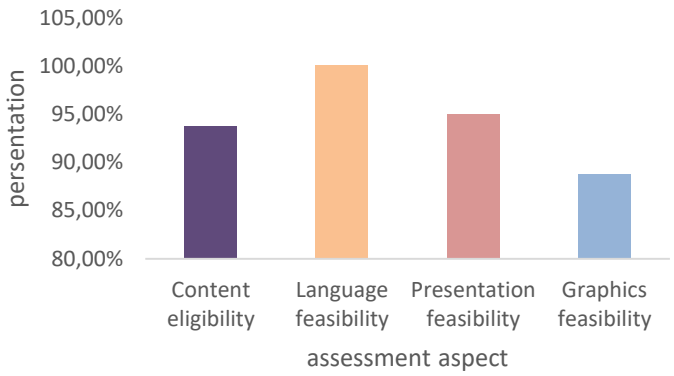

Figure 1.1 Diagram of Material Validity Test Results.

Based on the figure above, the highest percentage is in the language feasibility aspect which is 100.0%, for the feasibility of content and feasibility of graphics, the percentage is 93.7% and 95.0% respectively and the feasibility aspect of graphics gets the smallest percentage which is 88.8%.

The Practicality Test aims to see the feasibility of the practicum guide from the teacher's perspective. practicum guide seen from the teacher's side. Based on data analysis of the test results Based on the data analysis of the practicality test results of the chemistry teacher's practicum guide for SMA Muhammadiyah 1 Pekanbaru, an average percentage of 94.0% was obtained, which means that the practicum guide is included in the very practical criteria in terms of content feasibility, language feasibility, presentation feasibility, and graphic feasibility.

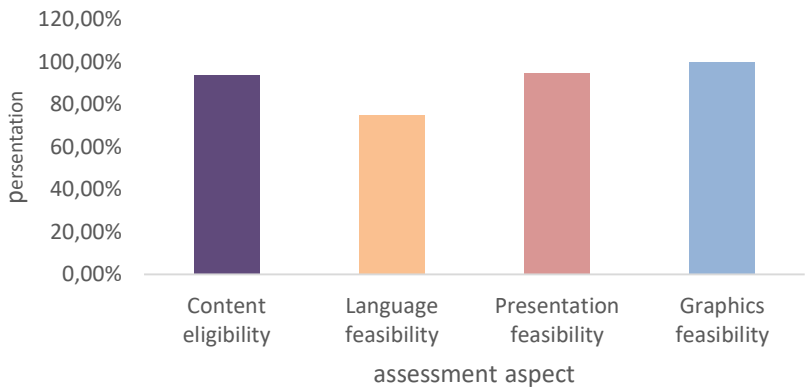

Figure 1.2 Diagram of Practicality Test Results

Based on the figure above, the highest percentage is in the aspect of feasibility of graphics, which is 100.0%, for the feasibility aspect of the content obtained a percentage of 93.7%, the feasibility aspect of the presentation obtained a percentage of 95.0%, and the feasibility aspect of language obtained the smallest percentage of 75.0%

The results of the student response questionnaire to the practicum guide on each aspect are presented in the following table.

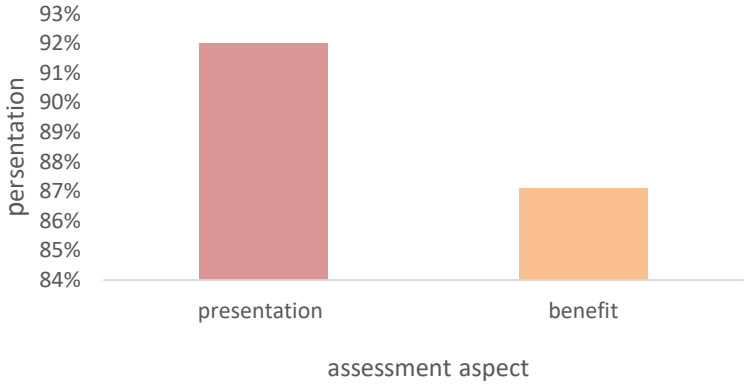

Figure 1.3 Diagram of Student Response Results.

Based on the figure above, the presentation aspect obtained the highest percentage of 92.0%, and the benefit aspect obtained a percentage of 87.1%.

The average percentage of the presentation aspect of the practicum guide was 87.1% with a very good category. This shows that the practical guide contains experiments that encourage students to think, discuss with other friends, and encourage students to integrate experiments into Riau local wisdom. In addition, the practical guide is considered to increase the desire to learn, help students learn to be more directed and coherent, motivate students to learn, and with this practical guide makes learning fun and not boring.

CONCLUSION

Based on the design research and trial of science literacy-based practicum guides integrated with local wisdom on hydrocarbon materials that have been carried out, it can be concluded that: The product is designed using a modified 4D development model. The 4D development model is carried out in three stages, (a) the defining stage: front end analysis obtained from interviews by

chemistry teachers regarding the problems that occur in chemistry learning, analysis of students obtained information on the characteristics of students, task analysis resulting in competencies to be achieved, (b) the design stage produced a practicum guide design; (c) the practicum guide is made with Microsoft Word application then through a series of validation activities so as to produce a product in the form of a practicum guide based on science literacy integrated with local wisdom on hydrocarbon material.

The validity level of the science literacy-based practicum guide integrated with local wisdom on hydrocarbon materials based on the assessment of material experts and media experts is declared very valid with a percentage of validity of 92.3%. The level of practicality of the practical guide based on science literacy integrated with local wisdom on hydrocarbon material designed was declared very practical with a percentage of practicality of 94.0%. Students' response to the science literacy-based practicum guide integrated with local wisdom on hydrocarbon material was very good with a percentage of 89.2%.

REFFRENCES

Alfansyur, A., & Mariyani. (2020). Seni Mengelola Data : Penerapan Triangulasi Teknik , Sumber Dan Waktu pada Penelitian Pendidikan Sosial. *Historis*, *5*(2), 146–150.

Arianti, W., Qaddafi, M., & Zulkarnaim. (2017). pengembangan penuntun praktikum kimia dasar untuk mahasiswa pendidikan biologi universitas islam negeri (UIN) Alauddin Makassar. *Occupational Medicine*, *53*(4), 130.

Candra, R., & Hidayati, D. (2020). Penerapan Praktikum dalam Meningkatkan Keterampilan Proses dan Kerja Peserta Didik di Laboratorium IPA. *Edugama: Jurnal Kependidikan Dan Sosial Keagamaan*, *6*(1), 26–37. https://doi.org/10.32923/edugama.v6i1.1289

Firdaus, R. N., Mulyanti, S., & Alawiyah, N. (2021). Pembelajaran Kimia Kuliner Khas Betawi Bagi Pelajar Secara Mandiri Sebagai Usaha Pelestarian Kearifan Lokal. *Chempublish Journal*, *6*(2), 103–117.

Harahap, A., Darmana, A., Jahro, I. S., Praktikum, P., Terintegrasi, K., Spiritual, N., Spiritual, S., & Kritis, K. B. (2022). *Nilai Spiritual Untuk Meningkatkan Sikap Spiritual*. 28–32.

Hasasiyah, S. H., Hutomo, B. A., Subali, B., & Marwoto, P. (2020). Analisis Kemampuan Literasi Sains Siswa SMP pada Materi Sirkulasi Darah. *Jurnal Penelitian Pendidikan IPA*, *6*(1), 5–9. https://doi.org/10.29303/jppipa.v6i1.193

Hidayat, M. C., & Mulyono, S. (2019). Integrasi Sains Teknologi Dengan Nilai-Nilai Islam : Model Pendidikan Yang Memberdayakan. *Tamaddun*, *20*(1), 15. https://doi.org/10.30587/tamaddun.v20i1.2756

Husain, H. (2024). *DOI: https://doi.org/10.26858/cer.v7i2*. *7*(2), 169–174.

Lubis, L. T., Silaban, R., & Jahro, I. S. (2016). Pengembangan Penuntun Praktikum Kimia Dasar I Terintegrasi Pendekatan Inkuiri. *Jurnal Pendidikan Kimia*, *8*(2), 95–104.

Millah, A. S., Apriyani, Arobiah, D., Febriani, E. S., & Ramdhani, E. (2023). Analisis Data dalam Penelitian Tindakan Kelas. *Jurnal Kreativitas Mahasiswa*, *1*(2), 140–153.

Muhammad Shohibul Ihsan, & Siti Wardatul Jannah. (2021). Analisis Kemampuan Literasi Sains Peserta Didik Dalam Pembelajaran Kimia Menggunakan Multimedia Interaktif Berbasis Blended Learning. *EduMatSains : Jurnal Pendidikan, Matematika Dan Sains*, *6*(1), 197–206. https://doi.org/10.33541/edumatsains.v6i1.2934

Muqdamien, B., Umayah, U., Juhri, J., & Raraswaty, D. P. (2021). Tahap Definisi Dalam Four-D Model Pada Penelitian Research & Development (R&D) Alat Peraga Edukasi Ular Tangga Untuk Meningkatkan Pengetahuan Sains Dan Matematika Anak Usia 5-6 Tahun. *Intersections*, *6*(1), 23–33. https://doi.org/10.47200/intersections.v6i1.589

Ningsi, A. P., Purwaningsih, S., & Darmaji. (2021). Pengembangan Penuntun Praktikum

Elektronik Berbasis Keterampilan Proses Sains Materi Suhu dan Kalor Untuk SMP/MTs. *Jurnal EDUMASPUL*, *5*(1), 242-251 Pendidikan Fisika Universitas Jambi. Indon.

Njatrijani, R. (2018). Kearifan Lokal Dalam Perspektif Budaya Kota Semarang. *Gema Keadilan*, *5*(1), 16–31. https://doi.org/10.14710/gk.2018.3580

Putro, H. P. N., Arisanty, D., & Puji Hastuti, K. (2022). *Desa Tangguh Bencana Banjir: Pemberdayaan Masyarakat Melalui Nilai Kearifan Lokal Banjar* (Vol. 1).

Rahayu, E. D., Supriyono, & Nurhidayati. (2022). Multimedia Pembelajaran Interaktif Berbasis Powtoon Pada Materi Daur Hidup Dan Upaya Pelestarian Makhluk Hidup Kelas IV SD. *Jurnal Pendidikan Dan Konseling*, *4*(6), 1349–1358.

Saputra, A., Adiasti, N., Hasnawati, H., & Muliani, E. (2022). Upaya Pemertahanan Bahasa Daerah di Kalimantan Utara melalui Penelitian dan Pengembangan Media Bigbook Cerita Anak. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *5*(9), 3713–3720. https://doi.org/10.54371/jiip.v5i9.879

Saputra, S. O., Ayatusa'adah, & Septiana, N. (2022). Validitas dan Keterbacaan Penuntun Praktikum Berbasis Pendekatan Saintifik pada Materi Jaringan Tumbuhan. *Ilmiah Pendidikan Biologi*, *08*, 48–58.

Sholikhah, A. (1970). Statistik Deskriptif Dalam Penelitian Kualitatif. *KOMUNIKA: Jurnal Dakwah Dan Komunikasi*, *10*(2), 342–362. https://doi.org/10.24090/komunika.v10i2.953

Umar, S., Jannah Baturante, N., Rahman, N. A., Ahmar, D. S., Khairun, U., & Tadulako, U. (2023). Nomor 2 Tahun 2023| 218 JOTE Volume 5 Nomor 2 Tahun 2023 Halaman 218-224. *JOURNAL ON TEACHER EDUCATION Research & Learning in Faculty of Education ISSN*, *5*, 2686–1798.