Proceedings of the International Conference on Education, Teaching, and Learning, Vol. 3, 2024, pp. 14-26

ISSN 2820-2155
DOI: https://doi.org/10.32789/edcon.2024.3102

Validity of Integrated Practical Instructions for Local Wisdom to Train Students' Critical Thinking Skills

H.Fitriani[1], T.Samsuri[1], I.B.P.Arnyana[2], P.B.Adnyana[2], D.M.Citrawathi[3]

[1]*Science Education, Postgraduate Program, Ganesha University of Education. Indonesia.*
herdiyana@student.undiksha.ac.id, taufiksamsuri@undikma.ac.id
[2]*Basic Education. Postgraduate Program, Ganesha University of Education. Indonesia.*
putu.arnyana@undiksha.ac.id, budi@undiksha.ac.id
[3]*Biology Education, Faculty of Mathematics and Natural Sciences, Ganesha University of Education. Indonesia.*
dskcitra@undiksha.ac.id

VALIDITY OF INTEGRATED PRACTICAL NSTRUCTIONS FOR LOCAL WISDOM TO TRAIN STUDENTS' CRITICAL THINKING SKILLS

Abstract: Critical thinking skills are important skills in life that are one of the focuses of 21st century learning. Critical thinking skills are skills that focus on making decisions about what to do and what to believe. To be able to make decisions, a person must process the information he obtains, that is, organize, analyze, and evaluate. The transfer of knowledge in universities that occurs at this time is only about knowledge about the material in books and does not pay attention to how the application of this knowledge is in daily life. Therefore, there is a need for efforts to include elements of local wisdom that are integrated in the learning tool in the form of practicum instructions that are able to involve the activeness of students (students) in practicing students' critical thinking skills. This study aims to determine the feasibility of the local wisdom integrated practicum instruction manual to train students' critical thinking that has been developed based on validity tests. This research is a product-based development research that focuses on the validation stage. The development of a set of practicum instructions with reference to the framework of a quality product includes three criteria, namely validity, practicality, and effectiveness. The validity test was carried out by 3 validators who had specific expertise according to the aspects assessed. In the validation of the material, an average score of 94.9% (very feasible) was obtained, in the media validation an average score of 97.2% (very valid) and the results of language validation were obtained an average of 98.4% (very valid). Based on the results of the validation, it can be concluded that the developed practicum instruction manual is suitable for use in the learning process in the classroom.

Keywords: Practicum manual, local wisdom, critical thinking skills, validity, higher education

Introduction

21st century learning focuses on developing higher-order thinking skills such as critical, creative, collaborative, and communicative thinking. Among these skills, critical thinking becomes one of the most essential competencies, as it affects the individual's ability to make rational decisions, solve complex problems, and become effective members of society (Mimbs, 2005; Partnership for 21st Century Skills, 2011; Mahapoonyanont, 2010; Udi and Cheng, 2015).

Critical thinking is a skill that focuses on the ability to determine what to do or believe, based on available information (Ennis, 2011; Lai, 2011). This process includes organizing information, analyzing, evaluating, and drawing conclusions based on evidence. According to Facione (2011), critical thinking involves interpreting, analyzing, evaluating, and compiling explanations for the information obtained. This competency is needed in various aspects of life, including in daily decision-making, leadership, and participation in democratic life (Samsuri and Fitriani, 2015; Hunaepi, *et al*., 2014; Fitriani, *et al*., 2022).

Higher education, as one of the institutions that prepares students for the real world, has a responsibility to ensure students master these skills. However, in reality, the learning process in higher education often focuses more on textbook-based knowledge transfer without connecting it with practical application in daily life. This learning model produces so-called "dead knowledge," which is knowledge that is less relevant to real-life contexts and does not encourage the development of critical thinking skills or cultural values (Anisa, 2017; Anjani, *et al*., 2019; Fitriani, *et al*., 2022).

To overcome these limitations, education needs to integrate elements of local wisdom into its curriculum. Local wisdom includes traditions, values, and cultural practices that develop in a society, which not only enrich the learning content but also shape the character of students (Ibrahim, 2014; Hunaepi, *et al*., 2016; Fitriani, *et al*., 2024). In the context of biology learning, for example, an ethnoscience approach that connects science concepts with local traditions has been proven to be effective in improving students' understanding of the material, while developing critical thinking skills and problem-solving skills (Festiyed *et al*., 2022; Anisa, 2017).

Local wisdom can also be used as inspiration to build student identity. Education that integrates local culture helps students understand and appreciate their traditions, while also increasing a sense of pride in cultural heritage. Values embodied in local traditions, such as concern for the environment, can be integrated to foster tolerance and responsibility for nature (Jeriyantoro, 2024; Lidi, *et al*., 2021; Riyanti, and Novitasari, 2021). In addition, research shows that learning based on local wisdom can increase student motivation because the learning materials are more relevant to their daily lives (Rizkiana *et al*., 2021; Fatihah, 2023; Putri, 2023).

In the Sasak community, local wisdom includes various traditions and practices related to natural resource management, such as the use of medicinal plants and traditional agricultural management. For example, knowledge about local plants used as traditional medicine not only has scientific value but also provides a real context for biology learning (Muzakir, 2024; Anisa, 2017; Anjani, *et al*., 2019). The integration of this knowledge into the learning process can enrich students' experience, make learning more relevant, and improve their critical thinking skills (Alimah, 2019; Fitriani, *et al*., 2024).

Biology practicums, as an integral part of science learning, provide a medium that allows students to be directly involved in the process of observation, analysis, and evaluation. This activity is not only oriented to the final result, but also to the learning process itself. Practicum instruction specifically designed to integrate local wisdom helps students connect scientific concepts with their local realities, making learning more meaningful (Purnamasari, 2012; Nengsi, 2016; Sawitri, 2008).

Practicum instructions are teaching materials that provide guidance for students to carry out practicum activities systematically, starting from preparation, implementation, data analysis, to reporting (Purnamasari, 2012; Sawitri, 2008; Rahayuningsih and Dwiyanto, 2005). In this study, practicum instructions were developed by integrating elements of the local wisdom of the Sasak community. This design aims to actively involve students in practicum activities and introduce them to local cultural values.

The main characteristics of this practicum instruction include a) Local Wisdom as Learning Content: Local wisdom is used as a concrete example to explain biological concepts. For example, students are invited to learn the ecological functions of local medicinal plants through direct observation. b) Local Wisdom as a Model and Inspiration: Local cultural practices are used as models to instill character values, such as responsibility and concern for the environment. c) Local Wisdom as a Media for Critical Thinking Training: The practicum process is designed to involve students in the observation, analysis, and evaluation of natural phenomena related to local traditions. This encourages students to develop their critical thinking skills.

This practicum instruction is also equipped with a clear and systematic work step guide, designed to guide students in exploring natural phenomena using a scientific approach. In addition, these guidelines include evaluation activities that aim to measure students' critical thinking skills, including their ability to analyze data, evaluate evidence, and draw conclusions.

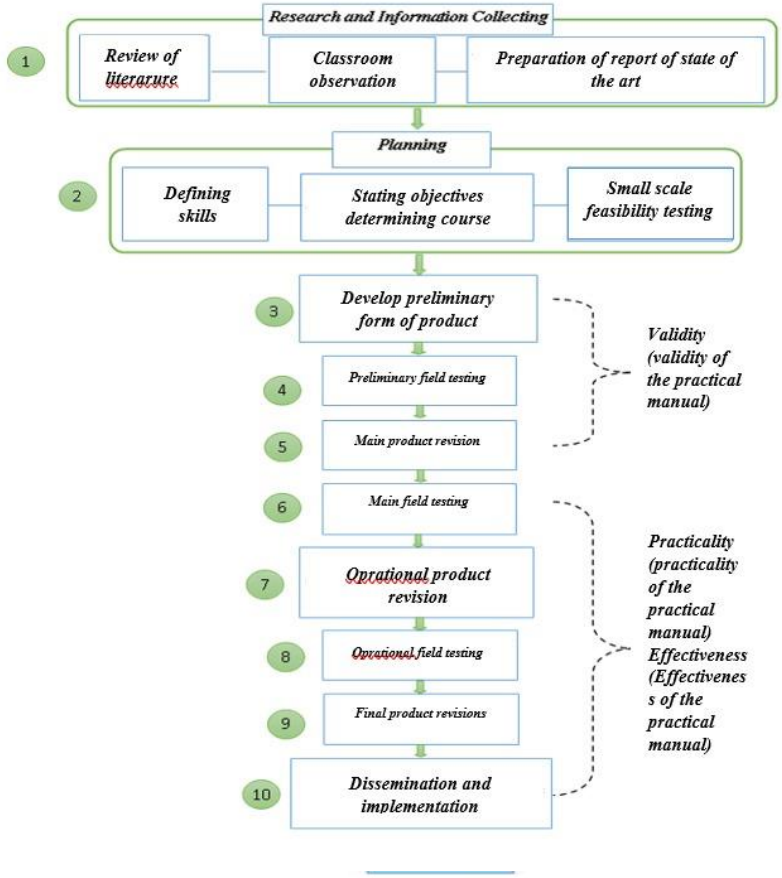
The integration of local wisdom into biology learning has several important benefits, namely a) Improving Understanding of Biological Concepts: By using local examples, students can more easily understand abstract scientific concepts. b) Encouraging the Development of Critical Thinking Skills: Local wisdom-based learning encourages students to analyze, evaluate, and interpret information, which is a key component of critical thinking. c) Increasing Cultural and Environmental Awareness: This learning helps students appreciate and preserve their local culture and natural resources. d) Increasing Student Motivation and Engagement: Learning materials that are relevant to students' lives increase their interest and participation in the learning process.

This study aims to test the validity of biology practicum instructions that are integrated with the local wisdom of the Sasak community. Validation is carried out by experts using the criteria of content eligibility, media eligibility, and language eligibility. The integration of local wisdom in education,

especially in biology learning, not only enriches teaching materials but also provides a relevant real context for students. By developing practicum instruction based on local wisdom, students are invited to connect scientific concepts with their cultural traditions, improve critical thinking skills, and strengthen their cultural identity. This research is expected to be the first step in encouraging the adoption of similar approaches in science education, as well as contributing to the preservation of local culture.

Methodology

This research is a product-based development research that focuses on the product validation stage of the practicum handbook integrated with local wisdom to train students' critical thinking skills. The resulting product is a practicum instruction manual that makes it easier for lecturers to practically learn students' critical thinking skills through practicum activities. This research integrates the theory of (Nieveen, 1999) about the criteria for quality products include three criteria, namely validity, practicality, and effectiveness. In more detail, the development stage can be seen in the following figure:



Gambar 1. Alur Penelitian pengembangan

Figure 1: Research information collecting method

Based on Figure 1, Nieveen put forward three criteria for quality products, namely validity, practicality, and effectiveness. However, this research only focuses on testing the validity of the product. Products that have been declared valid can be used as a basis for continuing testing their practicality and effectiveness. The instrument used was in the form of a Likert scale-based observation sheet with a score range of 1 to 4, where a score of 1 indicates "strongly inappropriate," a score of 2 indicates

"inappropriate," a score of 3 indicates "appropriate," and a score of 4 indicates "very appropriate." The scores obtained from each validator were analyzed using quantitative descriptive techniques (Utami *et al*., 2019). This validity test includes the validity of the content (Content Validity), which is evaluated based on three main aspects: material, media, and language. The developed practicum instruction manual is validated by three experts who have specific expertise according to the aspects assessed. The data obtained from each aspect was analyzed using a percentage formula, then categorized based on the following assessment criteria:

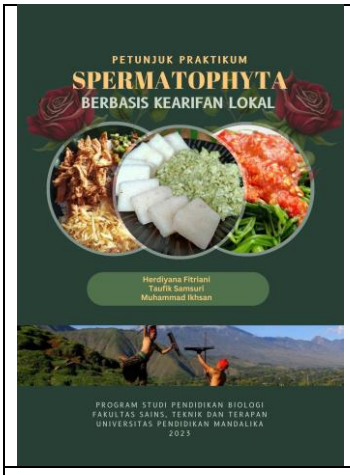
Table 1: Product Validity Category

Percentage (%)	Category	Information
0-25	Invalid	Not yet usable and still requires consultation
26-51	Less valid	Can be used with multiple revisions
52-77	Valid	Can be used with slight revisions
78-100	Highly valid	Can be used without revision

(Setiawan *et al*, 2021)

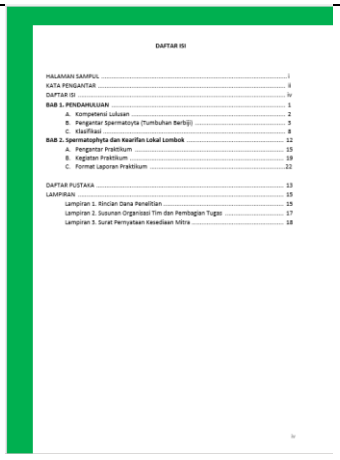
Results and discussion

This research is a development research that focuses on the product validation stage to develop a practicum manual. This guidebook is designed by integrating elements of local wisdom as one of the efforts to increase the relevance of learning. The structure of the developed practicum manual consists of three main parts, namely the beginning, content, and closing. Each section is systematically designed to support the practicum and learning process. The following is a description of each part contained in the product developed. The Initial section consists of a cover, a foreword and a table of contents.



Cover

Foreword



List of contents

Figure 2: The content consists of a boundary page, graduate competencies, theoretical studies and practicum activities.

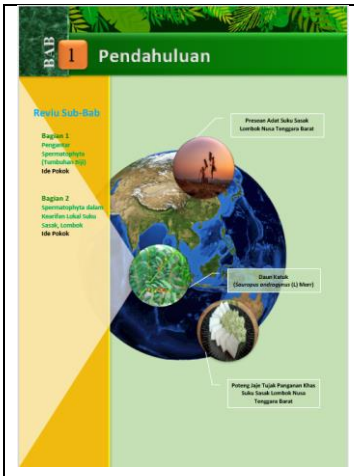
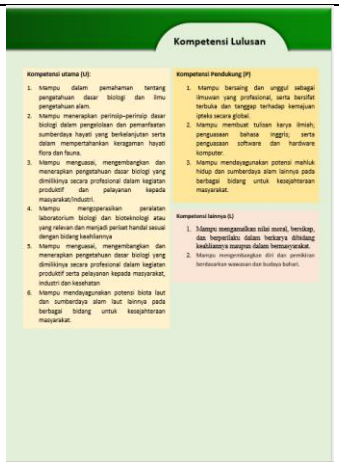
		
Border page	Graduate competencies	Theoritical review
		
Introduction to practicum	Study of local wisdom	Practical activities

Figure 3: End of the bibliography

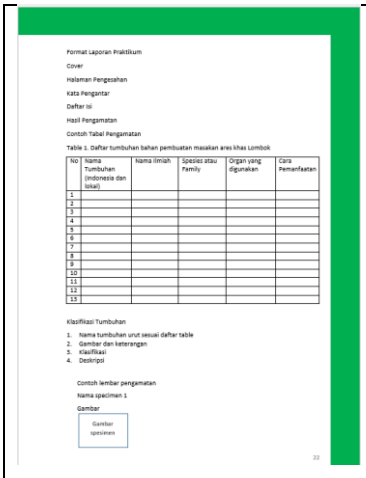
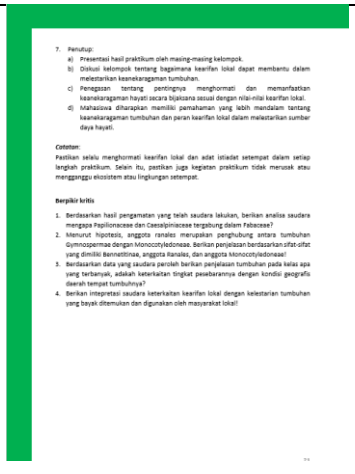
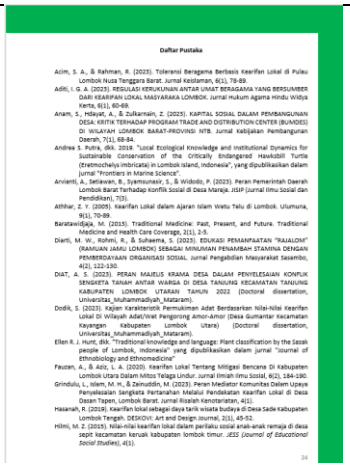
		
Report Format	Critical thinking evaluation	Bibliography

Figure 4: End of Report

After the product is prepared according to the steps for preparing the product that should be, then a validity test is carried out. The results of validation from the validator on the practicum instruction product will be presented as follows:

Table 2: Summary of Practicum Instruction Manual Validation Results

It	Indicators	Sub indicators	Score Percentage (%)			
			Validator 1	Validator 2	Vlidator 3	Average
1	Material	Eligibility	96.4	89.4	94.4	93.4
		Eligibility of Serving	95.9	93.0	98.9	95.9
		Suitability of Presentation	96.9	90.3	97.9	95.0
2	Media	Teaching material size	100	100	100	100
		Teaching Material Cover Design	96.9	90.6	95.5	94.3
		Design of Teaching Materials	100	93.1	98.5	97.2
3	Language	Businesslike	92.0	95.5	95.5	94.3
		Communicative	100	100	100	100
		Dialogical	100	100	100	100
		Suitability with Student Development	100	100	100	100
		Conformity with Language Rules	100	100	100	100
		Usage of Terms	94.8	95.4	97.3	95.8
Average			97.7	95.6	98.2	

Based on the data presented in Table 2, the validation of the local wisdom integrated practicum manual shows that this product meets high validation criteria in various aspects. Validation is carried out against three main indicators, namely material, media, and language, which include several specific sub-indicators to ensure comprehensive product quality.

On the indicator material, there are three sub-indicators that are assessed, namely the feasibility of content, the feasibility of presentation, and the suitability of presentation. The assessment results showed an average score of 93.4% for the feasibility of the content, 95.9% for the feasibility of presentation, and 95.0% for the suitability of the presentation. These three subindicators are in the very valid category based on the criteria in Table 1. This validation confirms that the material in the practicum instructions has met high quality standards and can be used without significant revisions. This is in line with previous findings that state that valid learning materials will significantly increase learning effectiveness (Haking & Soepriyanto, 2019; Kristanti & Sujana, 2022). On the indicator media, the three subindicators evaluated are the size of the teaching materials, the design of the cover, and the design of the content. The average score for the size of the teaching materials reached 100%, indicating the level of perfect fit. The design of the cover of the teaching materials received an average score of 94.3%, while the design of the content of the teaching materials reached 97.2%. All of these subindicators are also in the very valid category, which indicates that the media aspect has been well designed and suitable for use without major revisions. Previous research supports these findings, which suggest that well-designed learning media can significantly improve student engagement and learning outcomes (Cahyati *et al*., 2023; Dewi, 2019). Moreover (Christiana, 2022; Rosmiati *et al*., 2021) also noted that effective learning media contributes greatly to the quality of learning.

On the indicator language, the validation results show excellent performance across all subindicators. The straightforward sub-indicators obtained an average score of 94.3%, while the communicative,

dialogical, conformity with student development, and conformity with language rules each obtained a perfect score of 100%. The use of the term gets an average score of 95.8%. These results show that the language used in the practicum instruction manual is very precise, clear, and in accordance with learning needs. Research supports the importance of using communicative and clear language in learning materials to ensure good understanding for students (Azzahro & Subekti, 2022; Rachmadian, 2023). Similar findings were also reported by (Biringkanae, 2024; Dewinta *et al*., 2022) which highlights the important role of language in improving learning effectiveness.

The average validation score of the entire indicator is 97.8%, which puts this product in the very valid category. Thus, this practicum handbook can be used without revision and has met excellent quality standards to support the learning of students' critical thinking skills. Other research shows that high-quality learning materials and media contribute significantly to improving student learning outcomes, which supports the conclusion that these products are highly feasible to use in an educational context (Asiah, 2016; Khairiyah *et al*., 2021; Nurrita, 2018; Syarifuddin, 2024). Although the validation results show that the product has met the criteria of being very valid and does not require significant revisions, the validators still provide minor input that can be used to further improve the product. These comments and suggestions are an important reference in efforts to improve product quality to be more optimal and in accordance with user needs. Comments and suggestions can be seen in Table 3 below:

Table 3. Validator advice

Indicators	Suggestions and Inputs		
	Validator 1	Validator 2	Validator 3
Material	1. The practicum guidebook based on local wisdom to improve critical thinking skills has been systematically compiled and it is hoped that through this book it can improve critical thinking skills for students. 2. It is necessary to pay attention again regarding the work steps, it must be made more detailed at each stage	1. Add more representative images with practicum content 2. Renaming of practicum events 3. Notice the writing of the Latin name of the species	1. It is worth noting the shape of the observation table
Media	1. Some Latin writings in italic 2. Adjust the color, when the product is in black and white copy it is likely to be illegible	1. Paying attention to the suitability of the script and the layout of the graph/image is good enough, but it is necessary to consider the point of view of the image to be clearer	1. Complete images with valid sources
Language	1. In some editorials, pay attention to punctuation	1. Pay attention to the use of capital letters	1. Try to use symbols correctly

Table 3 presents suggestions and inputs from three validators on the local wisdom integrated practicum guidebook which is assessed based on three main aspects: material, media, and language. In the material aspect, the validator appreciated the systematics of the book but suggested adding details of work steps, representative images, attention to the writing of the Latin name of the species, and improving the shape of the observation table. The media aspect received input in the form of color adjustments for readability, the use of italic format for Latin writing, improvements to the layout of graphics or images, and the completion of images with valid sources. In terms of language, validators suggest improvements to punctuation, the use of capital letters, and more context-appropriate symbols. Overall, this suggestion is minor but important to improve the product to be more optimal in supporting learning.

Conclusion

The practicum handbook integrated with local wisdom to train students' critical thinking skills is declared to be very valid in the material, media, and language aspects. The validation results show that the product is feasible to use without major revisions and meets high quality standards to support learning. Minor input from validators is used as a reference for improvement so that the product is more optimal. This book is expected to be an effective learning medium in integrating local wisdom and improving the quality of education.

Recommendatıon

1. Further research can be conducted to test the practicality and effectiveness of this book in improving students' learning outcomes and critical thinking skills in various learning contexts.
2. Minor input from validators, such as improving design details or refining terminology, should be implemented to further improve product quality.

Acknowledgements

With gratitude and respect, I would like to express my deepest gratitude to BPI (Indonesian Education Scholarship), Puslapdik (Center for Education Financing Services), and LPDP (Education Fund Management Institution) for providing financial support for this research.

References

Alimah, S. (2019) 'Kearifan Lokal Dalam Inovasi Pembelajaran Biologi: Strategi Membangun Anak Indonesia Yang Literate Dan Berkarakter Untuk Konservasi Alam', *Journal Pendidikan Hayati*, 5(1). Available at: https://doi.org/10.33654/jph.v5i1.574.

Anisa, A. (2017) 'Meningkatkan Keterampilan Berpikir Kritis Peserta Didik Melalui Pembelajaran IPA Berbasis Potensi Lokal Jepara', *Journal Inovasi Pendidikan IPA*, 3(1), p.1. Available at: https://doi.org/10.21831/jipi.v3i1.8607.

Anjani, I., Sutrisky, L., Ramdani, A. and Khery, Y. (2019) 'Respon Terhadap Pembelajaran Mobile Berbasis Kearifan Lokal Dan Kepariwisataan Pada Mahasiswa Pendidikan Biologi', *Bioscientist Journal Ilmiah Biologi*, 7(2), p.151. Available at: https://doi.org/10.33394/bjib.v7i2.2380.

Asiah, N. (2016) 'Evaluasi Pelaksanaan Pembelajaran E-Learning Di SMA Budaya Bandar Lampung', *Circuit Journal Ilmiah Pendidikan Teknik Elektro*, 1(2). Available at: https://doi.org/10.22373/crc.v1i2.775.

Azzahro, T. A. and Subekti, F. E. (2022) 'Systematic Literature Review: Efektivitas Penggunaan Media Evaluasi Digital Dalam Pembelajaran Matematika', *Biormatika Journal Ilmiah Fakultas Keguruan Dan Ilmu Pendidikan*, 8(2), pp. 207–213. Available at: https://doi.org/10.35569/biormatika.v8i2.1331.

Biringkanae, P. (2024) 'Pengaruh Kualitas Pembelajaran Terhadap Capaian Akademik Mahasiswa Perguruan Tinggi Kedinasan', *Buletin Pengembangan Perangkat Pembelajaran*, 5(2). Available at: https://doi.org/10.23917/bppp.v5i2.3216.

Cahyati, F. N., Ersita, V., Khairunnisa, H. and Rizkia, R. A. (2023) 'Pengembangan Alat Evaluasi Pembelajaran Berbasis Roll Spin Test Pada Materi Pertumbuhan Dan Perkembangan Tumbuhan', *Proceeding of Biology Education*, 5(1), pp. 1–9. Available at: https://doi.org/10.21009/19642.

Christiana, L. (2022) 'Pemanfaatan Kahoot Sebagai Media Evaluasi Kimia Di Masa Pembelajaran Tatap Muka Terbatas', *Teacher Journal Inovasi Karya Ilmiah Guru*, 2(1), pp. 73–83. Available at: https://doi.org/10.51878/teacher.v2i1.1112.

Dewi, N. S. N. (2019) 'Workshop Penyusunan Perangkat Pembelajaran Bahasa Inggris Bagi Instruktur Lembaga Kursus Non Formal', *Sarwahita*, 16(01), pp. 45–55. Available at: https://doi.org/10.21009/sarwahita.161.05.

Dewinta, D. Y. P., Santosa, A. and Nugroho, W. (2022) 'Pengembangan Media Permainan Monopoli Proklamasi Kemerdekaan Sebagai Evaluasi Pembelajaran Kelas V Sekolah Dasar', *Tanggap Journal Riset Dan Inovasi Pendidikan Dasar*, 2(2), pp. 110–121. Available at: https://doi.org/10.55933/tjripd.v2i2.185.

Ennis, R. H. (2011) 'The Nature of Critical Thinking: An Outline of Critical Thinking Dispositions and Abilities', *Sixth International Conference on Thinking*, MIT, Cambridge, MA, May, pp. 1–8.

Facione, P. (2011) *Critical Thinking: What It Is and Why It Counts*. London: Measured Reason and The California Academic Press.

Fatihah, W. (2023) 'Efektivitas e-modul praktikum berbasis kearifan lokal untuk meningkatkan kreativitas dan hasil belajar siswa SMA Negeri 4 Cilegon', *The Journal of Learning and Technology*, 2(2), pp. 77–84. Available at: https://doi.org/10.33830/jlt.v2i2.6786.

Festiyed, F., Mikhayla, M., Diliarosta, S. and Anggana, P. (2022) 'Pemahaman guru biologi SMA di sekolah penggerak DKI Jakarta terhadap pendekatan etnosains pada kurikulum merdeka', *Journal Pendidikan Dan Kebudayaan*, 7(2), pp. 152–163. Available at: https://doi.org/10.24832/jpnk.v7i2.2993.

Fitriani, H., Asy'ari, M., Zubaidah, S., Mahanal, S. and Samsuri, T. (2024) 'Enhancing Prospective Biology Teachers' Critical Analysis Skills: An Evaluation of Plant Anatomy and Development Textbook Effects', *Journal of Turkish Science Education*, 21(3), pp. 533–548.

Fitriani, H., Rapi, N. K., Arnyana, I. B. P., Adnyana, P. B. and Citrawathi, D. M. (2024) 'Validity of the Instrument for the Critical Analysis Ability of Prospective Biology Teacher', *Path of Science*, 10(7), pp. 8006–8014.

Fitriani, H., Samsuri, T., Rachmadiarti, F. and Raharjo, R. (2022) 'Evaluative Process Based on Conceptual Problem-Based Learning Model: A Conceptual Framework for Learning Tools to Train Critical Thinking', *Bioscientist: Journal Ilmiah Biologi*, 10(2), pp. 1202–1208.

Haking, D. D. and Soepriyanto, Y. (2019) 'Pengembangan Media Video Pembelajaran Renang Pada Mata Pelajaran PJOK Untuk Siswa Kelas V SD', *JKTP Journal Kajian Teknologi Pendidikan*, 2(4), pp. 320–328. Available at: https://doi.org/10.17977/um038v2i42019p320.

Hunaepi, Kurnia, N. and Firdaus, L. (2016) 'Validitas Buku Ajar Ekologi Berbasis Kearifan Lokal untuk Meningkatkan Sikap Ilmiah Mahasiswa', *Journal Prisma Sains*, 4(2).

Ibrahim, M. and Wahyusukrtiningsih. (2014) *Model Pembelajaran Inovatif Melalui Pemaknaan (Belajar Perilaku Positif dari Alam)*. Surabaya: Unesa University Press.

Jeriyantoro, F. (2024) 'Menumbuhkan rasa peduli dan toleransi pada anak sekolah dasar melalui pembelajaran PKN berbasis kearifan lokal', *HMRM*, 2(2), pp. 8–11. Available at: https://doi.org/10.37010/hmr.v2i2.49.

Kristanti, N. N. D. and Sujana, I. W. (2022) 'Media Pembelajaran Interaktif Berbasis Pembelajaran Kontekstual Muatan IPS Pada Materi Kenampakan Alam', *Journal Penelitian Dan Pengembangan Pendidikan*, 6(2), pp. 202–213. Available at: https://doi.org/10.23887/jppp.v6i2.46908.

Mahapoonyanont, N. (2010) 'Factors Related to Critical Thinking Abilities: A Meta Analysis', *Procedia Social and Behavioral Sciences*, pp. 986–990.

Mimbs, C. (2005) 'Teaching from the Critical Thinking Problem Based Curricular Approach: Strategies, Challenges and Recommendation', *Journal of Family and Consumer Science Education*, 23(2), pp. 7–18.

Muzakir, M. (2024) 'Kearifan lokal suku sasak sebagai sumber nilai pendidikan di persekolahan: sebuah kajian etnopedagogi', *Edukatif Journal Ilmu Pendidikan*, 6(1), pp. 84–95. Available at: https://doi.org/10.31004/edukatif.v6i1.6067.

Nengsi, S. (2016) 'Pengembangan penuntun praktikum biologi umum berbasis inkuiri terbimbing mahasiswa biologi STKIP Payakumbuh', *Journal Ipteks Terapan*, 10(1), pp. 47–55.

Nieveen, N. (1999) 'Prototyping to reach product quality', in Akker, J.V.D., Branch, R.M., Gustafson, K., Nieveen, N. and Plomp, T. (eds.) *Design Approaches and Tools in Education and Training*. Springer.

Nieveen, N. (2007) 'Formative Evaluation in Educational Design Research', *Proceedings of the Seminar Conducted at the East China Normal University, Shanghai (PR China)*.

Nurrita, T. (2018) 'Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa', *Misykat Journal Ilmu-Ilmu Al-Quran Hadist Syari Ah Dan Tarbiyah*, 3(1), p. 171. Available at: https://doi.org/10.33511/misykat.v3n1.171.

Partnership for 21st Century Skills (2011) *Framework for 21st Century Learning*. Available at: www.p21.org.

Paul, R. and Elder, L. (2011) *Consequential Validity: Using Assessment to Drive Instruction*. Foundation for Critical Thinking, pp. 1–7.

Prayitno, T. A. (2017) 'Pengembangan petunjuk praktikum mikrobiologi program studi pendidikan biologi', *Journal Biota*, 3(1), pp. 31–37.

Purnamasari, S. (2012) *Pengembangan Petunjuk Praktikum Kimia SMA Pada Pokok Bahasan Stoikiometri*. [Unpublished thesis]. Jakarta: UPI.

Putri, C. (2023) 'Peran pembelajaran berbasis outdoor dalam meningkatkan keterampilan berpikir kritis siswa: studi quasi-eksperimental di sekolah menengah atas di Bandung', *pendidik.*, 1(02), pp. 68–77. Available at: https://doi.org/10.58812/spp.v1i02.113.

Rachmadian, R. H. (2023) 'Sosialisasi Penggunaan Media Interactive Virtual Reality Untuk Mendukung Pembelajaran Imersif Siswa Di Kawasan Geopark Ijen', *Abdimasku Journal Pengabdian Masyarakat*, 6(3), p. 712. Available at: https://doi.org/10.62411/ja.v6i3.1329.

Rahayuningsih, E. and Dwiyanto, D. (2005) *Pembelajaran di Laboratorium*. Yogyakarta: Pusat Pengembangan Pendidikan UGM.

Riyanti, A. and Novitasari, N. (2021) 'Pendidikan multikultural berbasis kearifan lokal bagi siswa sekolah dasar', *Journal Adat Dan Budaya Indonesia*, 3(1), pp. 29–35. Available at: https://doi.org/10.23887/jabi.v3i1.37780.

Rizkiana, F., Khairunnisa, Y. and Apriani, H. (2021) 'Studi kelayakan modul IPA tematik berbasis kearifan lokal dengan tema mie habang', *Journal Pendidikan MIPA*, 11(2), pp. 130–135. Available at: https://doi.org/10.37630/jpm.v11i2.499.

Rosmiati, U., Supratman, S. and Madawistama, S. T. (2021) 'ELMA (E-Learning for Mathematics): Pengembangan Media Pembelajaran Berbasis LMS (Learning Management System) Sebagai Alternatif Pembelajaran Di Masa Pandemi Covid-19', *Jipm (Journal Ilmiah Pendidikan Matematika)*, 10(2), p. 163. Available at: https://doi.org/10.25273/jipm.v10i2.10051.

Samsuri, T. and Fitriani, H. (2015) 'Pengembangan Perangkat Pembelajaran Inkuiri Terbimbing Untuk Melatihkan Kemampuan Berpikir Kritis Mahasiswa Pada Mata Kuliah Biologi Umum', *Journal Ilmiah IKIP Mataram*, 2(2), pp. 559–567.

Sawitri, S. (2008) 'Model Pengembangan Buku Petunjuk Praktek Mata Kuliah Draping', *Journal Penelitian Pendidikan*, 24(1), pp. 23–24.

Sudrajad, H. (2009) *Pengembangan Perangkat Percobaan Konsep Rotasi untuk Pembelajaran Fisika Di SMA dan Universitas*. Unpublished thesis, Program Pascasarjana UNP.

Syarifuddin, S. (2024) 'Penguatan Metode Literasi Dan Numerasi Bagi Guru SMP Islam Terpadu an-Nisa Dompu Berbasis Tata Kelola Manajemen Sekolah', *Taroa Journal Pengabdian Masyarakat*, 3(1), pp. 64–71. Available at: https://doi.org/10.52266/taroa.v3i1.2608.

Udi, E. and Cheng, D. (2015) 'Developing Critical Thinking Skills from Dispositions to Abilities: Mathematics Education from Early Childhood to High School', *Creative Education*, pp. 455–462.

Utami, S. D., Efendi, I., Dewi, I. N., Ramdani, A. and Rohyani, I. S. (2019) 'Validitas Perangkat Pembelajaran Etnoekologi Masyarakat Suku Sasak Kawasan Taman Nasional Gunung Rinjani', *Journal Penelitian Pendidikan IPA*, 5(2), pp. 240–247. Available at: https://doi.org/10.29303/jppipa.v5i2.291.