

# Need Analysis of the Development of Tri Hita Karana-Based Biological Learning Modules in Secondary Schools: A Systematic Literature Review

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## Abstract

The characteristics of biology learning that study living things and their environment are closely related to the wisdom of the Balinese people, especially Tri Hita Karana in an effort to achieve harmony. Preservation of local wisdom values of Balinese people needs to be developed and integrated into the Tri Hita Karana (THK) based biology learning module to be used as a companion teaching material by teachers and students who can motivate students to learn independently outside the classroom. This journal analysis study uses the PRISMA Systematic Literature Review (SLR) method through the ERIC, Springer, Wiley, and BASE search engines from 2017 to 2021. Articles that meet the inclusion and exclusion criteria are reputable articles at international and national levels, namely articles included in the journals Q1, Q2, Sinta 1, and Sinta 2. 13 quality journals were analyzed in the full text further to support the purpose of this study. The results of the full-text SLR journal state that 1) various types of development of innovative biology learning modules have been carried out in high school; 2) PBL is mostly used as a module development approach and the 4D model is the most dominant development model chosen. The most widely developed biological material in the module is material with environmental topics. Materials that can be further developed are biological materials that are integrated with community culture, such as Tri Hita Karana, because from the SLR results, no module development is found that is integrated with culture.

**Keywords**— Biology Module, Biology Learning, Tri Hita Karana, Systematic Literature Review.

## INTRODUCTION

The development of science leads to social dynamics that are always moving towards progress. In the 21st century characterized by the era of disruption, humans are faced with various challenges including readiness for the proper acceptance, understanding, and utilization of information technology. Technological progress has always had a positive and negative impact, to be able to minimize the various negative impacts that occur, it is necessary for digital literacy of the technological user community, which requires 4C's

ability (critical thinking, creative thinking, collaboration, communication). Various skills of the 21st century should be developed more intensely in the world of education. Various efforts can be made to support these goals, among others, the implementation of various types of learning models, including contextual learning, the ability of teachers to review, and the use of diverse learning resources. But in general, teachers only use learning resources that are limited to mandatory textbooks from the government, and teacher innovation in Indonesia is still low in

terms of media development or learning resources including biology learning modules.

Indonesian Partnership for 21st-Century Skills Standards (IP-21CSS) includes: 1) 4Cs capabilities; 2) ICTs, 3) spiritual values, and 4) character formation, which are ideal expectations of educational implementation in Indonesia that demand a variety of innovative learning strategies including modeling strategies and contextual learning approaches that emphasize the IP-21CSS indicator (Afandi et al., 2019; Harsiati, 2018; Hofeld, 2021; Paraniti & Noviyanti, 2019). The development of learning models such as Tri Hita Karana-based Community Technology Science as well as learning resources such as case-based learning modules can also improve students' critical thinking skills to support 4C's (I. Arnyana, 2019; Suryawan et al., 2020). The learning module is a learning resource that provides a self-learning experience for students that is delivered in a systematic and easy-to-understand way by students with the characteristics of 1) self-instruction, 2) self-contained, 3) stand-alone, 4) adaptive, and 5) user-friendly (Setiyadi, 2017; Director-General of PMPTK, 2008).

Biological learning tends to be done in conventional ways such as memorizing concepts, theories, and principles, leading to low learning achievements and quality of education (I. B. P. Arnyana et al., 2017; Harsiati, 2018). In addition, the low quality of teachers in Indonesia is also an obstacle faced by education in Indonesia where teachers generally have not implemented learning models that are in accordance with the nature of science, so the ability of the student's science process has also not been explored to the maximum (Chairunnisak, 2020; Puspita, 2019). The quality of teachers in Indonesia ranks 14th among developing countries, this indicates that the quality of teachers is still low, resulting in teacher difficulties in accepting changes (Mamoah et al., 2021). Generally, teachers are already satisfied with the use of general package books so they are less motivated to develop teaching material supplements in the form of modules as systematic and interesting learning materials are expected to motivate students to study independently outside the classroom (Mamoah et al., 2021; Puspita, 2019).

Various studies on the development of biological learning modules have been carried out, but endeavors to develop biological learning devices based on local wisdom are still not broadly examined in Indonesian schools where the emphasis on the value of local

wisdom as indigenous science is needed in biology learning (Abidinsyah et al., 2019).

Cross-cultural learning by bridging the various dividing factors between science and non-science, between classroom learning and daily life in society, and especially between generations with the excellence of their ancestral heritage (Surata, 2013). Bali is one of the most enjoyed islands by domestic and foreign tourists because of its beautiful and interesting nature and culture. Tri Hita Karana (THK) is a view of Balinese community life in an effort to achieve harmony between humans with God, humans with humans, and humans with nature/environment (Sutajaya et al., 2020).

Biology is a science that studies the ins and outs of living things and their interactions with their environment. The characterization of biology learning is very closely related to the wisdom of the Balinese people Tri Hita Karana in an effort to achieve harmony. Based on these interrelationships and the urgency of the dissemination of the values of local wisdom of the Balinese people, it is necessary to analyze the needs for the development of biology learning modules based

on Tri Hita Karana through qualitative meta-analysis of library studies with Systematic Literature Review (SLR) techniques.

## METHOD

This study is a qualitative meta-analysis of the Systematic Literature Review (SLR) Prisma method (Preferred Reporting Item for Systematic Review and Meta-Analysis) through search engines ERIC, springer, wiley, and BASE from 2017 to 2021 with material on all articles included in Q1, Q2, Sinta 1, Sinta 2 and reputable international proceedings (Richter et al., 2020). The keyword used in search engines is "senior high school biology learning module".

## FINDING AND DISCUSSION

### Types of Research development of Biology Learning Modules in High School

The construction of the article selection criteria used in this study is a biology learning module in high school that is included in reputable international and national journals for the last 5 years (2017-2021) which are included in the journals Q1, Q2, Sinta 1 and Sinta 2. Through criteria exclusion and inclusion further found 16 articles met the criteria, and then in the final stages of selection based on the criteria of exclusion and

inclusion found 13 journals were analyzed full text results of the Systematic Literature Review (SLR) full-further to support the purpose of this research. The text journal are presented in the following Table 3.1.

Table 01. Article Description and Types of Module Development Approaches

No	Code	Journal	Module Development Approaches	Year
1	(Q2.1)	International Journal of Instruction (Q2)	Generative Learning-Based Biology Module	2019
2	(Q2. 2)	International Journal of Instruction (Q2)	STEAM-Based Biotechnology Module Equipped with Flash Animation	2020
3	(S2.1)	JPBI (Jurnal Pendidikan Biologi Indonesia) Sinta 2	Fun and Educative Module	2018
4	(S2. 2)	Biosfer: Jurnal Pendidikan Biologi Sinta 2	E-module	2020
5	(S2. 3)	JPBI (Jurnal Pendidikan Biologi Indonesia) Sinta 2	Integrated Biology Module	2020
6	(S2. 4)	JPBI (Jurnal Pendidikan Biologi Indonesia) Sinta 2	Genetic Learning Module Based on Blue Eyes Phenomenon	2019
7	(S2. 5)	JPBI (Jurnal Pendidikan Biologi Indonesia) Sinta 2	Biology Module Based on Stim-HOTS Models	2019
8	(S2. 6)	Biosaintifika: Journal of Biology & Biology Education (Sinta 2)	Problem-Based Learning Module	2018
9	(S2. 7)	Biosaintifika: Journal of Biology & Biology Education (Sinta 2)	Problem-Based Learning Module	2018
10	(S2. 8)	Journal of Educational Science and Technology (Sinta 2)	Modul Pembelajaran Biologi Berbasis Pendekatan Saintifik	2017
11	(P. 1)	Proceedings of the 2'nd International Conference on Innovative Research Across Disciplines (ICIRAD 2017); ISBN 9789462523753 Atlantis press (prosiding internasional bereputasi)	Case-Based Learning Oriented Biology Module	2017
12	(S2. 9)	Biosfer: Jurnal Pendidikan Biologi Sinta 2	Modul Pembelajaran Berbasis Sains Teknologi dan Masyarakat (STM)	2017
13	(S2. 10)	Jurnal Inovasi Pendidikan IPA Sinta 2	Module Challenge Based Learning	2017

Based on table 3.1, it was found that various types of module development in biological learning in high school have been carried out including: generative learning based biology module, STEAM based, educative module, e-module mangrove, integrated biology, phenomenon based module, HOTS based module, Problem Based Learning module, scientific short, case-based module, Community Technology Science, challenge based module. The use of package books in general, therefore a supplement of teaching materials in the form of modules as systematic and interesting learning materials is expected to motivate

students to learn independently outside the classroom (Puspita, 2019).

### Types of Research development of Biology Learning Modules in High School

PBL based module is more widely used as a model for developing biology learning modules in high school because PBL provides opportunities for students to develop the ability to argue scientific reasoning, critical and creative thinking (Anjarwati et al., 2018; Nurinda et al., 2018). The use of challenge based learning modules is also a combination of PBL, PjBL and contextual models that focus on solving problems in everyday life can empower students' critical abilities (Nawawi, 2017).

The tendency of the material developed in the module is an environmental topic. Biology is a science that studies the ins and outs of living things and their interaction with the environment. Environmental topics and environmental issues discussed in the curriculum of primary, secondary and higher education in various countries, including in Indonesia. The main

goal is to prepare students to individually and collaborate to be able to take positive actions on the environment, in addition to information transfer, increasing knowledge, values and attitudes (Ardoin et al., 2018). While biological learning materials that are integrated with the wisdom of local cultural values have not been found in this SLR study and have the opportunity to be further developed. Emphasis on the value of local wisdom as an indigenous science is needed in biology learning (Abidinsyah et al., 2019). Cross-cultural learning by bridging the various dividing factors between science and non-science, between classroom learning and daily life in society, and especially between generations with the excellence of their ancestral heritage (Surata, 2013). Domestic grouped journals that contain many articles on the development of biology learning modules are JPBI (Journal of Indonesian Biological Education) accredited *sinta 2* at 36.4%, while international journals have 100% *repute* from the International Journal of Instruction (Q2).

Table 02. Methods, Data Analysis, Finding, Weaknesses

No	Methods & Instruments	N	Data Analysis	Finding	Weaknesses
1	Faktorial 2x2 treatment by level Motivations for Reading Questionnaire (MRQ)	250	ANCOVA	The modules developed effectively improve analytical thinking skills.	Developed modules require a high interest in reading
2	Pre-experimental One group pretest-posttest design  Questionnaire	32	Gain Score	The modules developed effectively improve learning outcomes.	small sample count and pre-experimental design, questionnaire is not yet clear
3	RnD (ADDIE)	-	Deskriptive	Modules worth using	No sample count
4	RnD (ADDIE) Non equivalent control group design  Questionare of self regulated learning	42	Deskriptive	Modules worth using	Not significantly measuring learning autonomy
5	RnD (4D) Factor Analysis	150	Deskriptive & Factor Analysis	Modules can effectively measure environmental attitudes	-
6	RnD (Borg n Gall)	70	Deskriptive	Modules worth using	-
7	RnD (ADDIE)	-	Deskriptive	Modules worth using	No sample count

8	-	2 class	Deskriptive Gain score	Modules are worth using and can improve scientific argumentation skills	Design and research samples are less clear
9	Quasi-experiment with nonequivalent control group design.	56	Deskriptif kuantitatif-kualitatif	Modules effective to improve creative thinking skills improve creative thinking skills	-
10	RnD (4D)	38	Deskriptive	Modules worth using	-
11	RnD (4D) Pre eksperimen One Group Pre-test Post-test Design.	-	Deskriptive & T test	Modules worth using	No sample count
12	RnD (4D) modification to 3 D	-	Deskriptive	Modules worth using	The sample is unclear
13	RnD (Borg n Gall)	Kelas X	Deskriptive & Anacova	Modules worth using	Explanation of the design and analysis of module effectiveness test data (Anacova is less clear)

Based on Table 3.2 the widely used module development model is the 4D model and the least selected development model is the Borg n Gall development model. 4D models are widely used because they are more clear, complete, directional, structured, systematic and from the beginning to the final process of the resulting product (Setiyadi, 2017). Writing articles with a combination of development design and experimentation (effectiveness test) with an adequate sample number of  $N > 200$  is more likely to be accepted in reputable international journals.

## CLOSING

### Conclusion

Types of innovative biology learning module development have been widely carried out such as: generative learning based biology module, STEAM based, educative module, e-module mangrove, integrated biology, phenomenon based module, HOTS based module, Problem Based Learning module, scientific shorts, case-

based module, Community Technology Science, challenge based module.

The PBL approach is more widely carried out in the development of modules in high school, with environmental topic materials, but nevertheless there has been no development of culturally based biological learning modules, such as tri Hita Karana culture in Bali.

## SUGGESTION

1. The development of culture-based biology learning modules outside of environmental materials needs to be developed using innovative learning approaches.
2. Writing articles on the development of quality biological learning modules needs to pay attention to several things such as the clarity of the selected development model as well as conducting effectiveness tests in the form of experiments in large numbers of  $N > 200$ .

## REFERENCES

1. Abidinsyah, A., Ramdiah, S., & Royani, M. (2019). The implementation of local wisdom-based learning and HOTS-based assessment: Teacher survey in Banjarmasin. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 5(3), 407–414. <https://doi.org/10.22219/jpbi.v5i3.9910>
2. Afandi, Sajidan, Akhyar, M., & Suryani, N. (2019). Development frameworks of the Indonesian partnership 21 st -century skills standards for prospective science teachers: A Delphi study. *Jurnal Pendidikan IPA Indonesia*, 8(1), 89–100. <https://doi.org/10.15294/jpii.v8i1.11647>
3. Anjarwati, P. G. P., Sajidan, S., & Prayitno, B. A. (2018). Problem-Based Learning Module of Environmental Changes to Enhance Students' Creative Thinking Skill. *Biosaintifika: Journal of Biology & Biology Education*, 10(2), 313–319. <https://doi.org/10.15294/biosaintifika.v10i2.12598>
4. Ardoin, N. M., Bowers, A. W., Roth, N. W., & Holthuis, N. (2018). Environmental education and K-12 student outcomes: A review and analysis of research. *Journal of Environmental Education*, 49(1), 1–17. <https://doi.org/10.1080/00958964.2017.1366155>
5. Arnyana, I. (2019). Pembelajaran Untuk Meningkatkan Kompetensi 4c(Communication, Collaboration, Critical Thinking Dancreative Thinking) Untukmenyongsong Era Abad 21. *Konferensi Nasional Matematika Dan IPA Universitas PGRI Banyuwangi*. <https://ejournal.unibabwi.ac.id/index.php/knmipa/article/view/829>
6. Arnyana, I. B. P., Upadianti, L. P. E., & Suma, K. (2017). *Developing Case-Based Learning Oriented Biology Module to Improve Senior High School Students' Critical Thinking Skill*. 134(Icirad), 257–262. <https://doi.org/10.2991/icirad-17.2017.48>
7. Chairunnisak. (2020). Implementasi Pembelajaran Abad 21 Di Indonesia. *Prosiding Seminar Nasional Teknologi Pendidikan Pascasarjana UNIMED*, 351–359.
8. Harsiati, T. (2018). Karakteristik Soal Literasi Membaca Pada Program Pisa. *Litera*, 17(1), 90–106. <https://doi.org/10.21831/ltr.v17i1.19048>
9. Hofeld, J. F. (2021). Using Modeling to Develop a Deep Understanding of Photosynthesis & Cellular Respiration as Chemical Processes. *American Biology Teacher*, 83(6), 382–386. <https://doi.org/10.1525/abt.2021.83.6.382>
10. Mamoah, S., Mahfud, H., Istiyati, S., & Hadiyah. (2021). Pelatihan Karya Inovasi Guru Sekolah Dasar. *Jurnal Pengabdian Kepada Masyarakat*, 1(Agustus).
11. Nawawi, S. (2017). Developing of module challenge based learning in environmental material to empower the critical thinking ability. *Jurnal Inovasi Pendidikan IPA*, 3(2), 212. <https://doi.org/10.21831/jipi.v3i2.15988>
12. Nurinda, S., Prayitno, B. A., & Article, H. (2018). Problem-Based Learning Module of Environmental Changes to Enhance Students' Creative Thinking Skill. *Biosaintifika*, 10(36), 334–340.
13. Paraniti, A. A. I., & Noviyanti, P. L. (2019). Evaluasi Rencana Pelaksanaan Pembelajaran Pada Pelaksanaan Ppl Terhadap Pemahaman Mahasiswa. *Jurnal Bakti Saraswati*, 08(01).
14. Puspita, L. (2019). Pengembangan modul berbasis keterampilan proses sains sebagai bahan ajar dalam pembelajaran biologi. *Jurnal Inovasi Pendidikan IPA*, 5(1), 79–88. <https://doi.org/10.21831/jipi.v5i1.22530>
15. Setiyadi, M. W. (2017). Pengembangan Modul Pembelajaran Biologi Berbasis Pendekatan Saintifik Untuk Meningkatkan Hasil Belajar Siswa. *Journal of Educational Science and Technology (EST)*, 3(2), 102. <https://doi.org/10.26858/est.v3i2.3468>

16. Surata, S. P. K. (2013). Pembelajaran Lintas Budaya: Penggunaan Subak sebagai Model “Ecopedagogy” 1 Sang Putu Kaler Surata \*. *Kajian Bali*, 03(September), 24–25.
17. Suryawan, I. N. A., Manuaba, I. B. S., & Agustika, G. N. S. (2020). 1. Pengaruh Model Sains Teknologi Masyarakat Berbasis Tri Hita Karana Terhadap Kompetensi Pengetahuan Ipa. *Jurnal Adat Dan Budaya Indonesia*, 2(1), 11–19. <https://doi.org/10.23887/jabi.v2i1.28903>
18. Sutajaya, I. M., Sukra Warpala, W., Oka Riawan, I. M., & Sri Ratna Dewi, N. P. (2020). Implementation of Tri Hita Karana with Socio-Cultural Ergonomic Oriented on the Kecak Dance Performance to Improve Community Health and Supporting Cultural Tourism in Peliatan Ubud Gianyar. *Journal of Physics: Conference Series*, 1503(1). <https://doi.org/10.1088/1742-6596/1503/1/012053>