



The Validity of STEM Integrated Biotechnology Textbook to Learn Research Skills of Prospective Natural Science Teachers

Hasan Subekti¹, Fasih Bintang Ilhami¹, Aris Rudi Purnomo¹, and Arindra Trisna Widiandyah²

¹ Universitas Negeri Subaya, Surabaya, Indonesia

² Sekolah Tinggi Keguruan dan Ilmu Pendidikan PGRI Nganjuk, Nganjuk, Indonesia
hasansubekti@unesa.ac.id.com

Abstract. The integration of STEM (science, technology, engineering, and mathematics) concepts into biotechnology textbooks is a significant contributor to the development of competencies and the enhancement of the efficacy and quality of natural sciences education. The objective of this research is to develop and validate a STEM-integrated biotechnology learning book that is specifically designed to teach research skills to prospective natural science teacher students. This research is classified as development research following the stages of the Plomp model, specifically (a) preliminary, (b) prototyping, and (c) assessment. Validation is a data collection method involving five validator participants. The semi-qualitative data will be analyzed using percentages and the NVivo software. The results of the data analysis indicated that the textbook exhibited an average validity score of 3.57, which was categorized as "very valid." Additionally, the analysis of the reliability coefficient of the textbook yielded an average score of 0.74, which was categorized as "high." In conclusion, the biotechnology learning books developed have been found to exhibit excellent quality from various perspectives and are therefore categorized as valid and reliable.

Keywords: Biology, Natural Science, Research Skills, Textbook, Validity.

1 Introduction

Textbooks are a significant contributor to the advancement of scientific knowledge, the formation of scientific attitudes, and the acquisition of scientific skills, all of which are crucial elements in the efficacy of science education [1], student engagement [2] digital literacy [3], creative thinking [4], learning motivation [5], and multiple intelligences [6]. Textbooks are valuable teaching materials and tools, where in the implementation of the curriculum and implementation in the classroom [7]. The textbook has been researched from a variety of disciplines and perspectives [8] and improves the quality of learning. The textbook is used as a reference to guide the implementation of the curriculum [9], by determining teaching methods, content selection and educational organization in learning. In addition, textbooks are used as a standard in learning for students [10], and according to the level and standards of their educational level or class. The creation of this textbook is also consistent with the policy of the President of the Republic of Indonesia, which requires lecturers to author textbooks [11]. It is

therefore recommended that content be improved and integrated by global trends and current issues, including the integration of learning in science, technology, engineering, and mathematics.

The integration of science, technology, engineering, and mathematics (STEM) learning represents a pivotal methodology for the implementation of teaching and learning. This approach entails the incorporation of these four disciplines into a discussion or study [12], and the curriculum places particular emphasis on fostering students' conceptual understanding, honing their critical thinking abilities, cultivating their creative thinking skills, and developing their collaborative abilities. In addition, integrating STEM in learning will hone twenty-first-century skills, such as systems thinking skills, creativity, optimism, collaboration, and communication skills [13] as well as adaptive abilities about the development of science education in the face of new challenges [14]. In alignment with these references, STEAM-integrated learning represents a primary area of focus within the domain of learning research [15] and is considered an effective approach to prepare learners for the challenges of the 21st century [16] in the context of global education reform [17], over the past few decades. STEM-integrated learning demonstrates how concepts and principles within the context of integrated science, technology, engineering, and mathematics are utilized to develop products, processes, and systems for human life [18] with the hope of making it easier to learn and apply real activities around it. Nevertheless, despite the extensive research conducted on the implementation of STEM at various educational levels, a notable deficit persists in the development and validation of STEM instructional materials tailored to higher education, particularly for prospective students of natural sciences educators.

The completion of research skills is a crucial element in the pursuit of an undergraduate education [20] and must be able to face the 21st century [21]. Developing research skills in students is a fundamental responsibility of higher education institutions [22], has played a significant role in enhancing the caliber of scientific instruction and learning, and it is of paramount importance for contemporary science education. The aforementioned factors have contributed to the advancement of science education.

It is therefore imperative that biotechnology textbooks are developed and validated which integrate STEM approaches and are explicitly designed to teach research skills to prospective science teacher students. This research represents a pioneering study in the development and validation of STEM-integrated biotechnology textbooks designed to equip prospective science teacher students with research skills. This research is focused on the context of higher education and the educational background of prospective natural science teachers. The integration of STEM, biotechnology, and teaching research skills, particularly among natural science education students at UNESA, represents a distinctive aspect of this research. Considering the description, the objective of this research is to develop and validate a STEM-integrated biotechnology learning book that is specifically designed to teach research skills to prospective science teacher students. Specifically, the objective is to develop STEM-integrated biotechnology textbooks that encompass the following elements: (a) textbook design, (b) textbook format, (c) textbook materials, (d) language, (e) book presentation, and (f) material support.

2 Research Methods

This research is in the category of development research with the purpose of this research being to develop and validate STEM-integrated biotechnology learning books that are specifically designed to teach research skills to prospective science teacher students. The stages of the research refer to the stages of the Plomp Model, namely (a) preliminary, (b) prototyping, and (c) assessment [23]. The Plomp Model was chosen with several considerations in mind: (a) It combines research with practical aspects of instructional design, allowing for the development of effective educational solutions based on empirical evidence; (b) a systematic and structured approach to designing education or the development of teaching materials; and (c) allow for adjustments and refinements based on the needs and circumstances of the ever-evolving educational environment. The instrument used was in the form of a textbook validation sheet adapted by Nur, 2010 [24], Supriana, 2016 [25], and Suyidno, 2017 [26]. The data collection method is in the form of validation with a data source in the form of assessments or validation results from 5 (five) validators who are all in the process as educators at the higher education level (lecturers) with a doctoral education background. The data in this development research consists of qualitative data and quantitative data. Qualitative data comes from validation instruments in the form of numbers and this qualitative data is in the form of comments or suggestions from experts. The data was analyzed semi-qualitatively in the form of percentages and with the help of NVivo software.

3 Results and Discussion

3.1 Textbook Characterization

The learning book developed is arranged into 5 chapters with the objectives of each chapter as follows. Chapter I discusses biotechnology in the context of the 21st century, which includes (a) the definition of biotechnology, (b) conventional and modern biotechnology, (c) biotechnology as multidisciplinary knowledge, (d) genetic engineering, (e) the challenges of biotechnology in the 21st century, (f) biotechnology and the world of work, and (g) the strengthening of STEM. Chapter II discusses fermentation biotechnology, which includes (a) the definition of fermentation biotechnology, (b) fermentation processes, (c) microorganisms in fermentation biotechnology, (d) factors affecting fermentation, (e) the role of microorganisms in fermentation processes, (f) some practical applications of fermentation biotechnology in Indonesia, and (g) STEM strengthening. Chapter III discusses agricultural biotechnology, which includes (a) the definition of agricultural biotechnology, (b) the challenges and trends of agricultural biotechnology in Indonesia, (c) GMO methods in plants, (d) practical applications of agricultural biotechnology, and (e) STEM reinforcement. Chapter IV discusses livestock biotechnology, which includes (a) the definition of livestock biotechnology, (b) the challenges and trends of livestock biotechnology in Indonesia, (c) biotechnology methods in livestock, (d) practical applications of livestock biotechnology, (e) the benefits of livestock biotechnology, and (f) STEM strengthening. Chapter V discusses bioethics which includes (a) an

introduction to bioethics, (b) the definition of ethics and bioethics, (c) the principles of bioethics, (d) norms and ethics related to biotechnology, (e) the benefits of bioethics, (f) animals and research ethics, (g) STEM reinforcement. Chapter VI discusses biotechnology and its learning which includes (a) the urgency of biotechnology being taught in schools, (b) how to teach biotechnology at the junior high school level, (c) biotechnology learning through scientific research, (d) information technology as a learning resource for future generations (e) science communication as a demand, (f) biotechnology and character education, and (g) biotechnology and the cultivation of spiritual values.

3.2 Analysis of Textbook Validity Results

The validity data of the textbook is the result of an assessment by five experts or learning practitioners who teach on campus or work as lecturers with doctoral-level education backgrounds. The results of the analysis of the textbook's validity and reliability data are presented in Table 1.

Table 1. Results of Assessment of Validity of Learning Books

Assessment Aspects	Validity		Reliability	
	Average	Criterion	R	Criterion
Textbook design	3.50	Highly Valid	0.73	Tall
Textbook Format	3.57	Highly Valid	0.77	Tall
Textbook Materials	3.67	Highly Valid	0.77	Tall
Linguistics	3.72	Highly Valid	0.76	Tall
Book presentation	3.44	Highly Valid	0.64	Acceptable
Material support	3.50	Highly Valid	0.77	Tall
Average	3.57	Highly Valid	0.74	Tall

As illustrated in Table 1, the textbook exhibits an average validity score of 3.57, which is categorized as "very valid." The results of the analysis of the textbook data indicate that the textbook development process has met the criteria for assessment of design, format, material, language, presentation, and material support. Moreover, the results of the reliability coefficient analysis indicated an average score of 0.74, which falls within the high category. This can be interpreted as an assessment of the textbook's validity using the instrument for assessing the validity of textbooks in terms of valid and reliable criteria.

The data indicates that the analyzed learning books are of excellent quality in a variety of ways. All aspects assessed, including design, format, material, language, book presentation, and material support, were rated as "very valid" in terms of their alignment with established standards. This demonstrates that the textbook has been meticulously designed and developed, aligning with the rigorous standards for academic materials at the university level.

The textbook has been developed with great care and attention to detail, as indicated by the high validity ratings across all aspects. The linguistic aspect demonstrated the highest level of validity (3.72), followed by the material (3.67) and format (3.57). This

demonstrates that the textbook is notably proficient in the utilization of language, the presentation of material accurately and comprehensively, and the implementation of a well-structured format.

While all aspects were deemed to be highly valid, the presentation of the book was rated the lowest (3.44) in terms of validity. This may indicate areas that could be further improved in the future development of the textbook. Improvements in the presentation of the textbook, such as enhancements to its visual appeal or alterations to the sequence of material presentation, may enhance its overall effectiveness.

In terms of reliability, five of the six assessed aspects were classified as "High," with scores ranging from 0.73 to 0.77. This indicates that the majority of the textbook's components exhibit consistent reliability and are dependable. This high degree of reliability is crucial to guarantee that the textbook can consistently yield the desired outcomes when utilized as an educational resource.

However, it should be noted that the aspect of book presentation has a lower reliability (0.64) than other aspects, although it is still classified as "Acceptable". This may indicate greater variability in the presentation of the book, which could be a focus for future improvements. Increased consistency in book presentation can help improve the overall effectiveness of the textbook.

The material aspect of the teaching material is of great importance, and therefore the material must be of high validity and reliability. This is evidenced by the high scores of 3.67 and 0.77, which demonstrate the material's core value as a fundamental element of the teaching material. This indicates that the textbook has effectively conveyed accurate, comprehensive, and consistent content. It is of great consequence that students are furnished with accurate and dependable information throughout their educational journey.

The linguistic aspect that obtained the highest validity score (3.72) and high reliability (0.76) represents a significant strength of this textbook. The use of appropriate, clear, and consistent language is of great importance in facilitating students' comprehension of the material presented. The use of exemplary linguistic techniques can assist in the reduction of misconceptions and the enhancement of the learning process.

The design and format of the textbook that obtained high validity scores (3.5 and 3.57) and high reliability (0.73 and 0.77) indicate that this textbook is not only comprehensive in terms of content but also exhibits a clear visual presentation and structured organization. An effective design and format can enhance students' motivation to learn and facilitate their comprehension of the material. The proponents of the material, who also obtained high validity and reliability scores (3.5 and 0.77), demonstrated that this textbook not only focused on the presentation of the main material but also provided adequate support to facilitate student comprehension. Such material may include relevant illustrations, applicable examples, or exercises designed to reinforce comprehension. While the textbook is of high quality overall, there is still room for further improvement and development. There is room for improvement in the presentation of books that are of relatively lower value concerning validity and reliability compared to other aspects. Enhancements in this domain may entail a review of the presentation structure, an improvement in visual quality, or the incorporation of interactive elements to enhance student engagement.

Moreover, although all aspects have been rated as "very valid," there is still room for improvement, as the validity values have not yet reached the maximum number. Ongoing assessment and enhancement of the textbook based on user feedback (from students and instructors) can facilitate further improvements in its quality. In the context of developing teaching materials for higher education, particularly for intricate courses such as STEM-integrated biotechnology, the considerable validity and reliability of this textbook represents a noteworthy accomplishment. This demonstrates that the textbook has effectively integrated the multifaceted elements of biotechnology and STEM methodologies into a unified and dependable pedagogical resource.

The high validity and reliability also indicate that this textbook has good potential to support the development of research skills of prospective science teachers. Valid and reliable material can provide a solid foundation for students to understand key concepts in biotechnology and STEM, as well as develop the practical skills necessary for scientific research. It should be noted, however, that high validity and reliability do not necessarily ensure the efficacy of the textbook in enhancing students' comprehension and abilities. Further research may be required to assess the impact of this textbook on student learning outcomes, particularly regarding understanding biotechnology concepts, STEM integration capabilities, and research skills development.

Furthermore, as this textbook is designed for prospective science teacher students, it is essential to evaluate how it can equip them with the knowledge and skills necessary to not only comprehend the material but also to effectively disseminate it in their future teaching roles. It may be beneficial to further integrate aspects such as teaching strategies, classroom management, and material adaptation for different levels of student ability into the textbook.

3.3 Analysis of the Results of Suggestions Given by The Validators

The data set comprising suggestions, presented in the form of descriptions, was subjected to a semi-qualitative analysis with the aid of NVivo software. For the reader's convenience, the results of the matrix coding query, as proposed by the validator of the learning book, are presented in Table 2.

Table 2. Suggestions for Improving Textbook Validation and Efforts Made.

Suggestions for Improvement	Rf	Improvement Efforts Carried Out
Depth and Breadth of Material	7	Improvements were made related to graphics and content.
Cover Design	5	
STEM Integration	4	
Systematics of Writing	3	
Sentence Clarity	3	
Image Visualization	2	
Research Skills	2	
Writing Errors	2	
Writing Errors	2	

Information: Rf=References

Departing from Table 2, the follow-up carried out by improvements were made related to graphics and content. To facilitate comprehension, the visualization of the

results of the NVivo tree map comparison of the textbook validators is presented in Figure 1.

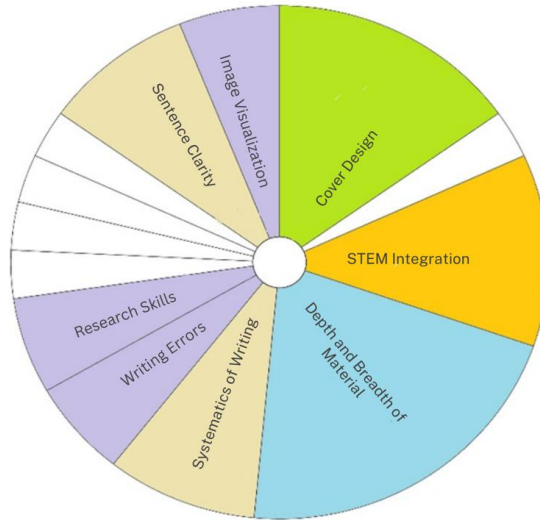


Fig. 1. Tree Map NVivo Text Comparison Suggestions Validator Textbook

In consideration of Figure 1, it is evident that several crucial elements warrant particular focus regarding the enhancement of instructional materials. The material is of considerable depth and breadth, with seven references, which serves to demonstrate the importance of presenting comprehensive and relevant content. This encompasses the selection of topics that are commensurate with the level of understanding of students, as well as the presentation of information that is sufficiently detailed to meet the learning objectives. Furthermore, the integration of STEM is a significant concern, as evidenced by four references. This underscores the necessity of integrating concepts across disciplines to provide students with a comprehensive and contextual understanding.

The systematic organization of writing and the clarity of sentences, each with three references, illustrate the significance of logical structure and the utilization of accessible language. It is essential that teaching materials be structured with a clear flow, and that the sentences used be concise, clear, and readily comprehensible to students. Additionally, consideration must be given to the aspects of image visualization and writing errors, each with two references. The incorporation of pertinent and compelling visuals, such as images, illustrations, or infographics, can facilitate the comprehension of complex concepts and foster greater student engagement in the learning process. Conversely, it is of paramount importance to minimize the incidence of writing errors to prevent confusion and maintain the credibility of the teaching materials.

It is anticipated that the teaching materials will be more effective in facilitating the learning process if these aspects are given due consideration. The incorporation of more

comprehensive and diverse content will guarantee that students are furnished with an adequate and suitable volume of information. Integration of the STEM disciplines will facilitate students' comprehension of the interconnections between scientific fields. An effective writing system, clear sentences, and coherent organization will facilitate comprehension of the material by students. The use of effective visualization techniques can facilitate comprehension of complex concepts, while the reduction of writing errors can enhance the quality and professionalism of written work.

3.4 Discussion

Textbooks play an important role in the improvement of education [27]. They provide specialized resources for educators and students [28]. Educators need evidence-based data to select, adapt, adopt, and use textbooks effectively. Textbooks define subjects to learners and help represent the subject of the school as learners experience it [28]. Textbooks can be seen as a curriculum that may be implemented because they take a curricular step towards implementation [29]. Textbooks serve as a conduit for the presentation of curriculum content and orientation, facilitating the dissemination of official standard translations and syllabi. [28]. The implication is that the learner's learning experience may be limited by their textbooks. The textbook's validity can be gauged by examining the comments and suggestions from expert reviews. These reviews assess the suitability of the reading texts and questions presented in the textbook in terms of content, construction, and language [30]. By the aforementioned references, the development of the textbook comprises, at a minimum, the following components: (1) Design, including cover, preface, table of contents, purpose of learning, order of subject matter content, image design, table placement, and coloring design, provision of sample questions, assessment, summary, and reference; (2) Format, including each part of the textbook can be clearly identified, activity materials in accordance with learning objectives, the numbering system is clear and attractive, text and illustrations of images are balanced, writing can be read clearly, and the appropriateness of physical size for students, as well as the level of visual attractiveness of the textbook. (3) Materials must include references that adhere to standard practices, accurate content (facts, principles, concepts, laws, theories, and scientific processes), up-to-date content, a clear relationship between the book's content and its implementation in education, and a systematic organization aligned with scientific structure. Additionally, the content must be relevant to the LPTK curriculum. (4) Language: The text should be written in a way that is accessible to students and lecturers at the appropriate level. It should be written in good and correct Indonesian, with terms used correctly and easily understood. The use of consistent terms is encouraged, as is the use of communicative and effective language. (5) Presentation: The text should be presented in a way that allows students and lecturers to develop process skills, scientific creativity, and responsibility in learning. This should be done according to the level of thinking and reading ability of students and lecturers. The text should also encourage active student involvement and be presented in an interesting and fun way. Furthermore, the sixth objective is to provide support for innovation and improvements in the quality of KBM. This entails the development of textbooks in accordance with the Education and Training Institution (LPTK) curriculum, with a particular emphasis on the integration of education within daily life. Additionally, it aims to facilitate a

student-centered learning process, encouraging active engagement in teaching and learning activities. In conclusion, the points serve to illustrate the necessity for a paradigm shift in the field of education, one that is centered upon the student and their individual needs, rather than upon the constraints of a traditional, teacher-centric model.

4 Conclusion

The results of the analysis demonstrate that the biotechnology learning books developed are of excellent quality in various aspects and can be classified as valid and reliable. All aspects evaluated, including design, format, material, language, book presentation, and material support, were classified as "very valid" in terms of their validity. This evidence demonstrates that the textbook has been meticulously designed and developed to align with the rigorous standards for instructional materials at the university level. This is based on the findings of the average validity score of the textbook, which was determined to be 3.57, a rating categorized as "very valid." The results of the analysis of the textbook data indicate that the textbook development process has met the criteria for assessment of design, format, material, language, presentation, and material support. Moreover, the results of the reliability coefficient analysis indicated an average score of 0.74, which falls within the high category. This indicates that the evaluation of the textbook's validity using the instrument is both valid and reliable.

Acknowledgments. The authors would like to express their gratitude to the leadership at the State University of Surabaya for their support. Furthermore, gratitude was extended to the leadership of the Faculty of Mathematics and Natural Sciences and the head of the Natural Sciences Education study program for their guidance, encouragement, and support in conducting the research.

Disclosure of Interests. The author asserts that no potential conflict of interest exists, and that the author team has no interests related to activities and publications associated with research activities.

References

1. Su, R., Wei, B.: Representation of the views of nature and human-nature relationships in chemistry textbooks: a comparative analysis. *International Journal of Science Education* **42**(9), 1-24 (2024)
2. Johnston, N., Ferguson, N.: University students' engagement with textbooks in print and E-book formats. *Technical Services Quarterly* **37**(1), 24-43 (2019)
3. Tarigan, JR., Fionasari, R., Kembaren, BP., Pambudi, N., Hartono, R.: Analysis of the effectiveness of e-books in increasing students' digital literacy. *Journal Emerging Technologies in Education* **2**(1), 36-48 (2024)
4. Siregar, BH., Kairuddin, K., Mansyur, A.: Developing interactive electronic book based on TPACK to increase creative thinking skill. *Al-Ishlah: Jurnal Pendidikan* **13**(3), 2831-2841 (2021)
5. Chen, TI., Chung, HC., Lin, SK.: The effect of applying language picture books in reciprocal teaching on students' language learning motivations. *SAGE Open* **13**(4), 1-10 (2023)

6. Hikmaturosyidah, N., Rachmadiarti, F.: Development of interactive e-book based on multiple intelligences ecosystem topic to train creative thinking skills. *Journal of Biology Education* **11**(1), 89-101 (2022)
7. You, J., Lee, H., Craig, C.J.: Remaking textbook policy: analysis of national curriculum alignment in Korean school textbooks. *Asia Pacific Journal of Education* **39**(1), 14-30 (2019)
8. Weninger, C.: Multimodality in critical language textbook analysis. *language, culture and curriculum* **34**(2), 133-146 (2020)
9. Richards, J.C., Pun, J.: A typology of english-medium instruction. *RELC Journal* **54**(1), 216-240 (2021)
10. Chi, S., Wang, Z., Qian, L.: Scientists in the textbook. *Science & Education* **33**(4), 937-962 (2023)
11. Presiden RI: Undang-Undang Republik Indonesia Nomor 12 Tahun 2012 Tentang Pendidikan Tinggi. Presiden Republik Indonesia; pp. 1-97. Jakarta (2012)
12. Wahono, B., Chang, C.Y., Khuyen, N.T.T.: Teaching socio-scientific issues through integrated STEM education: an effective practical averment from Indonesian science lessons. *International Journal of Science Education*. **43**(16), 2663-2683 (2021)
13. Han, J., Kelley, T.R.: STEM Integration through shared practices: examining secondary science and engineering technology students' concurrent think-aloud protocols. *Journal of Engineering Design* **33**(5), 343-365 (2022)
14. Wang, T., Ma, Y., Ling, Y., Wang, J.: Integrated STEM in high school science courses: an analysis of 23 science textbooks in China. *Research in Science & Technological Education* **41**(3), 1197-1214 (2021)
15. Dubek, M., DeLuca, C., Rickey, N.: Unlocking the potential of STEAM education: How exemplary teachers navigate assessment challenges. *The Journal of Educational Research* **114**(6), 513-525 (2021)
16. Suhirman, S., Prayogi, S.: Overcoming challenges in STEM Education: a literature review that leads to effective pedagogy in STEM learning. *Jurnal Penelitian Pendidikan IPA* **9**(8), 432-443 (2023)
17. Zhan, Z., Shen, W., Xu, Z., Niu, S., You G.: A bibliometric analysis of the global landscape on STEM education (2004-2021): towards global distribution, subject integration, and research trends. *Asia Pacific Journal of Innovation and Entrepreneurship* **16**(2), 171-203 (2022)
18. Muninggar, S., Sarwanto, S., Ramli, M.: The effectiveness of learning progression-based biotechnology STEM module to improve metacognitive skills. *Journal of Education Research and Evaluation* **7**(4), 684-691 (2023)
19. Siswati, B.H., Prihatin, J., Aloysius, D.C.: Effectiveness of e-module STEM biotechnology to empower metacognitive skills and science process skills of high school students with low academic ability in industrial agriculture areas. *Jurnal Penelitian Pendidikan IPA* **10**(1), 133-142 (2024)
20. Liang, Y., Kim, J., Kitheka, B.M.: Self-assessment of research skills among undergraduate students: a kinesiology field perspective. *International Journal of Kinesiology in Higher Education* **7**(3), 207-218 (2022)
21. Neni, N., Jujun, R., Sistiana, W.: Profile of research skills in the integrated guided inquiry model research skill development (RSD) framework. *Quagga: Jurnal Pendidikan dan Biologi* **16**(2), 102-107 (2024)
22. Schrum, K., Bogdewiecz, S.: Cultivating research skills through scholarly digital storytelling. *Higher Education Research & Development* **41**(7), 2382-2394 (2021)
23. Ünäl, Z.D., Çabuk, F.E.T., Erden F.T.: A learner-centered journey: pre-service early childhood teachers' learning through self-reflections and feedbacks with design-based curriculum course. *Journal of Early Childhood Teacher Education* **2**(5), 1-18 (2024)

24. Nur, M., Rahayu, YS., Wasis, W., Isnawati, I., Subekti, H.: Development of learning tools to make it easier for teaching teachers and students to learn science and thinking skills.; pp. 1-80. Universitas Negeri Surabaya: DRTPM (2010)
25. Supriana, E.: Appropriate media prototypes in inquiri-based learning to improve problem-solving skills and mastery of physics concepts in high school. Surabaya: Universitas Negeri Surabaya; (2016)
26. Suyidno, S.: Creative responsibility based learning (CRBL) model to improve students' science process skills, responsibility, and scientific creativity pp. 1–187. Universitas Negeri Surabaya, Surabaya (2017)
27. Shin, J., Lee, SJ.: The alignment of student fraction learning with textbooks in Korea and the United States. *The Journal of Mathematical Behavior* **51**(1), 129-49 (2018)
28. Chen, X., Goes, L., Treagust, D., Eilks, I.: An analysis of the visual representation of redox reactions in secondary chemistry textbooks from different chinese communities. *Education Sciences* **9**(42), 1-16 (2019)
29. Hadar LL., Ruby, TL.: Cognitive opportunities in textbooks: the cases of grade four and eight textbooks in Israel. *Mathematical Thinking and Learning* **21**(1), 54-77 (2019)
30. Effendi, KNS., Zulkardi, Z., Putri, RII., Yaniawati, P.: Developing mathematics worksheet using futsal context for school literacy movement. *Journal on Mathematics Education* **10**(2), 203-214 (2019)

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

