

Research Article

A biodiverse entrepreneurship-based textbook: A media of students' entrepreneurship enthusiasm development

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ABSTRACT

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In the natural science education study program of Universitas Hasyim Asy'ari Jombang UNHASY, textbooks based on biodiversity have never been developed and applied to biotechnology courses. This study aims to reveal the appropriateness of biodiverse entrepreneurship-based textbook based on validity and effectivity. This development model is ADDIE (Analysis, Design, Development, Implementation, and Evaluation). The study instruments include validation sheets, learning outcomes assessment sheets, and entrepreneurship enthusiasm questionnaire. The validity percentage average by the material experts is 77, 08% with valid criteria. The validity percentage average by the media experts is 73, 6% with valid criteria. The result of the validity test by user, showed the average is 83, 4% with valid criteria. Next, the effectivity test showed that the classical completeness score is 73, 7% with good criteria and the percentage average of the entrepreneurship enthusiasm is 83, 95% with high criteria. It is concluded that the biodiverse entrepreneurship-based textbook is effective for developing students' entrepreneurship enthusiasm.



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INTRODUCTION

Entrepreneurship is increasingly becoming an essential concern of the government is facing the challenges of globalization that is global economic competition in terms of creativity and innovation. The increasing number of entrepreneurs affected the growing number of national economic activities. However, the number of entrepreneurs in Indonesia is 400.000 people, or less than 1% Indonesian population, which is around 200.000.000 people (Aidha, 2016). The central bureau of statistics data showed that the low educated population dominated employment until February 2018, high school graduates or below, was 59, 80%. Meanwhile, the number of the high knowledgeable employee was only 11, 97%.

Based on those facts, it is indicated that Indonesian education has not been able to produce professional and skillful graduates yet. The other proof is that the number of unemployed is still high. The entrepreneurship ethic has not been fully embedded among students. The students tend to be reluctant to start a new business. Nonetheless, they hope to get a high-paying job after graduation (Zubaedi, 2015). Generally, most fresh graduates would look for jobs instead of creating job opportunities based on their field in college. Their attitudes would lead up to the increasing number of unemployment. The fresh graduates should have not only hard skills but also soft skills, including entrepreneurship (Afriadi & Yuni, 2018). They also should create job opportunities and not only look for a job (Salam, 2018).

The attempt to create fresh graduates who have entrepreneurship enthusiasm is not easy. Instilling the spirit of entrepreneurship can be done through learning (Isrososiawan, 2013; Okorie et al., 2014; Suyahman, 2017). The government has been continuously striving to increase the number of entrepreneurs in Indonesia by integrating entrepreneurship education into the curriculum. Higher education should equip their students with entrepreneurship education to create job opportunities (Budiati et al., 2012). Universities are responsible for preparing their graduates to choose entrepreneurship professionally (Okorie et al., 2014) and become young entrepreneurs (Budiati et al., 2012).

One of the innovations in learning to support entrepreneurship education is by developing a biodiverse entrepreneurship-based textbook. Biodiverse entrepreneurship stands for biotechnology, biodiversity, and entrepreneurship. The biodiverse entrepreneurship-based textbook is a book that contains Conventional Biotechnology topics by utilizing the potential of local biodiversity for entrepreneurship. The development of a textbook should consider three aspects, and they are (1) material aspect, (2) presentation aspect, and (3) linguistic aspect. In addition, the composition of a textbook also should consider the users' aspect (Prasetyo & Perwiraningtyas, 2017). Furthermore Abidin (2018) stated, a textbook that stated is developed should have relevance, consistency, and sufficiency principles. These aspects play an important role in achieving the learning objectives.

The development of the biodiverse entrepreneurship-based textbook aims to gain the students' knowledge and skills to produce biotechnology products. It is also intended that the students would recognize the local potency of an area. Several kinds of conventional biotechnology practicums can be introduced to the students. They are tempe makings, tape (fermented glutinous rice or cassava) making, yogurt, and making from local fruits. The result of the practicums can be processed again into commercial products.

Jombang is an area that has a rich biodiversity. According to the ministry of environment and forestry, it has biodiversity conservation in sumber rejo village, wonosalam district, jombang, Indonesia. Besides, wonosalam district also produces fresh milk, which yogurt. Other districts like megaluh and tembelang grow watermelons and cantaloupes, which can be processed into jelly.

Several studies related to the integration of entrepreneurship education into the curriculum have been conducted. According to Hayati & Fitriyah (2021), biotechnopreneurship-based learning can encourage students' entrepreneurship enthusiasm. In addition, based on the study conducted by Anwar et al. (2012), there was the progress of the students' entrepreneurship enthusiasm through the advancement of biology learning devices with a bio entrepreneurship approach. Furthermore, Fitri et al. (2014) proved that bio entrepreneurship worksheets could cultivate students' creativity in entrepreneurship. Then the result of the study by Fitriah (2013) showed an improvement of the students' life skills and entrepreneurship enthusiasm through bio entrepreneurship learning devices. Furthermore, the biotechnology learning resource can attract senior high school students' entrepreneurship enthusiasm through tempeh-making practicum. The last is Subekti & Hidayati (2013) research that describes the biotechnopreneurship learning prototype that can support science students' competency and the entrepreneurship mindset.

The novelty of this study compared to previous research one since this study contains the development of a biodiverse entrepreneurship-based textbook that will be used on campus in the area of Islamic boarding schools. The result of this biodiverse entrepreneurship-based textbook is undoubtedly necessary to support Universitas Hasyim Asy'ari Jombang (UNHASY) as an Islamic boarding school and entrepreneurship-based campus. Moreover, the Natural Science Education Study Program of UNHASY still does not have specific reference books for biotechnology practicums. Finally, this biodiverse entrepreneurship-based textbook is expected to be used as a teaching textbook during conventional biotechnology practicums.

METHOD

This study is a developmental study. It aims to explain the process of the development of biodiverpreneurship-based textbook and to recognize its appropriateness based on validity and effectivity. The developmental model employed is based on ADDIE which stands for Analysis, Design, Development, Implementation and Evaluation

(Molenda, 2015). The reason for choosing the ADDIE model because it is a simple and easy-to-learn, with five easy steps to understand. The stages of ADDIE development model is summarized in Figure 1.

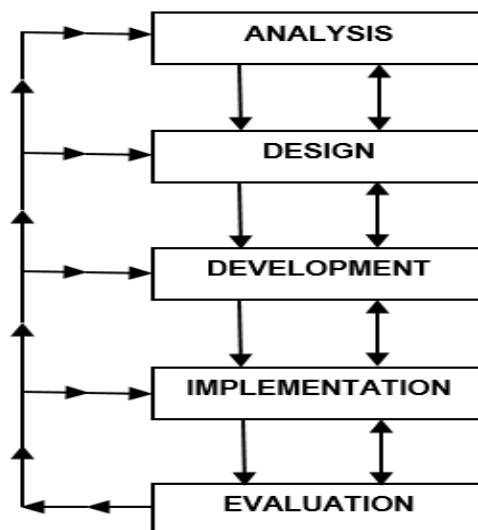


Figure 1. The ADDIE model development stages

The analysis stage in this research includes identifying the level of students' needs to the related course textbook. It is expected that the teaching textbook can cover core competence, basic competence and the indicator which is intended to be achieved in the learning process. In this phase, there are several steps. They are curriculum analysis, learning source analysis, and students' analysis. The curriculum analysis aims to analyze the biotechnology syllabus so that it can be used as one of references in biotechnology learning in Natural Science Education Program Study of UNHAS Y Jombang. Then, the learning source analysis aims to determine the need of learning source which is used in biotechnology course and the deficiencies in the teaching materials which have been used. Students' analysis is employed to figure out the students' problems in understanding the concepts and practicum of biotechnology course. From the curriculum analysis, learning source analysis, and the students' analysis, it is expected that a teaching textbook which covers previous analyzed aspects can be produced.

The design stage includes planning and designing the biodiverse entrepreneurship-based textbook. This design consists of learning objectives plan and learning materials plan. The learning objectives plan aims to cover all of the students' competencies who take biotechnology course. Then, the material plan consists of the plan of learning materials scope. The textbook design consists of: 1) cover, 2) foreword, 3) table of contents, table lists, list of pictures, 4) chapter 1. entrepreneurship education, 5) chapter 2. biotechnology basic concepts, 6) chapter 3. biodiversity, 7) chapter 4. biodiverse entrepreneurship learning methods, 8) chapter 5. biodiverse entrepreneurship tempe making, 9) chapter 6. biodiverse entrepreneurship tape making, 10) chapter 7. biodiverse entrepreneurship nata making, 11) chapter 8. biodiverse entrepreneurship yogurt making, 12) chapter 9. entrepreneurship enthusiasm, 13) bibliography, 14) glossary, 15) index. The design of this textbook follows the guidelines for proposing an incentive program for writing university textbooks by Ministry of Research, Technology and Higher Education that the components of the textbook consist of, (1) foreword, (2) table of contents, (3) body containing chapters, (4) bibliography, (5) glossary, and (6) index. The textbook physical sizes are commonly A4 (210 x 297 mm), A5 (148 x 210 mm), and B5 (176 x 250 mm). The size of this developmental textbook is B5 (15,5 x 23,5 cm) in order to adjust to the book template.

The development stage is the description of the design stage. This stage involves the activity of making, developing, modifying, and validating the textbook. The textbook validation was conducted by the material experts, the media experts, and the students who had taken biotechnology course. Then, the revision is done according to the result of the validation to improve the textbook from various aspects.

The implementation stage is the textbook implementation during learning process. The result of the textbook development was implemented in biotechnology course. In order to meet the learning objectives, this textbook should be well implemented by using the proper model during learning process.

During evaluation stage, there would be continuous revisions in every stage of textbook development aimed to improve the previous stage. The evaluation in every cycle was formative evaluation which aimed to revise, so that this evaluation process makes it easier to improve each stage that is passed.

The samples of this developmental study are 15 science students of Natural Science Study Program of UNHAS, class of 2018. The product qualification, that is the biodiverse entrepreneurship-based textbook, was measured by validity and effectivity. The validation data was measured by material expert, media experts, and 10 science students of UNHAS who had taken biotechnology course. According to Kohar et al. (2017) the validity which is measured by the expert lecturers includes several aspects. They are the content, literacy, and the presentation that refer to the modified validation sheets. The validation test by the students employed modified validation instrument from Habibi et al. (2016), it includes 11 aspects. Furthermore, the criteria for determining the validation aspect scores refer to Table 1.

Table 1. The criteria of validation aspect scores

Score	Criteria
1	Not good/clear/interesting/decent/easy/appropriate/precise
2	Good enough/clear/interesting/decent/easy/appropriate/precise
3	Good/clear/interesting/decent/easy/appropriate/precise
4	Very good/clear/interesting/decent/easy/appropriate/precise

(Source: Modified from Habibi et al., 2016)

The data which was compiled in the validation sheets and questionnaire is basically qualitative data since every statement point is divided into several categories. They are not good, good enough, good, and very good. At first, the data is converted into quantitative data according to the scores. The conversion was done by using the Formula 1, P is percentage assessment and n is the total of all statements.

$$P = \frac{\sum \text{total score of the questionnaire answers}}{n \times \text{the highest score} \times \text{respondents number}} \times 100\% \quad (1)$$

The validity was analyzed by calculating the score of the validity result by the validators. Then, it was converted into percentage according to likert scale (Riduwan, 2018). The criteria of the validators' response percentage refer to Table 2.

Table 2. Percentage criteria of validator response

Scores	Criteria	Test Result
0%-20%	Very invalid	Inappropriate and needs major revisions
21%-40%	Invalid	Less appropriate and needs major revisions
41%-60%	Valid enough	Appropriate enough and needs major revisions
61%-80%	Valid	Appropriate but needs minor revisions
81%-100%	Highly valid	Completely appropriate and doesn't need revisions if it reaches 100%

(Source: Modified from Riduwan, 2018)

The textbook effectivity data is measured by: 1) the completeness scores of the students' learning result in biotechnology course especially conventional biotechnology topic and 2) the students' entrepreneurship enthusiasm after the implementation of biodiverse entrepreneurship-based textbook in learning process. The completeness of the learning result is measured by using assessment result instrument which consists of 20 multiple choices and 5 descriptive questions. The assessment sheets instrument has been reviewed by the biology lecturer of Natural Science Education Study Program of UNHAS. The data of the learning result is analyzed descriptively by calculating the scores average of learning result scores and the comprehension percentage of the learning result. The result of the study belongs to complete criteria if the score is ≥ 75 . The criteria of the completeness of the learning result are shown in Table 3.

Table 3. Comprehension scores criteria

Comprehension Scores (%)	Criteria
$0 < NK \leq 20$	Not good
$20 < NK \leq 40$	Rather good
$40 < NK \leq 60$	Good enough
$60 < NK \leq 80$	Good
$80 < NK \leq 100$	Very good

(Source: Ja'far et al., 2014)

The effectivity based on the entrepreneurship enthusiasm questionnaire aims to recognize the students' enthusiasm. The students' questionnaire consists of 16 statements. The entrepreneurship enthusiasm indicator refers to Kusumajanto (2015) which contains: 1) entrepreneurship willingness, 2) the interest of starting a

business, 3) enjoying entrepreneurship activities, 4) paying attention to entrepreneurship activities, 5) willingness to work hard 6) the willingness to develop the business 7) willingness to take entrepreneurship risk. The questionnaire has been reviewed by the entrepreneurship lecturers of UNHASY. The calculation of entrepreneurship enthusiasm questionnaire according to Likert's scale (Riduwan, 2018) is based on the answers choices: completely agree = score 4, agree = score 3, rather disagree = 2, and disagree = score 1. The percentage criteria of entrepreneurship enthusiasm are determined based on Table 4.

Table 4. The percentage criteria of entrepreneurship enthusiasm

Interval (%)	Criteria
20-36	Very low
37-53	Low
54-70	Neutral
71-87	High
88-100	Very high

(Source: Riduwan, 2018)

RESULTS AND DISCUSSION

This developmental study with the developmental model ADDIE generated a biodiversepreneurship-based textbook. This textbook is written based on the stages of textbook writing, they are: (1) curriculum analysis, (2) determining the title of the book based on competency standard, (3) inventing a textbook which is complete and cover all of the aspects which is suitable to the competence, (4) compiling references as writing materials, (5) writing a book which the presentation is suitable to the age and readers' experience, (6) editing the writing result by rereading, (7) inserting proportional illustrations, tables and diagrams.

The development of this textbook was based on the previous study in 2018 about the implementation of biotechnopreneurship in biotechnology course. It is expected that this textbook will be able to give new knowledge for the students, especially the innovation of the production of conventional biotechnology products. The products utilize the local materials from the agricultural and livestock products. According to Habibi et al. (2016) stated that the development of the textbook based on the latest study can support the learning process and students' references. The materials from the local biodiversity of Jombang's agricultural and livestock products which were employed in the study consists of: 1) mung beans, peanuts, red beans (Gudo District) for tempe making, 2) cassava (Diwek District) and glutinous rice (Kabuh District) for *tape* making, 3) tomatoes (Kabuh District), watermelons and cantaloupes (Tembelang District) for nata making, 4) soymilk (Diwek District) and cows' raw milk (Wonosalam District) for yogurt making. The biodiverse entrepreneurship-based textbook which was developed had been tested based on validity and effectivity. The data of the appropriateness tests is as follows.

The validation is conducted by the material experts, the media experts, and the students who had taken Biotechnology course. The validation and test aim to control the content of teaching materials so that they can meet the students' needs and characteristics (Prasetyo & Perwiraningtyas, 2017). The summary of the validation result data by the material experts is described in Table 5.

Table 5. The result of data validation by the material experts

No.	Validation Aspects	Indicator	Validation Scores	Maximal Scores	Validation %	Criteria
1	The conformity between material description and Basic Competence	The completeness of the materials	3	4	75	Valid
		The breadth of the materials	3	4	75	Valid
		The depth of the materials	3	4	75	Valid
2	The accuracy and the integrity of the materials	Facts accuracy	3	4	75	Valid
		Concept accuracy	3	4	75	Valid
		Procedure accuracy	4	4	100	Highly valid
3	Modernity	The conformity of the science and technology development	3	4	75	Valid
		Modernity, feature, example, and reference	3	4	75	Valid
		Relationship between concepts	3	4	75	Valid
4	Containing productivity insights	Growing entrepreneurship spirit	3	4	75	Valid
		Generating new idea/innovation in entrepreneurship	3	4	75	Valid
		Stimulating creativity and independence	3	4	75	Valid
Average % validation scores					77.08	Valid

Based on Table 5, it can be concluded that the validation result by material experts showed the average 77.08% which belongs to “valid” criteria. It means that the developed textbook is appropriate to be learning materials although it needs minor revisions. Then, the validation result will be employed as the reference in writing the teaching textbook. The revisions were based on the suggestions and inputs from the material experts and the media experts, which are mentioned in the data presentation, and also oral discussion. The revisions suggested by the material experts were mainly related to employing more up-to-date references. Therefore, the revisions were made by adding the up-to-date references related to the conventional biotechnology topic.

Next, the summary of validation data result by the media experts is described in Table 6. Based on Table 6, it can be concluded that the validation result by the media experts showed the average 73.6% which belongs to valid criteria. It means that the developed textbook is appropriate to be learning materials although it needs minor revisions. The revisions that needed to be made especially in composition, size, and conformity aspects of the cover layout and the book content. Other revisions also should be made in the coherence between chapters which belongs to valid enough criteria. This means that the textbook is appropriate enough and needs major revisions.

The revisions suggested by the media experts were: 1) the cover design should be more interesting and suitable to the materials and 2) the incoherence of the sentences between paragraphs. Thus, the aspects that should be revised are cover design, cover layout, and the book content. Moreover, the incoherence sentences also should be revised.

Table 6. The result of data validation by the media experts

No.	Validation Aspects	Indicator	Validation Scores	Maximal Scores	% Validation	Criteria
1	Presentation	Presentation System	3	4	75	Valid
		Presentation coherence	3	4	75	Valid
		The relevance between picture/table illustration and the materials	4	4	100	Highly valid
2	Graphic suitability	Book size standard	3	4	75	Valid
		Cover design				
		a. Layout	3	4	75	Valid
		b. The composition and the size of layout elements	2	4	50	Valid enough
		c. Letters	3	4	75	Valid
		Book content design				
		a. Book content representation	3	4	75	Valid
		b. Layout conformity	2	4	50	Valid enough
		c. Layout completeness	3	4	75	Valid
		d. Content typography	3	4	75	Valid
3	The conformity to the developmental level of the students	a. The conformity to the level of intellectual development	3	4	75	Valid
		b. The conformity to the level of emotional social development	3	4	75	Valid
4	Communicative	a. The accuracy of the grammar and spellings	4	4	100	Highly valid
		b. Message legibility	3	4	75	Valid
5	Perspective coherence	a. The coherence between sentences in one paragraph	3	4	75	Valid
		b. The coherence between paragraphs	3	4	75	Valid
		c. The coherence between chapters	2	4	50	Valid enough
Average % validation scores					73.6	Valid

Then, the result of the textbook validation by the students is described in Table 7. Based on Table 7, it is concluded that the aspects number 2, 4, 6, and 7 show the validity percentage which belongs to valid criteria. It means that the textbook is appropriate to be used as reference although needs minor revisions. The aspects 1, 3, 5, 8, 9, 10, 11 show the validity percentage which belongs to highly valid criteria. The Table 7 also shows that the validity percentage by students' validation is 83.4% which belongs to highly valid criteria. It means that the textbook is totally appropriate to be the reference of learning process. The validators' revisions include: 1) The textbook needs more illustrations and 2) There are several typos.

Writing a textbook should meet several assessment standards. They are materials, presentation, and diction. The standard of the textbook materials includes materials completeness, materials accuracy, and the activity supporting materials, materials update, and the effort to improve the students' competence. The presentation standard includes the general presentation and every chapter organization. It also should consider the meaning and the advantage of the textbook (Habibi et al., 2016; Permana et al., 2021). The language standard includes the employment of good and correct Indonesian in accordance with EYD (Improved Spelling) or enhanced spelling, the language clarity, language appropriateness, and legibility. Therefore, to meet the standard, the textbook needs revisions.

Table 7. The result of the textbook validation by the students

No.	Validation Aspects	Validity Percentage (%)	Criteria
1.	Textbook identity clarity	82.5	Highly valid
2.	Attractive illustration cover and its suitability to the theme.	77.5	Valid
3.	Clear and understandable textbook diction	85	Highly valid
4.	Coherent textbook presentation and comprehensible materials	80	Valid
5.	The relevance between the textbook materials and learning topic.	87.5	Highly valid
6.	Comprehensible and complete textbook materials	77.5	Valid
7.	The illustrations help the student to understand the materials concept.	80	Valid
8.	The textbook helps the students to understand the conventional biotechnology concept.	90	Highly valid
9.	The textbook proposes new ideas for creating commercial products.	87.5	Highly valid
10.	The textbook encourages the students to start business.	85	Highly valid
11.	The practicum activities in the textbook encourages the students to be independent in learning.	85	Highly valid
Average		83.4	Highly valid

According to the users' validation, the textbook should be revised by correcting the typos and the spellings. In addition, the writer should add more illustrations of the examples of the processed products from the conventional biotechnology practicums which can be developed as commercial products (Isrososiawan, 2013; Permana & Setyawan, 2020). The use of illustrations in textbook are essential to deliver the information or learning materials and to describe the information chronologically. The result of the revised textbook based on the validators comments and suggestions aims to improve it so that the use of the textbook can be efficient, effective, and communicative and also achieved the objectives of the textbook writing (Baumgartner & Zabin, 2008; Fidiastuti & Rozhana, 2016; Pirard, 2012; Wallington et al., 2005).

The data of the effectivity test was obtained from the completeness scores of the students learning result in Biotechnology course, especially Conventional Biotechnology topic, and from the result of entrepreneurship enthusiasm questionnaire. The data is described in Table 8.

Table 8. The completeness data of the students learning result

No.	Students' Code	Scores	Description
1.	ASA	69	Incomplete
2.	SL	73	Incomplete
3.	AF	74	Incomplete
4.	DSH	73	Incomplete
5.	ENI	81	Complete
6.	DA	85	Complete
7.	IFM	76	Complete
8.	SU	78	Complete
9.	SA	75	Complete
10.	SZ	78	Complete
11.	RN	83	Complete
12.	QU	75	Complete
13.	QA	78	Complete
14.	MNF	87	Complete
15.	SAN	79	Complete
Average		77.6	
% Completeness		73.3	
Completeness Category		Good	

Description: The Criteria of Minimum Completeness = ≥ 75

Based on Table 8, it can be concluded that the average of the learning result is 77.6 and the completeness score is 73.3%, which 11 out of the students achieved the completeness. According to Table 3, the classical completeness scores belong to good criteria. It means that the textbook is effective to be used in learning process.

Next, the data of effectivity based on the percentage of the students' entrepreneurship enthusiasm is described in Table 9.

Table 9. The percentage of the students' entrepreneurship enthusiasm

No.	Students' code	Entrepreneurship enthusiasm (%)	Criteria
1	ASA	86	High
2	SL	89	Very High
3	AF	84	High
4	DSH	80	High
5	ENI	80	High
6	DA	84	High
7	IFM	94	Very high
8	SU	81	High
9	SA	88	Very high
10	SZ	78	High
11	RN	83	High
12	QU	86	High
13	QA	75	High
14	MNF	89	Very high
15	SAN	83	High
Average		83.95	High

Based on Table 9, it can be inferred that the percentage average of the students' entrepreneurship enthusiasm after the implementation of biodiverse entrepreneurship-based textbook is 83.95%. Based on Table 4, the students' entrepreneurship enthusiasm belongs to high criteria. Therefore, the biodiverse entrepreneurship-based textbook is effective for teaching and encouraging the students' entrepreneurship enthusiasm (Kusumajanto, 2015; Permana & Setyawan, 2019). This biodiverse entrepreneurship-based textbook facilitates the students to start business since it contains the directions of conventional biotechnology practicums. This textbook also contains the examples of the innovation of the commercial products developed from the practicums.

CONCLUSION

The development process of this biodiverse entrepreneurship-based textbook employed the developmental model ADDIE which stands for Analysis, Design, Development, Implementation, and Evaluation. The appropriateness of the textbook is observed from the validity and effectivity appropriateness test. The result of the textbook validity by the material experts reached the percentage average 77.08% which belongs to valid criteria. Then, the result of the validity test by the media experts showed the average percentage 73.6% which belongs to valid criteria. Next, the result of the validity test by the users showed the average percentage 83.4% which belongs to highly valid criteria. Furthermore, the effectivity test result showed that the classical completeness score is 73.3% which belongs to good criteria. Lastly, the percentage average of the students' entrepreneurship enthusiasm is 83.95% which belongs to high criteria. In conclusion, this biodiverse entrepreneurship-based textbook is appropriate and effective to be used as the media of developing students' entrepreneurship enthusiasm.

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