



# Development of e-Book Based on Self Regulated Learning Enhancing Self Efficacy

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**Abstract.** Currently, there is no self-regulated learning-based e-Book focusing on the biology course materials in the College of Al-Qur'an and Science. This study aims to 1) formulate learning material on prokaryotic cells and eukaryotic cell topics based on self-learning, 2) develop an e-book based on self-learning using the Canva platform, and 3) evaluate the developed e-book based on self-learning. This study used the research and development method using Sukmadinata's research steps covering three stages, namely 1) the preliminary stage consisting of field studies, literature studies, and preparation of product drafts; 2) the development stage consisting of the validation process, limited trials, and extensive trials; 3) development stage subsisting of the validation process, limited trial and broad trial; and 3) testing includes a pretest, product use, and posttest. The data was collected using tests and non-tests, while the obtained data were analyzed using qualitative methods. The results showed that self-learning-based e-books increase self-efficacy by 76.94%. This development research is essential in the identification of SRL-based e-books effectiveness in increasing self-efficacy.

**Keywords:** E-Book · Self Regulated Learning · Self Efficacy

## 1 Introduction

Technology is an integral part of the advancement of the education system. Recently, technology has been used in the learning process, facilitating learning outside the classroom. Technology is very influential in learning activities. Students' personalities are shaped by the ease of access to information provided by technology, which allows them to learn at their own pace, prefer novel experiences, feel at ease using the internet, like visual content, use social media, and engage in media-related activities [1].

However, many educational institutions currently have not adopted technology in their learning process. The results of observations conducted in the study program of Al-Qur'an and Tafsir Sciences at the College of Al-Qur'an and Science found no technology-based teaching materials that could be used outside the classroom. This is because the lecturers have minimum skills in developing the learning media, along with the absence of competent human resources. The observation results also identified students' problems related to low self-confidence in achieving the learning objectives.

Bandura defined self-efficacy as people's belief in their personal ability to regulate and carry out behavior in achieving goals [2]. According to social cognitive theory, self-efficacy beliefs are formed from the interpretation of previous experiences, encouragement from others, observations of other people's abilities, and feelings of being involved in activities [3]. Self-efficacy affects student motivation and increases critical thinking. It also affects their environment, facilitating an increase in academic achievement. Thus, high self-efficacy enhances academic achievement [4].

In the information and communication technology (ICT) era, reading literacy also includes electronic or online text [5]. E-books are books with digital publishing consisting of text and images that can be viewed on a computer. E-books [6] have responsive and interactive features, helping readers to understand the text. Its interactive features include guidance and feedback features that allow students to get information by focusing on the text and finding the causal effects to answer the evaluative questions accurately. The advantages offered by e-books include great flexibility, easily accessible [7], portability, and being environmentally friendly [8]. Besides, by using e-books, readers can improve their vocabulary and phonological awareness [9]. E-books provide the opportunity to foster literacy, reading engagement, and the ability to persist [10]. E-book users increase following the increase of smartphone, computer and tablet users [9].

Previous research related to the use of e-books [1] explores the benefits of using e-books, which subsists of following the development of industry 4.0, interactive presentation using several media, materials presented according to students' cognitive development, interesting, effective, efficient, and flexible.

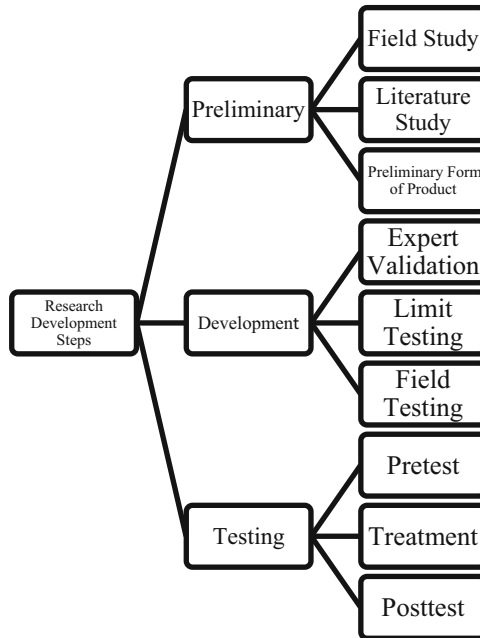
Self-regulated learning is the process of students planning, observing, and reflecting on their cognition, behavior, motivation, and emotions to achieve learning success [11]. The learning process of self-regulated learning depends on the direction or self-regulation of each individual [12]. Self-regulation is a process of changing mental competence into academic competence [13].

This study aims to improve teaching materials that support technology adoption in the learning process. This study aims to 1) formulate material on prokaryotic cells and eukaryotic cells in self-regulated e-books, 2) develop self-regulated learning e-books using the Canva platform, and 3) evaluate self-regulated e-books.

## 2 Method

This research was an R&D (Research and Development) research used to produce products and test the effectiveness of the products [14]. Development research is a systematic method used to design and develop learning programs and products following a set of internal criteria [15]. Sukmadinata describes three stages of research and development study, consisting of 1) the preliminary stage consisting of field studies, literature studies, and product draft preparation 2) the development stage includes the validation process, limited trials, and extensive trials, and 3) the testing stage includes a pretest, product use and posttest [16], as presented in Fig. 1.

In the preliminary stage, the data were collected using interviews and document analysis. Product development started with determining the material and core competencies, followed by constructing the product prototypes. Then, we prepared material using the



**Fig. 1.** Research Development Steps

**Table 1.** Category of E-book's Effectiveness by Melzer

N-Gain Value	Category
$g \geq 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g \geq 0.3$	Low

Canva platform. The development stage subsisted of the validation process involving the material and media experts, product limited trials, and product-wide trials. Product quality testing focused on aspects of content, presentation, contextual, linguistic, presentation, media effects on learning strategies, and overall appearance. The revised product was tested to 2 students in the seventh semester. Further, the limited and broad tried out involved student interest in the product and conclusions from the product.

The testing was carried out using Normalized Gain (N-Gain) to determine the e-book's effectiveness in increasing students' self-efficacy.

Table 1 shows the effectiveness categories according to Melzer. The e-book's effectiveness level was determined using the Richard R. Hake category presented in Table 2 with four categories of effective, moderately effective, less effective, and ineffective [17].

**Table 2.** Category of E-book's Effectiveness by Richard R. Hake

N-Gain Value	Category
<40	Ineffective
40–55	Less Effective
56–75	Quite Effective
>76	Effective

**Table 3.** Core Competencies of the Material

Core Competencies	Indicator
Explain material related to prokaryotic cells and eukaryotic cells.	Understand the material related to prokaryotic cells.
	Describe the material associated with eukaryotic cells.
	Analyze the difference between prokaryotic cells and eukaryotic cells.
	Describes components related to the plasma membrane, nucleus, and cytoplasm.
Explain material related to human and animal cell organelles.	Identify the organelles of human and animal cells.
	Describe the organelles of human and animal cells.

### 3 Results and Discussion

#### 3.1 Formulation of Prokaryotic Cells and Eukaryotic Cells Material in Self-regulated E-Books

The preparation of the e-book combines the activities for developing materials and media. The material's design was constructed by learning media experts in collaboration with lecturers of the life sciences course. The material development was started by determining Core Competencies (KI) and indicators. The material in this e-book was adapted from a Biology book by Campbell. Core Competencies (KI) and indicators in the Life Sciences course semester 2 are listed in Table 3.

The developed e-book subsists of a cover page, concept map, competency achievement, user manual, and presentation of materials and markers. The e-book based on self-regulated learning is entitled "Eukaryotic and Prokaryotic Cells in Life Science Courses." The e-book's concept map presents the relationship between the concepts of cell development theories, cell organization in living creatures, and cell organelles. Each of that concepts contains sub-materials in each concept. This competency achievement



Fig. 2. E-book Display

sheet describes the basic competencies and indicators that must be mastered by students. The basic competencies and indicators in this module were formulated based on the semester learning plan (RPS) developed by a lecturer in Life Sciences at the Al-Qur'an and Tafsir Study Program at the College of Al-Qur'an and Science. The material is presented in a dense and concise descriptive form equipped with object visualization, allowing students to access the materials from outside the classroom online. A previous study has reported that distance learning using e-books impacts students' self-efficacy during online learning [17]. The e-book display is illustrated in Fig. 2.

### 3.2 Self-regulated Learning-Based e-Book Development with Canva Platform

#### 3.2.1 Expert Validation

This study aims to develop an e-book based on self-regulated learning. This study is prompted by previous study results that demand the solvency of situational problems and constraints [9].

Nunuk described that learning media is a platform for teachers to communicate knowledge that cannot be immediately communicated to pupils using their five senses but can be directly communicated via media [18]. This statement implies the importance of learning media for teachers as it facilitates the transfer of knowledge to students. So, the right procedures for developing learning media should be carried out to ensure the media's feasibility.

The results of material expert validation on the content aspect show that the developed e-books can help increase self-efficacy through the accuracy of concepts, definitions, pictures, illustrations, and science-related terms. The material's suitability, breadth, and depth are also considered good. Additionally, self-regulated learning-based e-books also encourage student curiosity. The presentation aspect, which includes presentation techniques, presentation support, learning presentation, and coherence in the flow of thinking, is also classified as sufficient.

The results of media expert validation showed that the developed e-book has good linguistic aspects. In detail, the book presents great clarity of instructions, suitability of language with students' thinking level, suitability of language with students' social-emotional development level, ability to encourage students' curiosity, politeness of language use, and accuracy of text with the. Meanwhile, its presentation also attains excellent categorization. This presentation aspect subsists of the continuity of material presentation, the means of the media presentation to encourage student involvement in learning, and the presentation of cell images. Additionally, the aspect of media effects, including ease of use and media support for independent learning, is also good. Besides, the e-book also possesses the great ability to increase students' motivation and expand their knowledge. In the aspect of feasibility, the e-book has great initial appearance attractiveness, audio suitability with the material, selection of colors, and image suitability and material. Meanwhile, in the regularity of media design, the book also has good letter type and size, ease of reading, and operations.

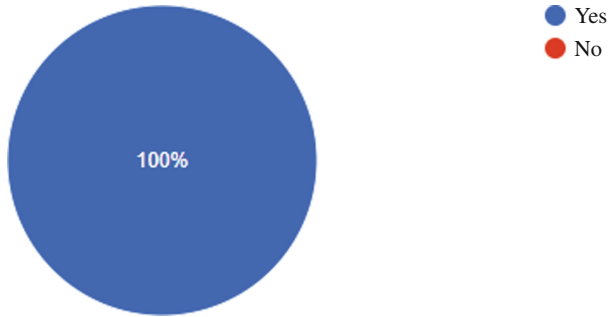
### 3.2.2 Limited Trial

Figure 3 shows that 100% of students expressed their interest in self-regulated learning-based e-books. The suggestions and inputs from students at the limited trial stage were related to improvement in image quality and uniformity of writing fonts because the writing was less clear and blurry. Besides, they also suggested adjusting the cell material explanations to help them understand the material easily.

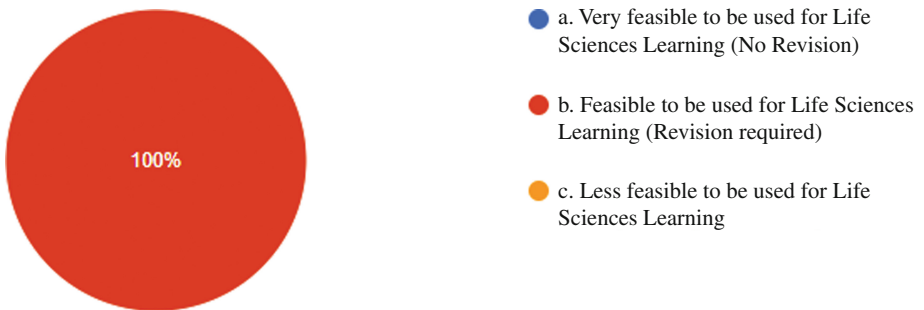
In general, students agreed that the developed e-books could be used in life science learning, but they stated that the book still needs some improvements, as shown in Fig. 4.

### 3.2.3 Extensive Trial

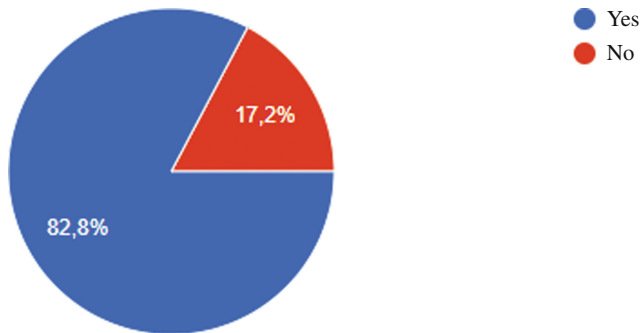
As illustrated in Figure 5, 82.8% of student demonstrates their interest in using the e-book, while the remaining 17.2% (4 students) of them are not interested. In general, the majority of students (86.2%), while 13.8% of the students, agreed that the e-book could be used with no revision, as presented in Figure 6. Most of them argued that every figure in the e-book should be provided in high quality, along with a proper caption in English.



**Fig. 3.** Student Interest in E-Books



**Fig. 4.** Students' Opinion on the E-book



**Fig. 5.** Student Interest in E-Books

### 3.3 Effectiveness of Self-regulated Based e-Book to Improve Self Efficacy

The e-book effectiveness test was estimated using N Gain through Microsoft Excel. N Gain is used to identifying the effectiveness of self-regulated-based e-books thoroughly. Malzer categorizes effectiveness into high, medium, and low categories. The obtained media effectiveness scores were interpreted using the Richard R Hake category. The results of the N-Gain test can be seen in Table 4.

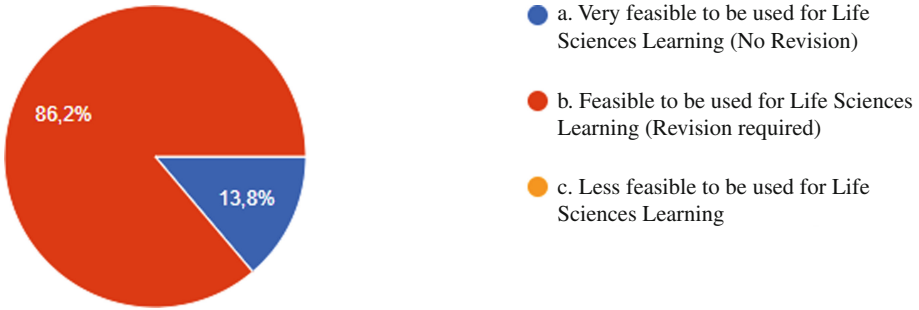


Fig. 6. Students' Opinions on the E-book

Table 4. The Obtained N Gain Representing the Effectiveness of Self-Regulated Based E-book

No.	Pretest	Posttest	N Gain	Effective	N Gain %	Effective %
1.	27	90	0.863	86.3	High	Effective
2.	13	93	0.92	92	High	Effective
3.	40	93	0.8833	88.33	High	Effective
4.	47	87	0.7547	75.47	High	Quite Effective
5.	40	80	0.6667	66.67	High	Quite Effective
6.	17	93	0.9157	91.57	High	Effective
7.	60	93	0.825	82.5	High	Effective
8.	30	93	0.9	90	High	Effective
9.	34	87	0.803	80.3	High	Effective
10.	50	74	0.48	48	Medium	Less Effective
11.	53	96	0.915	91.5	High	Effective
12.	57	93	0.8372	83.72	High	Effective
13.	53	80	0.5745	57.45	Medium	Quite Effective
14.	57	87	0.6977	69.77	Medium	Effective
15.	60	80	0.5	50	Medium	Less Effective
16.	30	87	0.8143	81.43	High	Effective
17.	50	80	0.6	60	Medium	Quite Effective
18.	43	87	0.7719	77.19	High	Effective
19.	63	90	0.7297	72.97	High	Quite Effective
20.	14	90	0.8837	88.37	High	Effective
21.	27	87	0.8219	82.19	High	Effective
<b>Mean</b>	<b>41.2</b>	<b>74</b>	<b>0.7694</b>	<b>76.94</b>		
<b>Description</b>					<b>High</b>	<b>Effective</b>

During the extensive tryout, we observed that some students could use the e-book effectively. For instance, respondents number 10 and 15 in Table 4 described the e-book



as less effective due to their low cognitive skills, resulting in only a 48% increase in their self-efficacy. In contrast, the remaining 19 respondents stated that the e-book was effective in increasing self-efficacy.

Our developed E-books adopt various types of multimedia that increase the students' interaction. Szapkiw, Cardiff, Carter & Bennett reported that e-book users have a higher perception of affective than traditional textbook users. Besides, a study involving 195 vocational high schools showed a positive effect of using e-books on students' academic performance [19]. E-books help teachers deliver material effectively and provide some feedback facilitating students to have good learning achievements. This learning achievement improves students' self-efficacy [2].

## 4 Conclusion

This development research explores the importance of self-regulated-based e-books for the learning process, especially in Biology courses. This development research is useful for identifying the effectiveness of SRL-based e-books in increasing self-efficacy. The results of the study suggested that our developed e-book is effective in increasing students' self-efficacy since our data showed a 76.94% of self-efficacy increase after using the e-book. The product results are in the form of an e-book based on self-regulated learning to increase self-efficacy.

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