USING KOTOBEE AUTHOR SOFTWARE TO DESIGN INTERACTIVE E-BOOK FOR TEACHING BIOLOGY TO DEVELOP STUDENTS' SELF-STUDY COMPETENCE

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Abstract

This study aims to design interactive e-books and evaluate their effectiveness in students' study performance. The process of designing interactive e-books based on design principles of content, form, and high applicability using Kotobee Author software has been built and designed for Biology grade 10. Interactive e-books have fully met requirements in terms of supporting online learning with lectures, questions, videos, sharing links, and documents that are suitable for readers' levels and received very good feedback from students. Experimental study designs were used to determine academic achievement and self-study competence. The research sample was 82 grade 10 students divided into two groups, the experimental group learned Biology through interactive e-books, while the control group learned through printed books. The experimental results show that there is a significant difference between the experimental groups in terms of learning outcomes and self-study competence as well as the level of interest of students in Biology lessons when learning by e-books. Interactive e-books can be used in teaching Biology in particular or other subjects in general to improve learning outcomes and self-study competence of students in Vietnam.

Keywords: Interactive E-Book, Kotobee Author, Self-Study Competence, Vietnam

INTRODUCTION

The drastic development of Information and Communication Technology - ICT in the digital era has influenced various fields and made many changes in social-economical life in the world, especially education. ICT is very necessary for upgrading educational quality to suit the modern education model of the world (Alam & Ujjwal, 2017; Lawrence & Usman, 2018). Teachers and students can be exposed to digital activities by using information technology in teaching and learning. A positive learning environment can be supported by suitable study materials and resources because of the development of ICT, for instance, e-books (Lu et al., 2003). E-books not only support students during lessons in class but also help them improve their study results due to the functions that

e-books bring to them (Daradkeh et al. 2012; Tsai et al. 2017). Teachers can use e-books as study materials to improve students' self-study competence. It means that students are able to make plans, select useful information, and follow their study process as well as their academic performance.

According to the strategies for basically and comprehensively reforming education and training issued by the government of Vietnam, there are three criteria needed for implementing new to meet the requirements of industrialization and modernization: facilitating the study methods, encouraging the activeness of students, and applying ICT in teaching and learning activities. The development of students' self-study competence is the core value and main purpose which is emphasized in the reformation strategies of the Vietnam government. However, according to early investigations, e-books written in Vietnamese have not gotten prevalent yet, even e-books designed suitably and updated to improve students' desirable competencies (Nguyen et al., 2022). Moreover, interactive e-books play a crucial role in modern society, particularly during COVID-19. The online study process has become more convenient due to the support of e-books. Interactive e-books help students study actively and improve their ICT skills easily. Therefore, this study aims to design and implement e-books in high schools, after that analyze the impact of e-books on students' study results and self-study competence.

LITERATURE REVIEW

Electronic book (e-book) is a book published in digital form, it combines hypermedia such as audio, animation, featured text, and music… which can be read on a flat screen of a computer or other electronic devices. Shiratuddin và Landoni (2003) defined e-books as "digital information with a variety of forms from disks to interactive form on internet or websites" or "interactive pages with digital information…". E-books defined as interactive books or digital books, are documents with content in digital format and can be viewed on computers or electronic reading devices such as computers, laptops, or smartphones... (Tsai et al., 2017). Besides, interactive e-books are the integration of information technology that is equipped with various functions to support the study and teaching process such as video, hyperlinks, puzzles, and searching tools (Askar, 2014). It is necessary to consider the consent structure, images, and language when designing interactive e-books. The overuse or lack of sentences, symbols, images, or figures on each page of the e-book should be carefully considered (Yang et al., 2018).

Interactive e-books have proved that they are an interesting tool for learners since it is very easy to integrate e-books into educational programs. Teachers can also design and apply e-books easily in teaching (Zucker et al., 2009). Some studies used experimental designs to examine the effectiveness of e-books in teaching, students' enriching knowledge process, and academic performance (Slavin, 2008; Tsai et al. 2017). Study activities are designed appropriately so that students can easily access online interactive e-books for determining the suitable learning environment to get the highest results. The study materials can be stored longer and it is easy to find, and extract. Furthermore, it can help students maintain their reading habits and have the

motivation to study. Students are aware of the significance of e-books and use them frequently for the purpose of study and research (Akpokodje & Ukwuoma, 2016). The effect of interactive e-books on the study results of high school and university students was examined. The results showed that there was a significant difference in the student's academic performance when using e-books and printed books (Ebied & Shimaa, 2015; Rockinson et al., 2013). In general, interactive e-books not only raise the students' awareness and good behavior but also improve their outcomes. Therefore, it is necessary to research more about designing and applying interactive e-books in teaching and studying to develop self-study competence at different levels.

Self-regulation learning (SRL) is considered a significant factor in establishing and evaluating students' study objectives. SRL helps them actively set goals for their study and self-regulate their awareness as well as study motivation (Alhaddad, 2014). Previous studies had introduced several SRL processes based on different perspectives about SRL, however, we concentrate on the SRL suggested by Zimmerman et al., (2011). This process includes: (1) Determining the objectives and making a study plan; (2) Implementing the plan and regulating the study activities if needed; (3) Self-evaluating and fixing. This process helps students determine their study objectives and strategic plans which are related to the study activities so that they can have a continuous and self-regulated study process for themselves. To improve their academic results and enrich their experience in studying, learners will self-evaluate whether they get given objectives and whether their methods are suitable, then they can self-regulate their plan-making process and plan implementation. Therefore, SRL or self-study competence are tightly close to the study process and they are great practices to reinforce and promote students to study independently and actively. Their study process is concerned with how to use methods to achieve learning goals based on self-perceptions of their personal competence level in the learning process (Zimmerman, 2011). Students with a high degree of autonomy are considered to be able to apply cognitive strategies and receive excellent grades in their subjects, and also know how to develop ways to excel in assignments and tests. On the other hand, the skill that students can find useful material through means such as interactive e-book is important. In this study, the research team focused on investigating the effectiveness of studying Biology through interactive e-books.

METHODS

This study applied methods of the descriptive-qualitative approach to describe the designing process and application of e-books in teaching to improve students' self-study competence. ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) was used (Aldoobie, 2015). This model is compact, easy to use, and simple to operate with two stages. The students' studying motivation and knowledge before using interactive e-books were analyzed in the analysis stage. The analysis of the studying program was executed by creating indexes of documents. This stage aims to produce suitable e-books for students' features and the studying program. After that, the

draft was converted into a digital format through Kotobee Author software. E-books created from this application have .pub to help users access e-books either offline or online through electronic devices such as smartphones, tablets, laptops, or computers. The development stage is for confirmation to qualitatively determine the possibility of the application of e-books. Evaluating the suitability of e-books is based on three aspects: contents, interface, and language. In the implementation stage, e-books were applied in a studying process. Finally, in the evaluation stage, e-books were edited based on comments and recommendations contributed by participants.

Participants

There were 82 students from four classes (two experimental classes (EC) and two control classes (CC)) engaging in this study. Students of the experimental classes used e-books to study Biology, while students of the control classes used traditional teaching methods. Before the experiments, we assess students' self-study competence in classes using a questionnaire table. Thirteen criteria for determining self-study competence were designed with four levels as below:

Level 1 - Bad (1 point): students are not able to do

Level 2 - Average (2 points): Students can do but still make many mistakes

Level 3 - Good (3 points): Students are proficient at using some skills

Level 4 - Excellent (4 points): Students are proficient at using skills, flexibly apply skills, and gain effectiveness.

The teaching process using e-books in experimental classes is presented in a diagram below (Fig 1). Students in two class groups were requested to take a 45-minute-exam to evaluate their awareness. After that, the self-study competence of the four classes was assessed and compared with each other.

Data analysis

This article uses the SPSS tool to process research data with the help of calculations such as standard deviation, independent t-test verification (p), and effect size (ES). All analyzes were tested at the 0.05 significance level.

Figure 1. Diagram presenting the teaching process using e-books in experimental classes
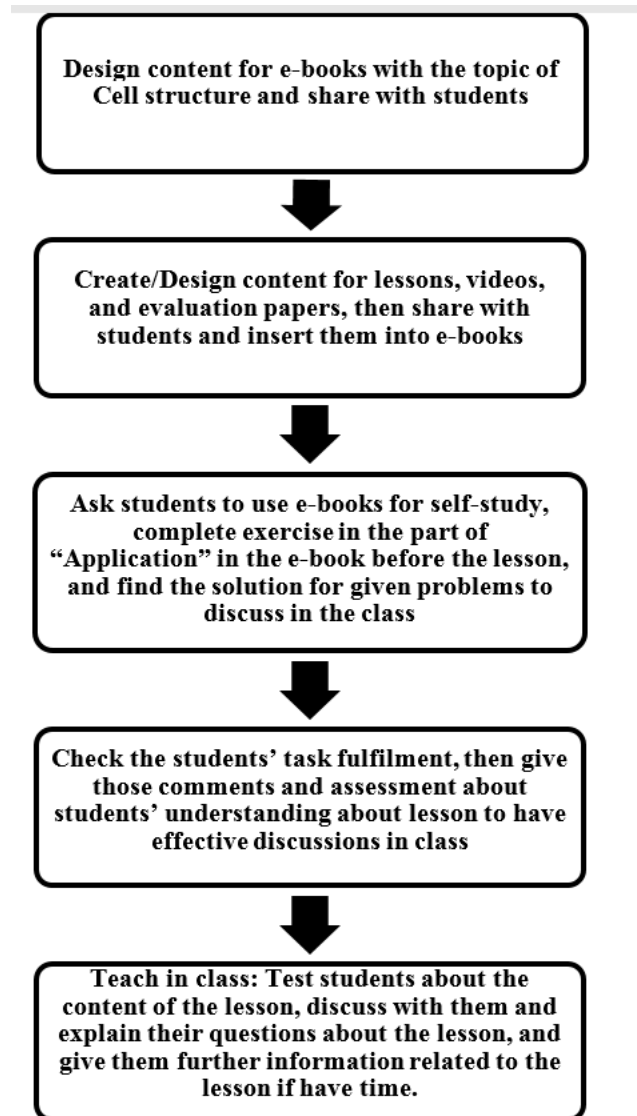
Validity of e-book

Designing and applying e-books in teaching play significant roles in reforming education and developing students' self-study competence. In this study, the research team used Kotobee Author software to design e-books with various functions such as videos, hyperlinks, images, and table of content, and choose the desirable parts with a click. This software also developed other functions, for instance, zooming in, zooming out, and searching for content. Two experts evaluated the suitability of e-books based on content, interface, and language. The results showed that all aspects of eligibility have

proportions of 100% (Table 1), which means e-books are very valuable for teaching in high schools.

The structure of e-books was designed as described below:

Chapter/Topic: The content of the chapter/topic and documents in e-books were systemized and presented logically.

Theoretical content: It was well organized in each chapter/sub-topic. Each lesson gives information about knowledge for students to read and understand.

Introduction: It presents brief information or activities to create students' studying motivation as well as build students' knowledge.

Extension part (Do you know?): It provides more information about reality and expands knowledge from the designed lessons. The information in this part can help students understand the lesson more effectively as well as encourage them to love science and Biology in particular.

Questions and exercises: It include all exercises in textbooks and

Guidance for using: It presents specific content in e-books so that users can quickly achieve their teaching and learning purposes. This section includes items such as e-book manuals, study materials, and a table of references so that readers can find them easily.
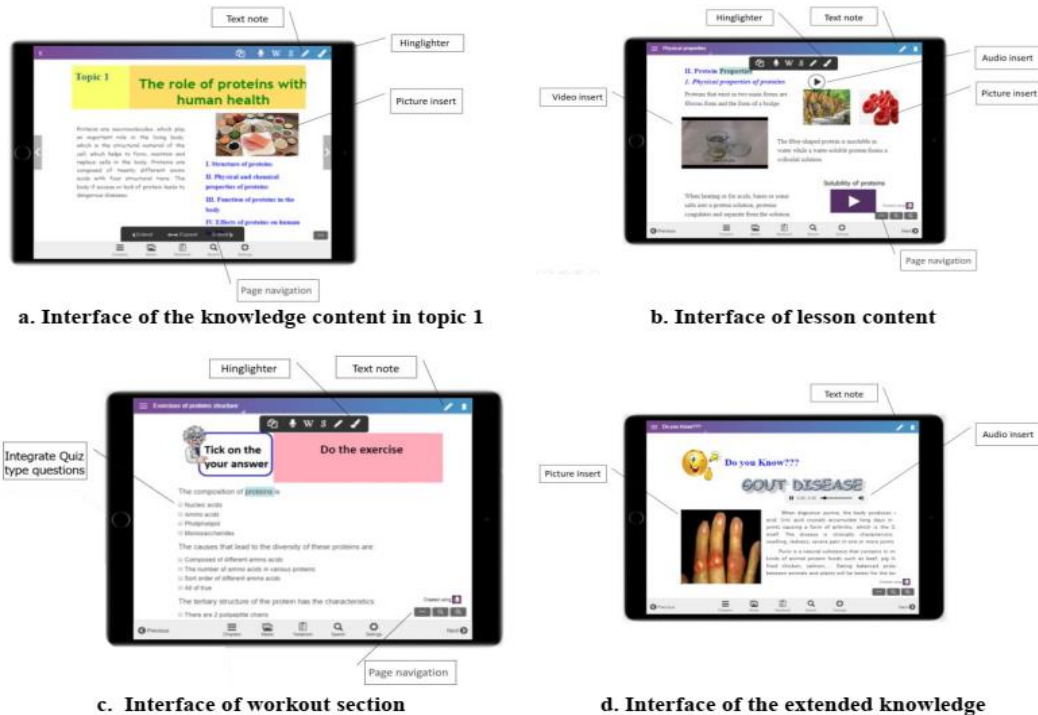
E-learning: e-books are designed to enhance interaction between users. The lookup-question-and-answer section helps users to look up academic words, documents, etc. The class link section helps users interact with the author and other users by creating a space that connects users through creating classrooms on apps like Edmodo/class dojo/google classroom.

Some interfaces of some sections in e-books are presented in Figure 2.

**Table 1. Results of the validity test of the interactive e-book**

Validity aspects	Category	Percentage (%)
Content	Very valid	100
Language	Very valid	100
Presentation	Very valid	100

Figure 2. The interface of some sections in the interactive e-book

a. Interface of the knowledge content in topic 1

b. Interface of lesson content

c. Interface of workout section

d. Interface of the extended knowledge

Students' responses

Figure 3. The levels of students' excitement with lessons using e-books in experimental classes
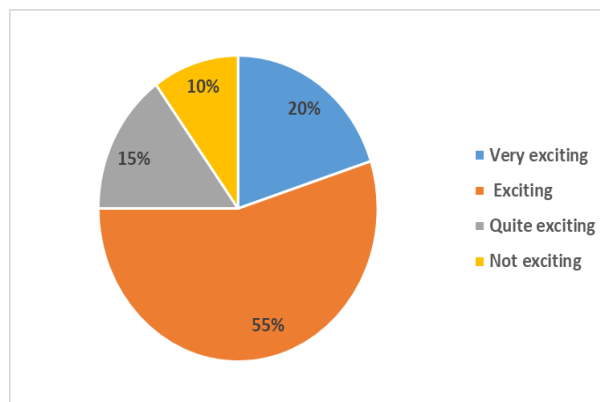
A questionnaire was sent to students via google form to investigate the degree of students' excitement in using e-books for studying. The results indicate that the percentage of students finding studying through e-books interesting was approximately 90% (Fig.3). This study also examined the suitability of users' knowledge and

awareness. The finding shows that about 61% of students in experimental classes found e-books suitable for them (Fig. 4).

Figure 4. Students' opinion about the suitability of the study method using e-books
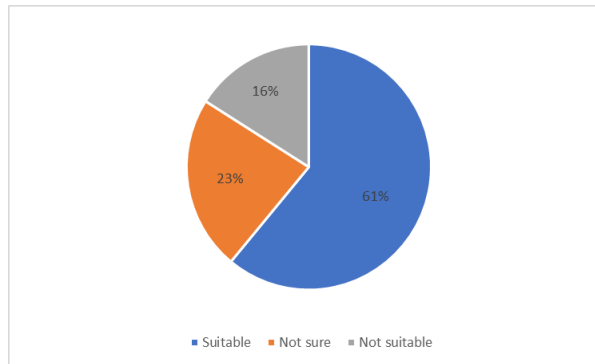
The results of the evaluation of the e-book design are shown in table 2. The average weight for the opinion of being easy to navigate between pages is the highest among aspects about the suitability of e-books (3.65). The ease of navigating pages is like a teacher explaining to students, therefore e-books should be designed logically and simple to use. In addition to that, the content of e-books should link together by integrating changing animations to help users easily navigate. Students also agreed that the introduction part in e-books provided insights about the lessons to them (the average point is 3.26). It shows the importance of the introduction part with students in self-studying. It supports students by giving them an overview of each lesson. In general, the average weight of students' responses is 3.12 indicates that the presentation is appropriate to the interests and nature of the learners to ensure maximum participation in the teaching and learning process.

Table 2. Evaluation of e-books design

Students (CC)		
	WM	**VI**
The introduction gives learners insights into lesson	3.26	A
Comprehensive and clear summaries in each chapter	3.07	A
Consistent and streamlined layout	3.15	A
Integrating with non-text content (maps, images, charts)	2.97	A
Easy to navigate between pages	3.65	A
Be able to access lessons through hyperlinks in the table of content	3.11	A
Appealing information, various functions, and interactive images	3.02	A
Average	3.12	A

Evaluating students' self-study competence

After finishing the pedagogical experiments, the research team investigated the quality and effect of using e-books in teaching Biology through a 45-minute-test and an evaluation paper.

The test results in two groups of experimental and control classes indicate that the test scores in the experimental class concentrated around the mean value higher than that in the control class. The coefficient of variation Cv of the experimental class (17%) is lower than that of the control class (20.33%), showing that the fluctuation of values in learning is lower, demonstrating high reliability (table 3).

Table 3. Comparison of parameters between control and experimental classes

	$\overline{X}$	S	S^2	C_v(%)
Control class (CC)	6.7	1.31	1.82	20.33
Experimental class (EC)	7.8	1.13	1.47	17

The students' self-study competence in the experimental class was statistically tested to determine whether there was a difference in the results of students' self-study competence before and after using e-books. Test statistics were performed using the Paired-Sample T-Test.

The results show that the p-value of the T-test is 0.04 < 0.05, which means that the development of students' self-study competence has changed significantly, all expressions have grown to a higher level, especially the expression of being able to make a study plan, and execute it has grown from average to good, the remaining expressions also increased compared to before experimental lessons. The degree of influence according to Cohen's criteria is quite large (ES = 0.81), showing that the use of e-books in the teaching process has developed the mathematical language of students quite a lot (Table 4). This also confirms the effectiveness and use of e-books in teaching students to study the high school curriculum.

Table 4. Evaluation of students' self-study competence in experimental classes

	Average points	
	Before experiment	**After experiment**
Be able to determine the lesson objectives	1,34	2,75
Be able to make a study plan and execute it	2,48	3,05
Be able to evaluate the effectiveness of the study process and adjust studying	1,06	2,45
Average	1,62	2,75
P (t-test)	0,04	
ES	0,81	

DISCUSSION

The development of ICT makes it possible to create software for designing interactive e-book and to improve learning environments that are very supportive of the self-study process (Perciso & Karl, 2017). Current conditions and technological advancements have allowed teachers to design their own interactive e-books through easy-to-use software. Vietnam was rated as "Asia's most exciting market" in a survey of Internet, social media, digital, and mobile phone developments in Asia. According to statistics, in 2012, Vietnam had only about 30.8 million Internet users, but up to now (2022), the number of internet and smartphone users has reached roughly 70 million out of 99 million people. Therefore, most students can use smartphones in their learning process. Innovation in the development of teaching materials is driven by the development of e-book technology. The use of instructional materials prepared according to the principles of learning technology is important for individuals to design an effective and interactive learning environment (Kassabolat et al., 2020). Instructional materials can be converted into electronic presentations, containing interesting and systematic material to enhance learners' competence.

In this study, after analyzing the 10th-grade biology curriculum, we agreed and designed the structure of an e-book with the following main contents: the content of the lesson, extended knowledge, questions and exercises, and manuals. These four contents are contained in each chapter of the e-book and are designed with accompanying images, videos, audio files, hyperlinks, mind maps, quizzes, ...to match the lesson content. The interactive e-book is designed using Kotobee Author software and has been validated by three biology education experts based on three aspects of validity: content, interface, and language. All aspects confirm achieving a 100% viable rate. The content of the lesson knowledge provides a full range of information to help students collect information and track awareness, as well as determine the lesson objectives. In addition, the planning and implementation aspect of self-study is supported by activities designed in the lesson content. To assess learning for learners, the lesson-related exercise questions are used to measure learners' understanding, as well as help them follow their cognition. The extended knowledge feature helps readers gather more information.

Learners' Asian cultural background is often seen as an obstacle to developing self-study competence (Palfreyman, 2003). This is because collectivism is emphasized and the teacher's relationship with their students is evidently power-based. Students have the attitude of learning only what the teacher has provided, learning by heart (passive learning). However, this cannot be fixed, the problem is how the teacher must teach and the solution for that is the teacher can design learning activities that facilitate active learning and encourage students to solve the problems together. In order to create positive student attitudes toward learning, it is very important for educators and researchers to consider exploring alternative teaching and learning methods so that students can increase awareness and understanding as well as positive attitudes toward learning (Sincuba & John, 2017). It is also very crucial to have new pedagogical

approaches to effectively incorporate learning into the learning environment. Therefore, educational technology on electronic devices is a technologically advanced approach in the digital era (Sincuba & John, 2017).

Self-regulation learning is closely related to learning through reflective learning, learners will enrich their experiences in learning and evaluate their achievement whether they reached the goals set out at the beginning of their study process and whether implementation methods were effective, from which they will self-regulate the planning and implementation of their learning plans. Therefore, self-study and self-regulation can be good measures to promote learners' independent learning competence. Many studies on the use of e-books show its many advantages in the learning process in particular and the field of education in general (Akpokodje & Ukwuoma, 2016; Ebied & Shimaa, 2015; Rockinson et al. 2013). The results of the present study are consistent with the results of previous domestic and foreign studies. The results of previous studies showed the superiority of the experimental groups that studied Biology through e-books compared with the control groups that studied through printed books (Nguyen et al., Azmi & Moradny (2010). Shabl (2012) also confirmed the effectiveness of using e-books in improving the academic achievement of junior high school students. This study also pointed out the effectiveness of e-books and the educational effects of e-books on students by increasing their achievement. The effectiveness of e-books and their educational effect on student academic achievement are based on the knowledge information contained in the text, audio, and images, and easy access to necessary information (Amari & Shabl, 2012). Besides, e-books increase students' confidence as well as motivate learning because e-books provide students with the opportunity to relearn entire lessons or portions of lesson content. Besides, students' academic performance can be improved because they can develop their learning skills by creating multimedia presentations in the classroom during the learning process.

CONCLUSION

The study concludes that interactive e-books are designed and evaluated by educational experts and they meet the standards of content, interface, and suitability with learners' level. Moreover, students also gave good feedback after using interactive e-books due to the benefits that e-books brought to their study. Interactive e-books are facilitated functions that support students to keep their study motivation and improve their academic performance. This study also proved the effectiveness of using interactive e-books in students' achievement and self-regulation competence. The results are consistent with regional and international studies, ensuring the superiority of the experimental group learning with interactive e-books compared to the group learning with printed books. Therefore, interactive e-books can be used in online learning or support the self-study process to improve students' self-perception at the high school level or higher education level in Viet Nam.

Limitations

This study just focuses on describing the design and implementation of interactive e-books in reforming the study methods in teaching Biology by using the application. This study just determined the study results of students and their self-study competence after using interactive e-books. Therefore, it is necessary to have more studies to examine the relationship between self-study competence and other subjects in Vietnam's educational program.

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