# FIELD TESTING RESULTS OF REDESIGNING THE DIGITAL INTERACTIVE BOOK "COGNITIVE DEVELOPMENT METHOD" FOR EARLY CHILDHOOD EDUCATION STUDENTS

### Mukti Amini<sup>1</sup>

<sup>1</sup>Universitas Terbuka (INDONESIA)

muktiamini@ecampus.ut.ac.id

#### Abstract

The Cognitive Development Method (CDM) is one of the courses that must be taken by Early Childhood Education (ECE) students at Universitas Terbuka (UT) as their core competency. Learning materials in printed books and as many as 12 modules were prepared to facilitate students' learning independently. Today's rapid digital development demands learning materials that are more attractive and interactive for students. Moreover, the average age of ECE-UT students includes the millennial generation. One of the efforts to make it easier for students to learn is redesigning CDM printed books into interactive digital books. This study describes the field-testing results of digitally redesigning CDM books' appearance. The research method used is Research & Development. The display is more colorful, with more examples and pictures, and they can access relevant video enrichment. The field testing was applied to 377 ECE-UT students. The field-testing results showed (scale 5) that the attractiveness of shape, font size, and layout was rated 4.1. The color composition is still rated 4. The improvement suggestions submitted by students are about color composition to make it more attractive, the font size, the explanation of the material, and the appearance of the module cover to be made more attractive and created for each module, and digital books can be downloaded if possible. The study concludes that CDM's interactive digital book is adequate but must be refined according to user input.

Keywords: learning material, digital interactive book, field testing

## **1 INTRODUCTION**

Universitas Terbuka is one of the public universities in Indonesia that implements an open and distance system. The ECE-UT study program is one of the programs at the Open University. The profile of graduates from the ECE-UT Study Program is to produce early childhood education educators with academic competence in ECE science, enrichment, and learning, individually and in groups. To have these competencies, one of the courses given to students is the Cognitive Development Method (CDM). Through this CDM course, students are expected to be able to design and apply cognitive development methods for early childhood that are to

the needs of children in ECE institutions. To master these competencies, the ECE-UT students have received CDM learning materials consisting of twelve modules. Initially, the learning materials were purchased by students as printed books. However, along with the development of technology and the situation, especially after COVID-19, there is a need for innovation in learning materials that are more interesting, flexible, and easily accessible to students. One of the alternative learning materials is interactive digital learning materials. For the preparation of this learning material to be by the rules of faith, it is necessary to conduct research.

UT learning materials are called Subject Matter Books (BMP) and are arranged modularly. In the distance learning system, the BMP modules are arranged to be learned in self-learning (Tabuena & Villareal, 2024). This means that students can directly learn from the module as if the module were the lecturer, thus allowing them to develop themselves optimally. Modules must also have self-contained characteristics (Goosen & Van Heerden, 2019), meaning they can provide students with fully designed learning materials.

A suitable learning module needs to have several main elements, namely: clear learning objectives, an orderly structure, relevant material, good readability, images and graphs, comprehension tests either in the form of exercises or formative tests, packaging of modules in several learning activities, applicable context, clarity of instruction, ease of access, measurement of learning outcomes, flexibility, periodic revision, and feedback to cross-check the understanding of the modules (Anggraini & Armiati, 2022).

Modules can be packaged in a variety of shapes. One of them is interactive digital. Digital books need to meet the following criteria: accommodate the type of device owned by the reader, so the book design must be suitable for that device (Modic, 2017); consider the size and display format of the application to suit the reader's screen display so that it is easier for them to read the book (Kapperman et al., 2018), and can be accessed from various types of devices, for example, laptops and smartphones (Salas-Rueda, 2023).

Meanwhile, interactive books refer to learning media that can stimulate interaction and active participation of students in the learning process (Nicolaidou, 2021). This means that when using an interactive book, students not only read but also have a dialogue with it through various triggering questions, comprehension tests, and feedback.

Quality interactive digital books have the following characteristics: (1) they have exciting and informative content according to the target reader. The content must be accurate, up-to-date,

and error-free (Johns & Jones, 2021); (2) invite reader interaction to understand the reading better. These interactions can be in the form of quizzes, games, or simulations (Colatrella, 2015); (3) using attractive and easy-to-use designs; (4) being accessible to everyone, including people with disabilities (Vereenooghe & Westermann, 2019); (5) equipped with support to guide readers which can be in the form of guides, tutorials or services for readers, and (6) being evaluated periodically to adapt to the needs of readers (Demiroz, 2020).

Along with several factors, including the development of information technology, the ease of use of the internet, and the price of smartphones that are getting cheaper; so, learning materials for ECE-UT students also need to be packaged not only in print format but also in interactive digital format to make it easier for students. Study programs in dummy form have attempted to reformat CDM interactive digital books. Therefore, this study aims to explore the information from the field test results from CDM interactive digital learning materials based on the opinions of ECE-UT students.

### 2 METHODOLOGY

The research was conducted on 377 ECE-UT students who had taken the CDM course by distributing questionnaires online. The sampling used is accidental random sampling. This research is part of the Research and Development (Gall et al., 2007), specifically in the steps of main field testing. Instruments are divided into three main categories: the digital module appearance, ease of use of the digital modules, and instructional design.

### **3** FINDINGS AND DISCUSSION

The results of this research are divided into 4 main parts, namely: the digital module appearance, ease of use of the digital modules, instructional design of the digital modules, and students' input from open-ended questions.

### 3.1 The Digital Modul Appearance

Students' opinions about the appearance of CDM interactive digital learning materials can be described as follows.

The Digital Modul Appearance	Mean
The physical appearance of the module is attractive	4.1
The font size is suitable for students	4.1
Interesting colour composition	4.0
Attractive module layout	4.1
Rate of Appearance	4.1

Table 1. The Digital Modul Appearance

Table 1 shows that the CDM interactive digital module is attractive; the font size and layout are appropriate. However, the composition of the book's color still needs to be improved. The letter used in the CDM digital module is Arial and is 12 in size. The Arial type is one of the typefaces that is widely used for printed books. Size 12 is the standard book size, assuming it is printed on A4 paper (Yanti et al., 2019). This size and typeface also consider the age of ECE-UT students who are not fresh graduates from high school but have been ECE teachers for at least one year (Aisyah, 2023).

The color composition in this CDM interactive digital module still needs to be improved, even though some modules already use an application for editing book layouts, namely Canva. This application was chosen because it is easier to use than other book layout editing. Therefore, the color composition of the module is highly dependent on the theme selected when using the book template (Dearman, 2018). The book's exciting colour composition will undoubtedly interest readers in reading page by page. In addition, a suitable color composition will avoid tired eyes and prevent boredom (Lawson, 2023). The digital book format opens vast opportunities for this color composition because it no longer needs to be printed; it can only be read online.

In contrast to the CDM, it printed books received by ECE-UT students in only two colors: black and white. The number of colors in a printed book will affect its price. Of course, the more types of colors used, the more expensive the printing cost per page of the book (Lucas, 2024).

## **3.2** The Ease of Use of Digital Modules

Student opinions regarding the ease of use of CDM interactive digital books are summarized below.

The Ease of Use	Mean
The material description is easy to understand	4.0
The material in the module is presented coherently and systematically	4.1
The material is accessible for UT students to learn independently	4.1
Navigation on the web is easy to click	4.0
The navigation order makes it easier to find what students want to learn	4.1
Video inserts are easy to play	4.0
Rate Ease of Use	4.1

Table 2.	The Ease	of Use	of Digital	Modules
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Table 2 shows that some aspects still need improvement despite the score already being 4. The first is a description of the material that makes it easier for students to understand. Indeed, CDM is categorized as a challenging course, so students need help understanding the various concepts in the course. The written descriptions sometimes need help understanding in textbooks for courses that are classified as complex. So, it must be supported by other media, such as images, audio, and video (OECD, 2023). In this interactive digital book, a video was taken from the explanation of related concepts from UT radio. Indeed, this video is quite long, 60 minutes, so the assessment of the ease of video playing gets a score of only 4. Students' difficulties when playing videos occur because of unsupportive internet access, especially in rural areas in Indonesia. The videos are all stored in the cloud, namely on the YouTube page, so that the system does not burden the memory of the CDM digital book page (Knapik et al., 2022; Limbong, 2021).

The navigation has been made as detailed as possible, but not all students are familiar with it, especially if digital CDM books are read from smartphones. The font display for digital books on smartphones has become smaller, and students may need help finding the navigation buttons on the left side. Students who still have difficulty using this navigation facility tend to click the back button manually (Kuczera & Jeon, 2019).

The picture below is an example of the appearance of the CDM digital module.

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PG PAUD Universitas Terbuka

Menu

Menu		
PG PAUD Universitas	Terbuka	
Home		The Navigation
Modul Metode Pengembangan Kognitif	Modul 5	
Modul 3		Kecerdasan Jamak Anak Usia Dini & Stra
Modul 5	Modul 5	Manaamhanakannus

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Modul 3		Kecerdasan Jamak Anak Usia Dini & Strategi	Home	
Modul 5	Modul 5	Mengembangkannya	Modul Metode Pengembangan	F. Kece
Peta Kompetensi		- Dr. Mukti Amini, M.Pd	Kognitif	
Kegiatan Belajar 1				
Kegiatan Belajar 2			Modul 3	
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Home	Untuk memudahkan Anda dalam mempelajari moduli	ini, materi yang dibahas dibagi menjadi 2 kegacan belajar, yaitu:		
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Figure 1. Example of CDM Digital Module Display

# 3.3 Instructional Design of The Digital Modules

Regarding instructional design, opinions from students can be explained as follows.

Instructional Design	Mean
The pages per module are sufficient (not too thin/thick)	3,9
The time required to read the module is adequate (not too fast/long)	3,8
The concept of learning strategies is explained clearly	4.0
There is guidance and motivation in the learning process	4.1
There are instructions for studying learning materials	4.1
The small tasks in the module are easy to understand and do	4.0
Rate of Instructional Design	4.0

Table 3. Instructional Design of The Digital Modules

Table 3 shows that several aspects still need improvement. The first is about the module page. The first is about the module page. Some students still think there are too many pages of the CDM module. Many pages because in the distance learning system, the module functions like a 'lecturer' for students in independent study. The module requirements must be self-learning. The module requirements must be self-learning. So, the module not only contains material such

as a textbook, but there must also be invitations, greetings, trigger questions, and cases that need to be discussed by students, like a lecturer who teaches students in front of the class. As a result, module pages tend to be thicker than regular textbooks when discussing the same topic (Qoshirotutthorfi et al., 2024). UT provides directions that for social humanities science studies, the number of module pages ranges from 40 to 60 (Arma, 2024).

Furthermore, what needs to be considered is the period required for students to read the modules. Reading time is undoubtedly related to several factors, including the number of module pages and the difficulty level of the topic discussed. The number of pages is by the first point explained above, which is the number of module pages for the humanities field, which tends to be thicker than the science field. Also, because CDM concepts are complex compared to other courses, this point is related to the third aspect in Table 3, namely, 'the concept of learning strategies is explained clearly,' with a score of 4. Because CDM material is quite complex, some students still need help understanding it even though it has been tried with a more detailed explanation. Therefore, in digital books, it is necessary to add media other than reading text, which can be audio or video, to make it easier for students to understand the book's contents. In general, students are expected to be able to read one module in approximately one hour. The provision at UT is that in one module, there are at least two learning activities (Rumanta et al., 2016). Students are expected to be able to learn one learning activity in the module. They read the material in the module and do exercises, in-text activities, and formative tests for each learning activity. So, this modular system allows students to study by chunking each learning activity according to the sub-topic they want (Bruijns et al., 2020).

The fourth aspect that needs to be perfected is that "the small tasks in the module are easy to understand and do." Small tasks in the module can be displayed in several forms, namely: intext activities in the form of triggering questions after students listen to pictures or videos, exercises at the end of the discussion of learning activities, and formative tests in the form of objectives at the end after the summary. One of the problems that students often experience in taking formative tests is inaccurate formative test answer keys. Sometimes, a key is not equipped with an explanation; only the answer key is in letters. This condition makes it difficult for students to believe that the key written is correct (Andayanj, 2020). Good multiple-choice questions must provide equal options, so it takes work to guess the correct answer (Nurhasnah, 2018). This equal answer choice sometimes makes it difficult for students, so when they cross-check it with the answer key, it turns out that there are still many wrong answers. Some students also

admitted that formative tests sometimes needed to be completed at the end of each learning activity. As a result, students do not get feedback on reading comprehension of the topic, whether it is sufficiently understood or still needs to be reread (Erlidawati, 2023).

### 3.4 Input from Students

In addition, through open-ended questions to students about what needs to be improved, there are several suggestions from students, which are as follows.

No	Input from Students
1.	Designed to be thinner but easy for students to understand
2.	The font type is Comic Sans Ms.
3.	This module is better than the previous module.
4.	Essential things are added and underlined.
5.	Images are more transparent to help understand learning concepts.
6.	Each module has more picture illustrations to make it easier to remember the
	material.
7.	The pages of modules have been reduced to make it easier to learn.

Table 4. Input from Students

Students' input in point 2 about a specific type of font may be because the Comic Sans font is familiar to them in their daily world as ECE teachers. Essential concepts students need to understand in the book are marked with different colors or in italics and bold. This has become a standard in writing textbooks (Hilte et al., 2019). Underlining is rarely used in textbook formats.

Regarding the module's image quality, some images lack contrast because the resolution is inadequate. The layout needs to look for images that support the topic with a larger resolution so that the image is not blurred. These images can be searched for free or paid for using various applications such as Canva, Shutterstock, Pinterest, etc. The existence of picture illustrations in a book, both printed books and digital books, is not only a compliment. However, picture illustrations in books have several important roles, including arousing readers' interest, improving their understanding and memory, strengthening their emotional connection with books, stimulating their creativity and imagination, and increasing their aesthetic value and attractiveness (Day, 2024). For the illustrations in the book to be of good quality, the steps that need to be done are understanding the purpose of the illustration and the intended audience, conducting research in advance to ensure the accuracy and relevance of the illustration, making sketches to perfect the idea and composition of the image, choosing the suitable medium and

technique for the illustration, developing the final illustration by paying attention to details, color and lighting, ensuring good quality and easy to see, and ask for feedback from colleagues or experts(Anita, 2022). When designing illustrations, several things need to be considered, namely: it is necessary to use an illustration style that is consistent with the overall design of the book (Atkinson, 2022), use bright colors that attract readers, avoid images that are too crowded or full of irrelevant details (Yaffe, 2022), use complementary text or captions to explain the illustrations and connect them to the material in the book (Maharani & Sari, 2024).

Students also suggested giving each module a unique illustration cover according to the topic discussed. This is also a valuable input for the research team. The cover is the first attraction a person will see when looking at a book. An informative book cover should meet the following criteria: have visual appeal, represent the content of the book, evoke the reader's emotions, have a difference from other books, and be able to reflect the quality of the book [(Le Brun, 2023). Since this CDM course consists of 12 modules, it is necessary to make 12 different covers. The module cover is only made once in the printed CDM module book, whereas twelve CDM modules are combined in one main material book. Cover design development has been so rapid, with the help of applications such as Canva, InDesign, Microsoft Bing, and others. Some tips for making the book cover attractive include using high-resolution images that match the content of the book, choosing easy-to-read typography according to the genre of the book content, using interesting wara according to the theme of the book, informative and able to describe the contents of the book briefly, and conducting a field test first before using it (Zuhair Hameed, 2023).

#### 4 CONCLUSION

Based on the description above, the conclusions of this research are as follows: The study concludes that CDM's interactive digital book is adequate but must be refined according to user input. The improvement suggestions submitted by students are about color composition to make it more attractive, the font size, the appearance of the module cover needs to be made more beautiful and created for each module, the explanation of the material needs to be summarized, and digital books can be downloaded if possible.

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