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Using Digital Textbooks in English Classes and Learner Motivation

—From the Perspective of the ARCS Model—

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Introduction

Issues in the Informatization of Education in Japan

With the advancement of internet technology, the informatization of education has made significant strides in Japan. However, there is a notable discrepancy between the expected and actual uses of Information and Communication Technology (ICT) among students. The National Institute for Educational Policy Research (2019) highlighted that, while ICT is intended for learning, students predominantly use it for playing. As ICT integration in classrooms is set to increase, this divergence in ICT usage could become more evident within the educational setting (i.e., the classroom environment).

With the broader dissemination of ICT devices among students, digital textbooks have garnered increasing attention. As the Ministry of Education, Culture, Sports, Science and Technology (MEXT) indicated in 2021, digital textbooks are educational materials with content identical to their printed counterparts, and enhanced with features like video, audio, animations, zoom in/out, highlighting, sharing, flipping, reflowing, read-aloud options, searching, and saving capabilities (MEXT, 2019). According to the Textbook Publishers Association of Japan (2019), digital textbooks can be categorized into three types: (1) digital textbooks for learners, (2) digital teaching materials for learners, and (3) digital textbooks (teaching materials) for teachers. As of 2023, the diffusion rate of digital textbooks for

teachers stands at 81.4%, with a 36.1% rate for learner-specific digital textbooks (MEXT, 2022). A full introduction of these digital resources is expected in 2024 (MEXT, 2020).

Students encountering new learning environments with digital textbooks will likely anticipate novel forms of learning, given the varied functionalities of these textbooks. Bordia et al. (2008) argue that advancements in educational technologies shift learners' expectations. However, as Kosovich et al. (2017) point out, student motivation can be impacted when these expectations are unmet. Therefore, this study will focus on learner motivation in English classes within the context of digital textbooks, specifically examining the gap between ideal usage scenarios and actual implementation.

ARCS Model as a Framework

The ARCS model, developed by Keller (1987), is a methodology designed to enhance the motivational appeal of instructional materials. Its primary objective is to create and sustain learner motivation (Calimag et al., 2014). The model encompasses four key elements: Attention, Relevance, Confidence, and Satisfaction, each further divided into subcategories to comprehensively address the issue of learning motivation. The Attention element focuses on capturing and maintaining learners' interest and engagement. Relevance relates to the learners' understanding of the learning task and their perception of its value and significance to themselves. Confidence pertains to the learners' belief in their ability to successfully complete the task. Satisfaction denotes the sense of achievement learners feel

upon task completion.

The ARCS model has been applied in various contexts to study its impact on learning motivation. For instance, Lail et al. (2022) explored the model's effectiveness in enhancing learning motivation and observed a positive influence. Additionally, Munawarah et al. (2018) demonstrated that instruction based on the ARCS model effectively improves academic performance. As previously mentioned, the ARCS model consists of four dimensions, crucial for generating and maintaining learner motivation (Keller & Suzuki, 2004). However, despite some research exploring the interrelationships among these four aspects (Chuang et al., 2023; Grebe, 2021), studies in this specific area remain relatively limited.

Aims and Research Questions of the Present Study

The present study aims to elucidate the differences in how the four elements of the ARCS model interact with each other. This is done by comparing the model's dynamics in two distinct contexts: (1) students' expectations and (2) their actual perceptions of English classes that utilize digital textbooks. To this end, two separate investigations were carried out: Study 1, focusing on expectations, and Study 2, examining actual perceptions. The following four research questions were formulated to explore the discrepancies between expectations and actual perceptions:

RQ1. In what ways do students' perceptions of each of the four ARCS model aspects vary?

RQ2. How do the interrelationships among the four ARCS model aspects differ?

RQ3. What are the differences in the predictive relationships among the four ARCS model aspects?

RQ4. How does the implementation of digital textbooks influence these variations?

Method

Participants

Study 1 involved 346 high school students who had not yet experienced using digital textbooks. In contrast, Study 2 included 36 high school students who were already studying English using digital textbooks. Additionally, a teacher who utilized digital textbooks for instruction participated in Study 2 to provide qualitative insights. In these classes, while students did not use digital textbooks designed specifically for learners, their teacher conducted English lessons using digital textbooks intended for teachers.

Data collection

In both studies, data were gathered through questionnaires administered via Google Forms. Additionally, Study 2 incorporated a semi-structured interview with a teacher. The questionnaire included items based on the ARCS model scale, along with questions

pertaining to the participants' demographic attributes. Participants responded to each item using a 5-point Likert scale, ranging from "1 = strongly disagree" to "5 = strongly agree." In Study 2, the teacher was interviewed to gather detailed information about the implementation of digital textbooks in English classes.

Data Analysis

For all analyses, SPSS version 28 was utilized. Additionally, SPSS Amos version 28 was employed for structural analysis in Study 1. In both studies, descriptive statistics were initially conducted to address RQ1 (In what ways do students' perceptions of each of the four ARCS model aspects vary?). This was followed by a correlation analysis to respond to RQ2 (How do the interrelationships among the four ARCS model aspects differ?). Furthermore, multiple regression analysis was performed to explore RQ3 (What are the differences in the predictive relationships among the four ARCS model aspects?). This analysis, aimed at determining the predictive relationships among the four components, was repeated four times, each time with a different dependent variable. This approach helped elucidate the mutual predictive relationships among the four aspects and illustrated how each aspect influences the others.

In Study 1, Structural Equation Modeling (SEM) was the final step, conducted to examine the structure of the four aspects of the ARCS model. Three hypotheses were formed based on the results of the multiple regression analysis and previous research: that Relevance

predicts Attention, Relevance predicts Confidence, and Confidence predicts Satisfaction.

In Study 2, a semi-structured interview with teachers was carried out to gain insights into the specific functions of digital textbooks and their application in English classes. This qualitative approach aimed to uncover the reasons behind the structural gap between expectations and actual perceptions. The insights gleaned from the use of digital textbooks in this context were considered in addressing RQ4 (How does the implementation of digital textbooks influence these variations?).

Results and Discussion

In both Study 1 and Study 2, a correlation analysis revealed a strong overall correlation among the four aspects. However, the correlations observed in Study 2 were notably stronger, especially between the Attention, Relevance, and Confidence aspects. Further analyses, including multiple regression and Structural Equation Modeling (SEM), highlighted these differences. Notably, the mutual predictive relationship between the Attention and Confidence aspects, which was only evident in Study 2, was particularly striking. This outcome suggests that the interrelationships between components can vary depending on the context.

A semi-structured interview provided insights into how digital textbooks were employed to capture students' attention (the Attention aspect). However, it was gleaned from the teacher's comments that the primary goal of the classes was not merely to engage

students' attention but to facilitate English learning without the associated discomfort. As a result, features targeting the Attention aspect were used only as a supplementary tool. The use of digital textbooks, which can pique students' interest, influences the Attention aspect. Simultaneously, learning content that is appropriately leveled for students fosters a sense of achievability ("I can do it"), thereby impacting the Confidence aspect. Consequently, the interaction between the Attention and Confidence components becomes more pronounced in English classes that utilize digital textbooks.

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