

RESEARCH ARTICLE

Evaluating Students Confidence and Learning Challenges Using Canva-Based Digital Textbooks in Zoology

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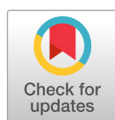
ABSTRACT

The purpose of the study is to identify the learning confidence and challenges of first-year undergraduate zoology students in using a Canva-based digital textbook. Thus, the study examines students' compatibility, accessibility and understanding of lessons as confidence and cognitive, technological and motivational barriers as challenges in using digital textbook. The digital textbook was developed using the ADDIE instructional model and informed by Mayer's multimedia learning theory. An exploratory qualitative approach was employed, with data collected through focus group discussions and semi structured interviews. The findings revealed that students experienced greater confidence in their learning when using the Canva-based digital textbook. They appreciated features such as videos, hyperlinks, and interactive tools & graphics, which enhanced understanding and engagement while reducing learning related anxiety. Cognitive challenges were minimal with negotiable initial unfamiliarity, language, and occasional eye strain. Technological issues were limited to minor problems, such as slow video loading and motivational challenges were largely absent where students preferring digital over printed textbooks. This study suggests that incorporating well-designed, multimedia-enhanced digital textbooks can significantly strengthen student confidence and learning engagement in science-based higher education in Bangladesh.

Keywords: Digital textbook, canva-based learning, zoology education, learning confidence, learning challenge.

Introduction

In today's technology-driven society, digital learning frameworks are increasingly replacing traditional textbooks by supporting diverse learning styles and promoting student-centred education. These platforms have transformed how educational content is developed and delivered, creating new opportunities to enhance student engagement, learning outcomes, and confidence.



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This trend accelerated during the COVID-19 pandemic, prompting educators to adopt a diverse array of digital tools for teaching. Among these platforms, Canva has gained popularity for its visually rich, interactive, and user-friendly interface, which enables the creation of multimodal learning materials that integrate text, videos, info graphics, and interactive features (Canva, 2025). Despite its widespread adoption, research on students' perceptions, confidence, and the usability of Canva-based digital textbooks—especially in content-intensive fields such as zoology—remains unexplored.

Canva supports a range of learning styles and has better academic performance and student satisfaction in higher secondary biology courses (Ahmed & Kwon, 2022). The use of customizable, visually engaging content can increase student motivation, engagement, and self-confidence (Deneen & Boud, 2021). Despite these benefits, Canva-based digital textbook (DT) face potential barriers. Technological barriers include limited or unstable internet access, outdated or incompatible devices, system crashes, and restricted mobile functionality (Al-Hariri & Al-Hattami, 2017). Cognitive difficulties—such as distraction from screen use, mental fatigue, and difficulty retaining information from complex visual layouts—may also impede learning (Delgado et al., 2018). Motivational issues can arise because some students prefer printed textbooks, which they find more familiar, comfortable, and engaging (Rockinson-Szapkiw et al., 2013).

However, confidence in using a DT refers to a learner's belief in their ability to effectively access, navigate, and utilize DT features (such as multimedia elements, hyperlinks, and interactive tools) as well as their level of comfort and competence in using these tools for content exploration, comprehension, and independent study to support learning (Tsai & Tsai, 2010; Bandura, 1997).

In zoology, where learning often involves understanding intricate anatomical structures, physiological processes, and classification systems, visual aids are critical for promoting comprehension and independent learning (Salas-Morera et al., 2018). By offering interactive, user controlled learning experiences, DT has been found to improve student engagement, usability, and academic confidence (Rockinson-Szapkiw et al., 2013). Students' confidence in interacting with digital materials further contributes to academic success (Nouri et al., 2020). Digital self-efficacy—the belief in one's ability to use technology effectively—plays a crucial role in determining learning outcomes (Zilka, 2021). Interactive features can enhance interest, motivation, and achievement, though students' confidence may vary depending on prior experience, interface quality, and instructional design (Clark & Mayer, 2016).

Given these considerations, this study has developed a Canva-based DT for first year undergraduate zoology students using the ADDIE instructional model and examined its impact on students' learning confidence and challenges in practical zoology-I course of Kurigram Government College, Kurigram under National University, Bangladesh.

Methodology

Research Design and Participants

This study adopted an exploratory qualitative design, employing focus group discussions (FGDs) and semi-structured interviews which enabled researchers to gain in-depth insights into students' learning confidence and challenges when using DT (Etikan, et al., 2016). At the outset, researchers developed a Canva-based DT using the ADDIE instructional

model (Molenda, 2003) and structured according to Mayer's multimedia learning theory (Mayer, 2024). 75 students among 175 first-year undergraduate zoology students used the DT to prepare for their first-year final practical examination. From this pool, 24 students were selected through purposive sampling for three focus group discussions (FGDs), while 10 additional students were chosen for semi-structured interviews using random sampling. Participation was entirely voluntary with no associated benefits or disadvantages. Consent was obtained through 'consent form' from all participants in accordance with ethical standards.

Instructional Design of the DT

In this study, the ADDIE instructional model was adopted to develop a digital textbook (DT), which comprises of five stages: Analyze, Design, Development, Implementation, and Evaluation (Branch, 2009) (Table 1). During the Analysis stage, researchers reviewed the *Practical Zoology I* curriculum and analysed exam-question formats to ensure alignment with the DT. Additionally, practical classes were observed to assess learning challenges (e.g., limited multimedia and interactivity) and students' digital literacy as well as familiarity with Canva and smart devices to inform a multimedia design that supports active cognitive processing (Mayer, 2024). In the Design and Development stages, the textbook was organized into five sections which have been described in result section (Figure 1), and the DT content was created using text, images, audio, video, animations, hyperlinks, simulations, and digital platforms such as YouTube and Google applications to enhance understanding and reduce cognitive load (Mayer, 2024; Clark & Mayer, 2016). Implementation was followed by a pilot test in class with 8 students from the respondent cohort to check DT's functionality. During implementation and evaluation, lectures were delivered using DT and students feedback was collected at the end of each session to inform revisions, thereby guiding iterative improvements for subsequent courses (Branch, 2009).

Table 1. ADDIE instructional model adopted in the development of an interactive DT.

Stages	Focus Areas	Considerations in DT Design
Analysis	Curriculum, identifying instructional problems, learner needs, and digital skills	Reviewed curriculum, questions pattern for examination, and student digital skills.
Design	Setting objectives, structuring content, and selecting media.	Structured with multimedia content.
Development	Creating content and assembling instructional tools.	Created content with text, videos, media, and interactive digital tools.
Implementation	Delivering and testing the instructional materials	Pilot-tested DT in class and collected feedback.
Evaluation	Assessing effectiveness and revising instructional design	Design refined from feedback.

Note: Shows how each ADDIE stage was applied in the DT design.

Instructional Validity of the DT

In this study, to ensure alignment with established multimedia learning standards and to evaluate the design quality and pedagogical alignment, the developed DT was reviewed using a checklist adapted from Mayer's multimedia learning theory (Mayer, 2024). The checklist encompassed key multimedia principles—such as coherence, modality, redundancy, contiguity, segmenting, pre-training, signalling, personalization, voice, and embodiment—to ensure that the instructional materials promote effective learning through efficient cognitive processing and learner engagement. These effective learning enhances student confidence (Wang & Zhang, 2024). After that a pilot test, with six teachers and ten students

other than research participants, was conducted through a Google form to evaluate the usability, clarity, and overall quality of the DT. Feedback obtained from the pilot test was used to revise and update the content, improving its clarity, engagement, and navigability of the DT.

Instrument Reliability and Validity

With a view to providing flexibility in exploring new ideas (Kallio et al., 2016) a semi-structured interview protocol and a FGD protocol were developed for interviews and FGDs respectively. The FGDs protocol was composed of 7 primary questions with adequate probing that align to Duwe's (2017) suggestion of having maximum 12 primary questions for FGDs. Researchers conducted a face validity test by consulting six instructors from the department of zoology who evaluated the clarity, relevance, and neutrality of the questionnaire items for FGDs and interviews. Prior to data collection, a pilot test was conducted involving six participants among the respondents to detect potential issues such as unclear questions or response difficulties ensuring that the instrument was understandable and feasible for the target population. Based on the pilot test, ambiguous or intrusive items were refined to improve clarity and usability (Willis, 2015). This combined process of expert review, pilot testing, participant feedback, and refinement—guided by the Delphi method—enhanced the overall quality, reliability, and applicability of the questionnaire (Boateng et al., 2018).

In addition, researchers employed the content validity index (CVI) to ensure the overall quality of the instruments. A five-point Likert scale, widely recommended for content validity and reliability, was used to ease of interpretation and to reduce response bias compared to scales with too few or too many points (Joshi et al., 2015). CVI, yielded an I-CVI of 0.86 and S-CVI/Ave and S-CVI/UA scores of 0.98 and 0.86, respectively—exceeding the generally accepted thresholds of 0.78 for I-CVI and 0.90 for S-CVI/Ave (Lynn, 1986). These results indicate that the instruments are valid and can be considered reliable to use. Notably, the question item no. Q3, “*Appropriateness of language for the target respondent*” received lower ratings from experts due to the use of English, which may have posed comprehension difficulties for the target students. To address this, the questionnaires were administered in Bangla, making formal language equivalence testing unnecessary (Maneesriwongul & Dixon, 2004).

Intervention Procedure

Participants were provided the link through WhatsApp and Messenger groups. They accessed and opened the DT using their smart phone. Researchers provided essential guidance on how to navigate and use the DT effectively before conducting the sessions in the classroom. During the classes, researchers demonstrated how to use various interactive features, join a Canva live class and navigating between content pages using multimedia. Such guided demonstrations and interactive participation align with digital learning strategies that enhance engagement, confidence, and motivation (Mayer, 2024; Clark & Mayer, 2016).

Data Collection and Analysis

This study employed two qualitative methods—focus group discussions (FGDs) to collect shared experiences and semi-structured interviews for collecting personal and sensitive issues—to explore participants' confidence and challenges in using DT (Kallio et al., 2016). Data collection involved three FGDs (eight participants each, 45–60

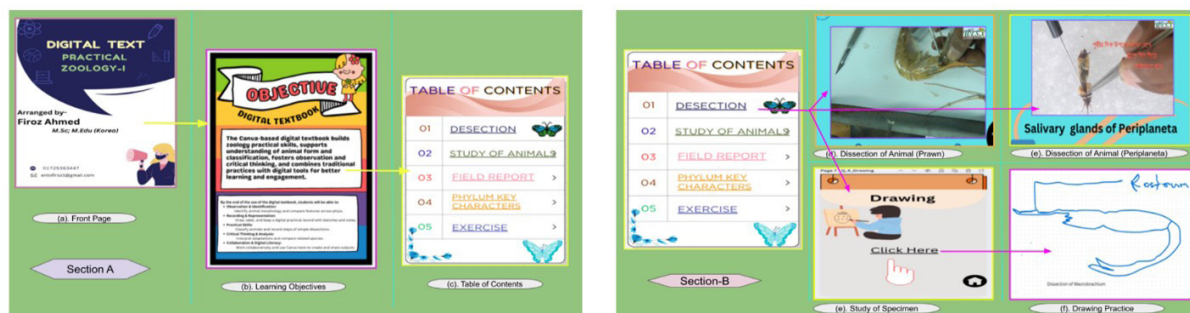
minutes), aligned with recommended FGD size and number for meaningful insight (Krueger & Casey, 2015). Then, ten semi-structured individual interviews (≈ 10 minutes each) were conducted, sufficient to achieve data saturation as no new insights emerged (Kallio et al., 2016). FGDs and Interviews were conducted with all participants between June 15 to July 30, 2025. All sessions were audio-recorded with participants' consent and transcribed verbatim to ensure accuracy and reliability (Creswell & Poth, 2018). Ethical considerations, including confidentiality and secure data storage, were strictly observed.

In this study, thematic analysis was employed to examine qualitative data collected from FGDs and semi-structured interviews. An inductive coding approach was employed through careful review of the transcripts, allowing codes and themes to emerge directly from the data in alignment with the research objectives and ensuring analytical rigor (Braun & Clarke, 2006). Initial codes and themes were reviewed and refined to produce a coherent set of final themes. For instance, in response to the question, *"How comfortable/confident do you feel using a Canva-based digital textbook?"*, four themes *"comfortable to navigate"*, *"more engaging and interesting"*, *"prior experience affecting confidence"* and *"ease of finding"* were identified, each of which was supported by relevant statement, such as *"I feel excellent, comfortable, and at ease using it."* To ensure the trustworthiness of the analysis, each researcher identified codes and generated themes individually and, then, assembled and filtered them collectively. Manual coding was used to identify meaningful segments of data, which were then grouped into broader themes (Nowell et al., 2017). Triangulation was applied by comparing data from FGDs and interviews which enhanced the credibility and consistency of interpretations (Patton, 2015). This systematic approach ensured that the analysis accurately represented participants' perspectives and provided meaningful insights into the research questions (Nowell et al., 2017).

Results

The Developed Canva-Based Digital Textbook

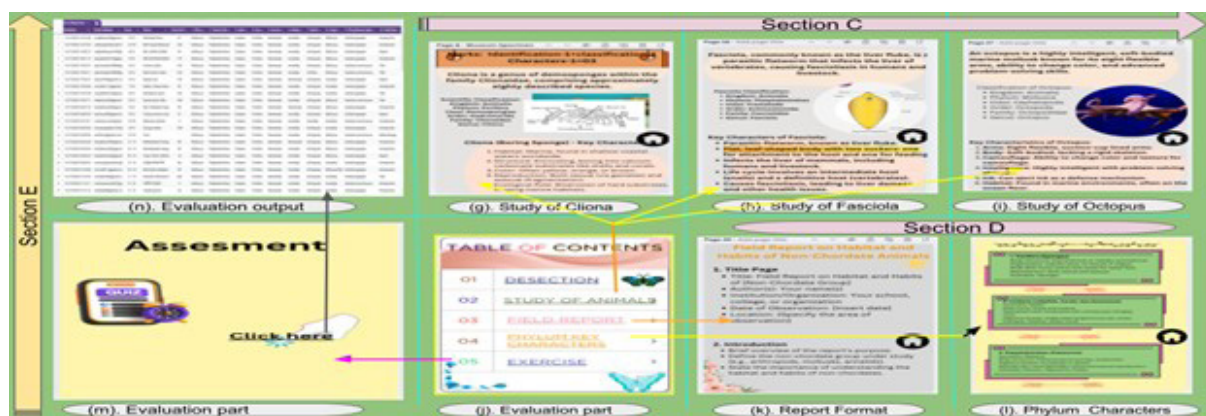
A Canva-based digital textbook (DT) was developed following the structure of the first-year undergraduate practical zoology syllabus. The DT was divided into five sections. The sections were A, B, C, D, and E. In Section A, researchers designed an eye-catching cover page with the book's title (Figure 1, Section A) to capture students' attention, reflecting Mayer's (2024) principle that design features support learners' focus and engagement. This was followed by a page outlining the learning objectives, providing learners with clear outcomes and guiding their focus. The table of contents included interactive navigation, enabling users to move to and fro Sections A–E, supporting learners control and usability (Branch, 2009). Such navigation reduces cognitive effort, aligning with Mayer's discussion of minimizing extraneous load. In Section B, researchers developed dissection activities for animals such as *Periplaneta americana*, *Pila globosa*, and prawn to demonstrate the salivary glands, nervous system, and rostrum, respectively (Figure 1, Section B). Video links from YouTube were embedded to guide observations, after which participants could use the interactive drawing page to draw, label, and erase the observed structures. These features enhance learners' engagement, support active learning, and allow self-directed practice in digital environments (Mayer, 2024).



Note. Cover page (a), objective (b), and table of contents (c) using a link with other sections; Section B = Dissection of animal (d) using YouTube videos and the interactive drawing tool from Canva.

Fig. 1. Features of the developed DT: Section A and B

Sections C and D cover the study of specimens, the format of field reports, and key characteristics of different phyla. The specimen study includes key features, classification, labelled illustrations, and highlighted structures using text and images from online sources (Figure 2, Section C: g–i). Participants can also prepare a field report based on the provided format (Figure 2, Section D: k) and learn the key characteristics of the studied specimens (Figure 2, Section D: l). In Section E, participants completed the collaborative assessment quiz, answering ten questions using Google Forms based on the content presented in the DT (Figure 2, Section E: n), enabling the assessment of learning outcomes and engagement in an interactive digital environment (Mayer, 2024; Branch, 2009).



Note. Section C = Study of specimen; Section D = Format of writing field notes and phyla key characters; Section E = The evaluation part.

Fig. 2. Features of the developed DT: Section C, D and E.

Learning Confidence with DT

The findings indicate (Table 2) a high level of student confidence in using the Canva-based DT. Most students felt comfortable navigating the textbook (n=21) and found it engaging and interesting (n=16), showing that usability and visual appeal positively influenced confidence. The clickable design and layout made information easy to locate (n=9), supporting independent use and reflecting strong learner self-efficacy (Bandura, 1997). Prior experience also influenced

confidence (n=4), as students familiar with Canva adjusted more quickly, consistent with the Technology Acceptance Model emphasizing perceived ease of use (Davis, 1989). Multimedia features such as videos and animations enhanced understanding and memory (n=27), chunked content reduced overload (n=12), and hyperlinks improved efficiency (n=17), aligning with the Cognitive Theory of Multimedia Learning (Mayer, 2020).

Clear navigation, including easy movement between sections (n=16), clear headings (n=13), and logical structure (n=15), further increased confidence. Students reported better focus (n=17), quicker understanding (n=13), and reduced anxiety (n=27), indicating both cognitive and emotional benefits (Pekrun, 2006). Compared to traditional textbooks, confidence was higher due to interactivity (n=31), accessibility (n=18), and feedback (n=9), supporting learning improvement (Awidi & Klutsey, 2025). Most students recommended continued use (n=28), with only one concern about internet access (n=1).

Table 2. Students' perceptions on learning confidence with Canva-Based DT

Questions	Themes (Number of respondents)	Quotations from Respondents
1. How comfortable /confident do you feel using a Canva-based DT?	Comfortable to navigate (21)	<i>'I feel excellent, comfortable, and at ease using it.'</i>
	More engaging (16)	<i>'Because it's interactive, I feel less intimidated but engaging'</i>
	Prior experience affecting confidence. (4)	<i>'I used Canva before, so the textbook felt natural.'</i> <i>'This is my first time using Canva, so I'm still learning it.'</i>
	Ease of finding (9)	<i>'I like that everything is clickable and easy to jump between sections.'</i>
2. What features of DT make learning easier and compatible for you?	Chunked content (12)	<i>'The text is broken into small sections, so it doesn't feel overwhelming.'</i>
	Videos and animation support learning and retention. (27)	<i>'The videos and animation help me understand the lessons faster.'</i>
	Links make learning conducive (17)	<i>'Hyperlinks save me time—I didn't scroll endlessly to find information.'</i>
3. Do you find it easy to locate relevant information in DT?	Ease of navigation (16)	<i>'I can navigate chapters easily.'</i>
	Clarity of headings (13)	<i>'Headings make it easy to find things.'</i>
	Well organized and logical structure (15)	<i>'Everything is arranged in a logical order, so it's easy to follow.'</i>
4. Does the DT help you better understand the lesson and reduce anxiety?	Grasp concepts quickly (13)	<i>'The interactive portions help to grasp the concept quickly'</i>
	More focused (17)	<i>'I stay more focused because the app is visually appealing'.</i>
	Ease worry or stress (27)	<i>'It lowers my stress because everything I need is in one place.'</i>
5. Do you feel more confident learning from DT compared to PT? Why ?	Interactive features increase confidence (31)	<i>'Interactive features help me grasp difficult concepts faster'.</i>
	Accessible and convenient (18)	<i>'Studying anywhere gives me control.'</i>
	Real-time feedback encourage improvement (9)	<i>'Immediate feedback motivates me.'</i>
6. Would you recommend the continued use of the DT in the future?	Strong recommendation due to convenience (28)	<i>'I like having lessons on the go, so I definitely recommend continuing it'.</i>
	Support because of enhanced learning tools (5)	<i>'The interactive exercises make studying more fun and effective'.</i>
	Conditional recommendation: Improve technical issues (1)	<i>'Wi-Fi should be free and available for all'.</i>

Note. Values in parentheses indicate the number of respondents endorsing each theme.

Challenges in Learning with the DT

Cognitive Challenges

The findings indicate (Table 3) that most participants experienced minimal cognitive challenges while using the Canva-based DT. A majority (n=30) found it easy to use, while a few (n=3) experienced initial unease but adapted quickly. Some (n=11) faced manageable language barriers due to the English content (Willis, 2015). The content was generally well-structured (n=31), facilitating navigation, and the layout was considered user-friendly by almost all participants (n=34). Searching for required information was straightforward for all (n=34). Visual challenges were rare, with most (n=32) reporting no issues, though a few (n=2) experienced eye strain related to vision problems. However, most participants (n=25) favoured the DT for its portability and convenience; some (n=6) depended on internet access, and a few (n=3) preferred PT for note-taking (Mayer, 2024).

Table 3. Cognitive Challenges Using the Canva-Based DT

Questions	Themes (Number of respondents)	Quotations from Respondents
1. Did you find DT harder to use?	No difficulty (30)	<i>'I feel easy to use the DT.'</i>
	Initial difficulty (3)	<i>'Initially uneasy, but I adjusted quickly.'</i>
	Manageable language barrier (11)	<i>'DT's English language was quite difficult for me but manageable.'</i>
2. Did you find the arrangement of DT challenging?	Well-structured content (31)	<i>'Good structure made learning easier.'</i>
	Adaptation to new technology (3)	<i>'I thought it was challenging for first time but I quickly adjust myself.'</i>
3. How did you find the layout of the DT?	User-friendly layout (34)	<i>'We found it perfect and relevant to course'</i>
4. Did you face any challenge in searching information in DT?	Easy and smooth search experience (34)	<i>'I got all the required information on DT easily.'</i>
5. Did you feel any other cognitive challenges using DT compared to PT?	No challenge (32)	<i>'Since I can use it at my own discretion, it is not a significant concern.'</i>
	Visual strain & anxiety (2)	<i>'... but I experienced eye strain due to my vision problems.'</i>
	Problems in taking notes (3)	<i>'I'm comfortable using DT for reading, but for note-taking I prefer PT.'</i>

Note. Values in parentheses indicate the number of respondents. DT = Digital Textbook; PT = Printed Textbook.

Technological Challenges

The study examined technological challenges (Table 4) in using a Canva-based digital textbook (DT). Most respondents reported adequate internet access (n=34) via Wi-Fi or personal data, supporting effective online learning (Al-Fraihat et al., 2020; Tsai & Tsai, 2010). The DT functioned well across devices (n=34), although one participant experienced issues due to a low-configuration smartphone, highlighting potential device limitations (Salas et al., 2018). Performance was largely error-free (n=30), with minor video streaming delays reported by three students, consistent with studies on multimedia-based digital learning tools (Cheng, S. et al., 2024). Access to the DT was mostly barrier-free (n=32), with only two first-time users facing initial difficulties, indicating high usability (Bandura, 1997). Most materials were easily downloadable (n=25), while nine respondents indicate didn't need downloading the materials. Printing was optional and posed no issues (n=34). All participants considered the DT cost-effective (n=34) and used it on mobile devices (n=34), although 31 respondents lacked access to tablets or computers, reflecting reliance on smartphones for

Table 4. Technological Challenges with Canva-based Digital Textbook

Questions	Themes (Number of respondents)	Quotations from Respondents
1. Did you face internet access or connectivity problems to use DT?	Adequate internet access (34) Internet resource access (34)	<i>'I had no problem with internet access.'</i> <i>'I had Wi-Fi internet access.' 'I used personal internet data.'</i>
2. Did the DT work properly on your device?	Multi-device functionality (34)	<i>'I felt no problem with devices.'</i>
3. Did you face a loading error using the DT?	Video streaming delays (3) Error-free performance (30) Smartphone capability issues (1)	<i>'Sometimes videos took time to load.'</i> <i>'I felt no problem, no loading error.'</i> <i>'My low-configuration cell phones created problems.'</i>
4. Did you face access problems using DT?	Barrier-free entry (32) Initial difficulty (2)	<i>'I did not feel access problems.'</i> <i>'First-time use was uneasy.'</i>
5. Did you face a problem downloading the DT materials?	Easily downloadable (25) Access without downloading (9)	<i>'materials are easily downloadable.'</i> <i>'I've accessed without downloading DT.'</i>
6. Did you face a problem in printing DT?	Optional print capability (34)	<i>'I did not need to print, but it could easily be printed.'</i>
7. Did you feel DT was more expensive compared to PT?	Cost-effective accessibility (34)	<i>'I used it free of cost.'</i> <i>'I did not need money but required internet access.'</i>
8. Did you use DT on your cell phone?	Mobile device usability (34)	<i>'I used DT on my cell phone.'</i>
9. Did you use the DT on tablets or computers?	Device availability constraints (31)	<i>'I did not have a computer or tablet.'</i>

Note: Numbers in parentheses represent the number of respondents. DT = Digital textbook; PT = Printed textbook.

digital learning (Al-Fraihat et al., 2020). Overall, results indicate that the DT provided a reliable, accessible, and low-cost learning solution with minimal technological challenges.

Motivational Challenges

The study examined motivational challenges (Table 5) in using a Canva-based DT. Most respondents reported enhanced motivation (n=25) and increased interest (n=9) when using the DT, indicating its positive influence on learner engagement (Ryan & Deci, 2020). Interest was largely maintained (n=30), and some participants (n=4) appreciated the time-saving aspects of the DT. The content was found consistent with the syllabus (n=26) and aligned with exam question patterns (n=20), reflecting its academic relevance (Bandura, 1997). A majority of students preferred DT over PT (n=31), while 15 participants highlighted motivation through innovative and interactive features. All respondents (n=34) found the DT engaging due to its links, videos, activities, and visuals and recommended its continued use for future cohorts. Overall, the DT boosted motivation, engagement, and learning efficiency.

Table 5. Motivational Challenges with Canva-based DT

Questions	Themes (Number of respondents)	Quotations from Respondents
1. Did you feel less motivated using Canva-based DT?	Enhanced motivation (25) Increased motivation (9)	<i>'I fell highly motivated.....'</i> <i>'I think it is good and interesting.'</i>
2. Did the use of DT lose interest?	Maintain interest (30) Time saving (4)	<i>'I felt interested in using DT.'</i> <i>'I like it, It saves time.'</i>
3. Did you face inconsistency in the readout of DT according to the syllabus?	Consistency with syllabus (26) Align with question pattern (20)	<i>'I got the well-decorated DT that was consistent with syllabus.'</i> <i>'It was consistent with our exam questions pattern.'</i>
4. Was the DT more motivating than the PT?	Preference for DT (31) Motivation through innovation (15)	<i>'DT motivated me more than PT.'</i> <i>'...motivated because it's new and innovative for interactive reading.'</i>
5. Did you find the DT was disengaging?	Interactive and engaging (34)	<i>'I found the link, video, activities and pictures to be engaging.'</i>
6. Would you suggest to use DT continuously?	Recommendation for continued use (34)	<i>'It should be used further.' 'I recommend it strongly'</i>

Note: Numbers in parentheses represent the number of respondents. DT = Digital textbook; PT = Printed textbook.

Discussions

The development and implementation of a Canva-based DT for first-year undergraduate practical zoology demonstrated significant pedagogical benefits, improving usability, reducing cognitive load, enhancing functionality, and boosting motivation. The DT was structured according to the ADDIE instructional design model, incorporating five sections (A–E) (Figure 1 & 2). Section A featured an attractive cover, clear objectives, and an interactive contents page that improved focus and navigation, following Mayer's (2024) multimedia learning principles. Section B presented dissection activities with embedded videos and drawing tools, promoting active, self-directed, and visually supported learning (Mayer, 2020). Sections C and D offered structured text, images, and animations to support specimen study, field reports, and understanding of key phyla. Section E used Google Forms for collaborative assessments and real-time feedback, aligning with research on the value of formative assessment for enhancing engagement and mastery (Awidi & Klutsey, 2025).

Student responses indicated a high level of confidence in using the Canva-based DT (Table 2). Most participants reported comfort with navigation ($n=21$) and perceived the textbook as engaging ($n=16$), suggesting that usability and visual appeal are critical factors in fostering learner self-efficacy (Bandura, 1997; Scherer et al., 2019; Mayer, 2020). Prior experience with Canva ($n=4$) facilitated adjustment to the digital format, highlighting the influence of perceived ease of use on technology adoption, as suggested by the Technology Acceptance Model (Davis, 1989; Sugiyani et al., 2024). Multimedia features such as videos, animations, and hyperlinks were particularly effective in supporting comprehension, knowledge retention, and efficient information retrieval ($n=27$, 17), aligning with the Cognitive Theory of Multimedia Learning (Mayer, 2020).

Cognitive challenges were minimal among participants (Table 3), with most students ($n=30$) reporting ease of use. Initial adjustment difficulties were limited ($n=3$), and language barriers in English were manageable ($n=11$). The content layout and structure were widely regarded as user-friendly ($n=34$), and information search was straightforward ($n=34$), supporting independent learning and minimizing cognitive overload (Sweller et al., 2019). Visual strain was rare ($n=2$), suggesting that careful design can reduce potential ergonomic and perceptual challenges in digital learning environments. Notably, most participants preferred the DT over PT ($n=25$), citing portability, convenience, and cost-effectiveness, although a minority noted constraints related to mobile data affordability or note-taking preferences ($n=9$), reflecting contextual considerations in digital learning adoption (Tsai & Tsai, 2010). Technological challenges were generally minimal (Table 4). Internet access was adequate for all participants ($n=34$), and the DT performed well across devices ($n=34$), although one participant with a low-configuration smart-phone experienced performance limitations. Occasional video streaming delays ($n=3$) were reported, consistent with prior research highlighting bandwidth-dependent variability in digital learning tools. The DT was considered cost-effective ($n=34$), compatible with smart-phones ($n=34$), and largely accessible without downloading materials, demonstrating that digital textbooks can offer reliable, low-cost alternatives to traditional printed resources (Al-Fraihat et al., 2020). Motivational outcomes were highly positive (Table 5). Students reported enhanced motivation ($n=25$) and increased interest ($n=9$), while the majority maintained engagement throughout the learning process ($n=30$). The alignment of the DT with syllabus requirements ($n=26$) and exam question patterns ($n=20$) reinforced its academic relevance and encouraged sustained engagement (Bandura, 1997).

Interactive features—including videos, links, and activities—were universally cited as engaging ($n=34$), supporting previous findings that multimedia interactivity can enhance intrinsic motivation in digital learning (Ryan & Deci, 2020). Furthermore, most participants recommended the continued use of the DT ($n=34$), underscoring its perceived effectiveness as a modern educational tool.

Overall, the findings suggest that Canva-based DT was well-designed which enhance students' confidence in practical zoology by improving cognitive accessibility, technological usability, and student motivation. These results contribute to the growing evidence that DTs, when thoughtfully designed, can foster confidence, enhance self-efficacy, reduce learning-related anxiety, and promote active engagement in higher education science curricula (Pekrun, 2006; Mayer, 2024).

Conclusions and Recommendations

The study contributes to the growing body of research on digital learning by demonstrating that Canva-based DTs can enhance student confidence, motivation, and accessibility in undergraduate zoology education. The structured design of the DTs, their integration of multimedia elements, and their alignment with syllabus content provided both learning support and assessment opportunities. Although minor challenges related to language barriers, the language of the DT can also be adapted to meet the specific needs of students, screen strain, and device limitations were identified, these did not outweigh the overall benefits of the digital format.

For pedagogical practice, educators are encouraged to integrate Canva-based DTs into both laboratory and field-based teaching, ensuring that multimedia components align with curricular objectives. Institutions should also provide language support and promote healthy digital practices to mitigate potential challenges. From a policy perspective, universities could adopt digital textbooks as sustainable and cost-effective alternatives to print, particularly in resource-constrained contexts.

For future research, longitudinal studies are needed to explore the long-term impacts of DTs on academic performance, skill development, and student well-being. Comparative studies across disciplines and institutions would further validate these findings and refine best practices in DT design.

Overall, this study highlights the considerable promise of Canva-based DTs as pedagogical tools in higher education, particularly in disciplines that depend on interactive, visual, and practice-oriented learning environment.

Conflicts of Interest

The author(s) declared no conflicts of interest.

References

- Ahmed, F., & Kwon, Y.-J. (2022). Development of a graphic-based digital textbook on biology learning for Bangladesh higher secondary students. *Brain, Digital, & Learning*, 12, 579–590. <https://doi.org/10.31216/BDL.20220035>

- Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating e-learning systems success: An empirical study. *Computers in Human Behavior*, 102, 67–86. <https://doi.org/10.1016/j.chb.2019.08.004>
- Al-Hariri, M. T., & Al-Hattami, A. A. (2017). Impact of students' use of technology on their learning achievements in physiology courses at the University of Dammam. *Journal of Taibah University Medical Sciences*, 12, 82–85. <https://doi.org/10.1016/j.jtumed.2016.07.004>
- Awidi, I. T., & Klutsey, J. Q. (2025). Using online critical reflection to enhance students' confidence, motivation, and engagement in higher education. *Technology, Knowledge and Learning*, 30, 1499–1534. <https://doi.org/10.1007/s10758-024-09751-4>
- Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. W. H. Freeman. https://openlibrary.org/books/OL25096527M/Self_Efficacy
- Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quinonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: A primer. *Frontiers in Public Health*, 6, Article 149. <https://doi.org/10.3389/fpubh.2018.00149>
- Branch, R. M. (2009). *Instructional Design: The ADDIE Approach* (2nd ed.). Springer. <https://doi.org/10.1007/978-0-387-09506-6>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Canva. (2025). Canva for education: Creating interactive learning materials with Canva. <https://www.canva.com/education/resources>
- Cheng, S., Cheng, H., Su, S., Ming, L., Masud, S., Wang, Q., & Huang, Y. (2024). Motion design principles for accessible video-based learning: Addressing cognitive challenges for deaf and hard of hearing learners. *arXiv preprint arXiv:2410.00196*.
- Clark, R. C., & Mayer, R. E. (2016). *E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning* (4th ed.). John Wiley & Sons. <https://doi.org/10.1002/9781119239086>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing among Five Approaches* (4th ed.). SAGE Publications. <https://us.sagepub.com/en-us/nam/qualitative-inquiry-and-research-design/book246896>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319–340. <https://doi.org/10.2307/249008>
- Deneen, C., & Boud, D. (2021). Active learning through multimedia: Impact on motivation and engagement. *Higher Education Research & Development*, 40, 1067–1082. <https://doi.org/10.1080/07294360.2021.1884112>
- Delgado, P., Vargas, C., Ackerman, R., & Salmerón, L. (2018). Don't throw away your printed books: A meta-analysis on the effects of reading media on reading comprehension. *Educational Research Review*, 25, 23–38. <https://doi.org/10.1016/j.edurev.2018.09.003>
- Duwe, B. E. (2017). *A Collective Case Study: Student Voice and the Implications for Partnership, Activism and Leadership* (Unpublished Doctoral Dissertation). University of Denver, United States. Digital Commons @ DU. <https://digitalcommons.du.edu/etd/1374>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5, 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, 7, 396–403. <https://doi.org/10.9734/BJAST/2015/14975>

- Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, 72, 2954–2965. <https://doi.org/10.1111/jan.13031>
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35, 382–385. <https://doi.org/10.1097/00006199-198611000-00017>
- Maneesriwongul, W., & Dixon, J. K. (2004). Instrument translation process: A methods review. *Journal of Advanced Nursing*, 48, 175–186. <https://doi.org/10.1111/j.1365-2648.2004.03207.x>
- Mayer, R. E. (2020). *Multimedia Learning* (3rd ed.). Cambridge University Press. <https://doi.org/10.1017/9781316941355>
- Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review*, 36, 8. <https://doi.org/10.1007/s10648-023-09842->
- Molenda, M. (2003). In search of the elusive ADDIE model. *Performance Improvement*, 42, 34–36. <https://doi.org/10.1002/pfi.4930420508>
- Nouri, J., Cerratto-Pargman, T., & Sahin, I. (2020). Digital competence and self-efficacy in higher education. *Education and Information Technologies*, 25, 3195–3214. <https://doi.org/10.1007/s10639-019-10088-4>
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet trustworthiness criteria. *International Journal of Qualitative Methods*, 16, 1–13. <https://doi.org/10.1177/1609406917733847>
- Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice* (4th ed.). SAGE Publications. <https://collegepublishing.sagepub.com/products/qualitative-research-evaluation-methods-4-232962>
- Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, 18, 315–341. <https://doi.org/10.1007/s10648-006-9029-9>
- Rockinson-Szapkiw, A. J., Courduff, J., Carter, K., & Bennett, D. (2013). Electronic versus traditional print textbooks: A comparison study on the influence of university students' learning. *Computers & Education*, 63, 259–266. <https://doi.org/10.1016/j.compedu.2012.11.022>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Press. <https://doi.org/10.1521/978.14625/28806>
- Salas-Morera, L., Quiroga, J., & Molleda, J. (2018). Digital learning tools and their impact on student performance in higher education. *Educational Technology & Society*, 21, 240–253.
- Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, 128, 13–35. <https://doi.org/10.1016/j.compedu.2018.09.009>
- Sugiarni, S., Widiastuti, D. E., & Tahrin, T. (2024). The implementation of Canva as a digital learning tool in English learning at vocational school. *English Learning Innovation*, 5, 264–276. <https://doi.org/10.22219/englie.v5i2.34839>
- Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive Load Theory*. Springer. <https://doi.org/10.1007/978-1-4419-8126-4>
- Tsai, M.-J., & Tsai, C.-C. (2010). Information literacy in high school: A theoretical model. *Computers & Education*, 54, 470–476. Retrieved from <https://www.sciencedirect.com/journal/computers-and-education/vol/54/issue/2>
- Wang, Y., & Zhang, W. (2024). The relationship between college students' learning engagement and academic self-efficacy: A moderated mediation model. *Frontiers in Psychology*, 15, Article 1425172. <https://doi.org/10.3389/fpsyg.2024.1425172>

- Willis, G. B. (2015). *Cognitive Interviewing: A Tool for Improving Questionnaire Design* (2nd ed.). Sage Publications. <https://doi.org/10.4135/9781412983655>
- Zilka, G. C., Finkelstein, I., Cohen, R., & Rahimi, I. D. (2021). Implications of the digital divide for the learning process during the COVID-19 crisis. *Review of European Studies*, 13, 57–71. <https://doi.org/10.5539/res.v13n2p57>

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