

Rethinking Learning Through AI-Powered Digital Note-Taking in Bangladeshi Higher Education

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Abstract

This study explores how AI-powered digital note-taking is reshaping learning strategies in Bangladeshi higher education. Focusing on emerging tools such as ChatGPT, Google Gemini, Notebook LM, and Notion AI, the study examines the transition from traditional note-taking practices toward intelligent knowledge management systems. The paper analyses how AI-assisted note-taking supports knowledge construction, personalized learning, academic productivity, and information organization while also addressing challenges related to digital inequality, AI dependency, academic integrity, and ethical use. A qualitative theoretical research methodology is adopted, based on the analysis of existing scholarly literature, theories, and research on digital learning and artificial intelligence in education. The study is intended for higher education students, educators, and researchers interested in technology-supported learning practices. The findings suggest that AI-powered note-taking can enhance learning strategies when integrated with critical thinking and responsible academic practices.

Keywords: AI-Powered Digital Note-Taking, Large Language Models, Higher Education in Bangladesh, Digital Learning, Learning Strategies.

1. Introduction

The fast development of artificial intelligence (AI) has greatly affected the processes of knowledge creation, access, and management in the higher educational institution. The technologies of digitization have revolutionized the conventional ways of learning through offering students new methods of communication, collaboration, and academic management. One of the learning techniques offered by digital technologies is digital note-taking, which

allows the learner to structure information, make connections between ideas and manage his personal academic resources. The combination of AI and digital note-taking has brought about even more opportunities for learning through the intelligent functions of summarizing, explaining, structuring, and interactive knowledge management (Holmes et al., 2019; Zawacki-Richter et al., 2019).

Traditionally, note-taking was considered a cognitive activity that helped students process information, improve memory, and prepare for academic tasks. Effective note-taking requires learners to identify important concepts, reorganize information, and connect new knowledge with existing understanding (Kieran, 1985; Pilot et al., 2005). However, the arrival of digital note-taking platforms like Notion, Microsoft OneNote, and Ever note has transformed the practice of note-taking because they help students save, modify, find, and organize academic material in an efficient manner. In recent years, there has been the development of artificial intelligence-based software that includes Catgut, Google Gemini, Notebook, and Notion AI that has added another layer to note-taking activities (Canseco et al., 2023). This transformation reflects the broader evolution of educational technology, where earlier technology-supported learning approaches gradually developed into digital and AI-assisted learning environments (Hassan et al., 2026).

In the higher education context, these trends imply a transition from mere data collection to the process of knowledge creation. AI-driven digital note-taking platforms may help students deal with vast amounts of educational data and engage in self-study by creating individualized learning settings for them. However, the growing prevalence of AI also poses many challenges associated with academic dishonesty, dependence on technology, data precision, privacy, and digital inequality (Cotton et al., 2023; Ng et al., 2021). Therefore, understanding the educational implications of AI-powered note-taking requires both an examination of its opportunities and a critical analysis of its limitations.

The importance of this topic is especially true in the situation where Bangladeshi universities are experiencing increased use of digital technologies and AI applications for educational purposes by the students. While the studies on the use of AI technology in education have become widespread all over the world, there has been insufficient work done on the topic of AI-based digital note-taking as a unique method of learning in Bangladeshi universities. There are no existing works that pay special attention to the impact of multiple AI-based note-taking systems on the students' study process.

The goal of this research is to investigate the impact of artificial intelligence on the methods of learning through note-taking in Bangladeshi higher education institutions. The change from the conventional method of taking notes to AI-based note-taking systems is investigated. Furthermore, this paper examines the involvement of such programs as Catgut, Google Gemini, Notebook, and Notion AI in building knowledge, personalization of learning and increased academic productivity. Moreover, the difficulties related to using AI for note-taking, such as digital divide, dependency on technology, academic dishonesty and ethics, are discussed.

2. Literature Review

2.1. Traditional Note-Taking and Learning

The practice of note-taking is well-known for being an important aspect in higher education due to its role in facilitating information processing and understanding, as well as memorization. Note-taking is not just about writing down information; it involves identifying important points, organizing ideas, and making summaries (Kieran, 1985; Pilot et al., 2005). Research has consistently shown that students who take well-organized notes demonstrate better recall and deeper conceptual learning than those who rely solely on reading or listening (Kieran, 1985; Mayer, 2021).

The technique employed in taking notes also plays a role in determining the outcomes of learning. The use of handwritten notes makes it more likely that the learner will engage in deep processing, as they are required to summarize the content rather than type out lectures word-for-word (Mueller & Oppenheimer, 2014). Nevertheless, both traditional and digital note-taking contribute to learning when students actively organize and review their notes rather than treating them as passive records of information (Pilot et al., 2005; Mayer, 2021).

2.2 Digital Note-Taking in Higher Education

The growing prevalence of digital technology has enabled note-taking to evolve from being done with traditional paper to becoming a more adaptive form of knowledge management. Note-taking can now be accomplished through the use of tools like Microsoft OneNote, Ever note, and Notion that enable the arrangement of lecture notes, scholarly articles, and other media sources into searchable online platforms (Selwyn, 2016; Davenport & Prussic, 1998). This shift represents a broader transformation of educational practices, where technology has continuously reshaped teaching and learning approaches from earlier technology-supported methods to contemporary digital learning environments (Hassan et al., 2026).

Note taking through digital means also encourages personalized learning by providing the capacity to categorize information, make connections through hyperlinks, and synchronize notes from different devices. These features allow the students to develop a network of their learning system rather than disconnected notes (Selwyn, 2016; Mayer, 2021). However, research also suggests that technology alone does not improve learning outcomes. Educational benefits depend on how students organize, review, and critically engage with their digital notes during the learning process (Selwyn, 2016; Mayer, 2021).

2.3. AI-Powered Note-Taking and Large Language Models

Recent advancements in artificial intelligence have brought about a new generation of note-taking applications that are powered by Large Language Models (LLMs). Note-taking platforms like Catgut, Google Gemini, Notebook, and Notion AI enhance the capabilities of existing digital note taking systems by offering functionalities like text summarization, explanation of concepts, question generation, and organization of knowledge. These programs turn notes into interactive learning environments for students to participate in an ongoing conversation with educational material (Holmes et al., 2019; Canseco et al., 2023).

The growing use of AI in higher education has attracted considerable scholarly attention. Research suggests that AI can support personalized learning, improve academic productivity, and reduce the time required for information management (Lucking et al., 2016; Holmes et al., 2019). Systematic reviews also indicate that AI has considerable potential to enhance teaching and learning, although concerns remain regarding accuracy, ethical use, academic integrity, and excessive dependence on AI-generated content (Zawacki-Richter et al., 2019; Cotton et al., 2023; Ng et al., 2021). Consequently, current literature presents AI as both an educational opportunity and a challenge that requires responsible integration into higher education.

2.4. Research Gap

Research has been conducted extensively on conventional note-taking, digital learning tools, and the general use of AI in education. Previous research has shown the benefits that come with taking notes, the organizational benefits of digital tools, and the educational applications of artificial intelligence (Kieran, 1985; Holmes et al., 2019; Zawacki-Richter et al., 2019). However, limited research has specifically investigated AI-powered digital note-taking as a distinct learning strategy that integrates Large Language Model (LLM)-based tools within higher education.

Moreover, there is a lack of empirical research that analyzes several AI-based note-taking software applications such as Catgut, Google Gemini, Notebook, and Notion AI in a single theoretical framework instead of studying the use of one or more AI applications or the overall AI use separately. There is an even greater lack of empirical research in the context of the Bangladesh higher education system even when the use of AI-based learning systems has increased among university students. This study aims to fill this gap.

3. Methodology

3.1. Research Design

This study adopts a qualitative theoretical research design to examine the role of AI-powered digital note-taking in reshaping learning strategies in Bangladeshi higher education. The study focuses on interpreting existing scholarly discussions rather than collecting quantitative data.

3.2. Data Sources

The research is based on secondary data such as peer reviewed journal articles, academic books and research papers concerning artificial intelligence, digital learning, large language models and higher education. Literature was chosen to examine the use of artificial intelligence for note taking and its implications in education.

3.3 Analytical Approach

A thematic analysis approach is applied to identify major patterns and concepts within the selected literature. The analysis focuses on four key areas: the transformation from traditional to AI-powered note-taking, knowledge construction, student learning behavior, and challenges of AI integration in higher education. Theoretical perspectives, including Constructivist Learning Theory, Connectives Theory, and Cognitive Load Theory, are used to interpret these themes.

4. Theoretical Framework

This study is guided by three complementary theories: Constructivist Learning Theory, Connectives Theory, and Cognitive Load Theory (CLT). Together, these theories explain how AI-powered digital note-taking influences knowledge construction, digital learning, and students' cognitive engagement in Bangladeshi higher education.

4.1. Constructivist Learning Theory

The Constructivist Learning Theory postulates that the learning process is active and involves the learners creating knowledge through the connections made between new information and their prior experience. The creation of knowledge occurs through the interpretation and reflection of the information, not simply receiving it (Piaget, 1972; Vygotsky, 1978). This perspective is highly relevant to AI-powered digital note-taking because modern note-taking extends beyond information storage and encourages learners to analyze, reorganize, and connect academic content.

Conventionally, note-taking has always been an advocate of constructivism because of the way students would summarize the lecture and write their ideas in their own language. With AI, note-taking not only includes this but also offers smart support through features like summarization, concept explanation, question formulation, and knowledge mapping. AI-based platforms that allow users to engage with data in an active manner include Notion AI, Catgut, Google Gemini, and Notebook (Holmes et al., 2019; Canseco et al., 2023).

Constructivism is however equally concerned about the importance of learners' cognitive efforts in creating meaning from learning experiences as opposed to use of technology in doing so. AI systems can arrange and interpret information but learners are required to judge information, challenge AI responses and make their own meaning of the information. Consequently, Constructivist Learning Theory is an appropriate theory for this study (Mayer, 2021; Ng et al., 2021).

4.2. Connectives Theory

According to Connectives, learning takes place in the digital environment when knowledge is spread out in a network comprising people, technology, and information resources. This theory posits that successful learning not only requires knowing something but also finding, evaluating, and connecting various forms of information from different digital resources (Siemens, 2005; Downs, 2012). This perspective reflects the realities of modern higher education, where students increasingly depend on digital platforms for learning and research.

Digital note taking with the help of AI is highly compatible with the connectives theory of learning since it allows for the creation of interconnected learning spaces as opposed to mere note compilations. Students are able to merge their lecture notes, journal entries, web pages, multimedia materials, and even explanations provided by AI into a comprehensive knowledge base. Tools powered by Large Language Models (LLMs) take it a step further (Holmes et al., 2019; Canseco et al., 2023).

However, Connectives also stresses the need to assess the quality of the information that is found on the digital networks. Responses generated by artificial intelligence may be inaccurate and incomplete, which is why digital literacy and AI literacy become very important in academia. Consequently, it becomes necessary for students to cross-check AI-generated information with reliable scholarly sources (Ng et al., 2021; Williamson & Etymon, 2020).

4.3. Cognitive Load Theory

Cognitive Load Theory (CLT) asserts that learning is affected by the finite nature of working memory. Successful learning takes place when extraneous cognitive load is minimized but at the same time the learner is still cognitively active in processing information (Seller, 1988; Seller et al., 2019). This theory helps explain both the advantages and limitations of AI-powered digital note-taking.

AI-based note-taking apps lower the extraneous cognitive load by automating tedious processes associated with academic work, including organization of notes, summarization of articles, access to information, and creation of questions for studying. In doing so, the use of AI allows students to spend more time on evidence analysis and argumentation (Holmes et al., 2019; Mayer, 2021). These functions are particularly valuable in higher education, where students regularly manage large amounts of academic information.

However, too much dependence on AI could decrease productive mental efforts in case students depend on the automated summarizations and explanations provided by AI. Effective learning needs a person to analyze, assess, and understand the information presented rather than simply accept the answer from AI. Therefore, AI should make work easier but still keep it mentally stimulating (Canseco et al., 2023; Carr, 2010).

5. Analysis and Discussion

5.1. From Traditional Notes to AI-Powered Knowledge Systems

The study shows that the act of taking notes in higher education institutions has developed from merely being a process of recording to becoming a dynamic system for organizing and learning knowledge. Note-taking in its classical form was mainly concerned with the act of capturing information from lectures and texts in order to help one remember and prepare for examinations. In other words, note-taking involved a lot of cognitive skills such as summarization and identification of ideas (Kieran, 1985; Pilot et al., 2005; Mueller & Oppenheimer, 2014).

This has been transformed by the widespread use of technology in recent times. Technology-based note-taking tools, including Notion, Microsoft OneNote, and Ever note, enable students to manage their lecture notes, research papers, multimedia materials, and personal notes in searchable and interlinked spaces. Hence, the process of taking notes has evolved from keeping information to managing knowledge by organizing and retrieving academic materials effectively (Davenport & Prussic, 1998; Selwyn, 2016; Mayer, 2021). This evolution reflects the broader transformation of educational practices, where technology has gradually shifted learning from traditional instructional approaches toward digitally connected and technology-supported environments (Hassan et al., 2026).

The use of artificial intelligence has made this evolution happen much faster. The platforms that have the support of language models such as Catgut, Google Gemini, and Notebook can perform tasks such as summarizing texts, explaining concepts, generating questions for revision, and linking information from multiple sources together. It is through these abilities that students get to engage with the information instead of just storing it (Holmes et al., 2019; Canseco et al., 2023; Zawacki-Richter et al., 2019).

Stage	Primary Function	Learning Focus
Traditional note-taking	Recording information	Memory and review
Digital note-taking	Organizing information	Knowledge management
AI-powered note-taking	Analyzing and connecting information	Knowledge construction

Table 1: Evolution of Note-Taking Practices in Higher Education

It also shows the bigger picture of changes in knowledge management at higher education institutions. AI-assisted notes help to structure complicated information, establish connections between various pieces of information, and access relevant sources. Still, technologies used for this purpose cannot substitute critical thinking since true learning is always dependent on students' ability to critically analyze the information and draw their conclusions (Davenport & Prussic, 1998; Siemens, 2005; Mayer, 2021).

In higher education in Bangladesh, the application of AI in note-taking has a potential for bringing positive impacts in terms of organizational skills and developing independent learners. However, the success of such an effort is contingent on the digital skillset and ethics of the students in making use of AI as a learning tool (Ng et al., 2021; van Disk, 2020; Canseco et al., 2023).

5.2. AI-Powered Note-Taking and Knowledge Construction

According to the analysis, AI-driven digital note-taking has transformed notes from being information storage places to become instruments which facilitate knowledge construction processes. As opposed to traditional note-taking that is mainly concentrated on information recording and revision, AI-driven applications provide opportunities for students to make sense of, organize, and synthesize knowledge through constant interaction with digital sources. It is learner-centered strategy, in which learners interact with information rather than receive it passively (Piaget, 1972; Vygotsky, 1978; Mayer, 2021).

Constructivist learning theory can serve as an excellent framework to comprehend this change in education. The key element of constructivism is connecting newly learned information to previous knowledge and experience instead of memorizing facts and figures. AI-driven note-taking tools help to do so by providing users with connections between ideas, structuring

information, and producing explanations (Piaget, 1972; Vygotsky, 1978; Holmes et al., 2019). Consequently, digital notes become spaces where knowledge is refined and reconstructed instead of merely stored.

Large Language Model (LLM)-based applications like Catgut, Google Gemini, Notion AI, and Notebook go an extra mile in making this process more effective by offering smart assistance in learning. They have the capability of generating summaries of academic articles, clarifying complicated ideas, comparing different theories, and even formulating questions based on the notes that the learners have taken (Holmes et al., 2019; Canseco et al., 2023; Lucking et al., 2016).

AI Function	Contribution to Learning
Summarization	Identifies key ideas from lengthy texts
Concept explanation	Improves understanding of complex topics
Knowledge connection	Links related concepts and sources
Question generation	Supports revision and self-assessment

Table 2: AI-Supported Functions in Digital Note-Taking

AI-enabled note-taking should be considered an aid to cognitive process and not a replacement for the reasoning process. While AI-based explanations and summary statements make the whole process more efficient, the process of genuine learning remains dependent on the students' capacity to reason out and interpret data. Excessive use of AI may lead to superficial learning based on AI-enabled interpretation (Carr, 2010; Canseco et al., 2023; Ng et al., 2021).

In the case of higher education in Bangladesh, there is enormous room for improvement in learning quality through AI-assisted note taking, as this process can be immensely helpful for research, academic writing, and self-study. However, these positive aspects will be possible if students possess sufficient levels of AI literacy as well as know how to apply AI in an academic and ethical manner (Holmes et al., 2019; Ng et al., 2021; Zawacki-Richter et al., 2019).

5.3. Impact on Student Learning Behavior and Academic Productivity

The findings indicate that AI-enabled digital note-taking technologies are altering student learning behavior in a way that fosters greater independence, adaptability, and educational efficiency. As opposed to the more traditional forms of note-taking, which serve the purpose of storing information, AI-enabled systems motivate learners to take charge of organizing, revising, and improving knowledge on their own (Knowles, 1975; Siemens, 2005; Holmes et al., 2019).

A notable effect is the creation of learner autonomy. Note-taking tools powered by artificial intelligence allow students to organize their notes from lectures, research papers, web pages, and

reflections in digital environments. This facilitates the ability of students to establish learning objectives, keep track of their achievements, and access information without having to depend entirely on classroom sessions (Knowles, 1975; Selwyn, 2016; Ng et al., 2021).

AI-enabled note-taking also enhances academic productivity through the saving of time in organizing information. Tools powered by LLMs can summarize long texts, highlight arguments, provide questions for revision, and classify learning materials. Consequently, students can spend more time on analysis of evidence, comparison of theories, and formulation of academic arguments rather than carrying out repetitive organizing activities (Holmes et al., 2019; Lucking et al., 2016; Mayer, 2021).

Even with these benefits, increased productivity does not necessarily mean improved learning. The instant availability of AI-generated summaries could actually lead students to skip the task of reading sources thoroughly and analyzing academic literature effectively. Moreover, an excessive dependency on AI-generated material could harm learners' ability to think analytically, creatively, and solve problems (Carr, 2010; Canseco et al., 2023; Mueller & Oppenheimer, 2014).

In Bangladesh's higher education system, AI-based note-taking will help in organizing research, preparation of assignments, and self-study, especially with the rise of e-learning systems. But all of these advantages of AI are contingent upon how students use AI in their educational process. In other words, AI-assisted note-taking works well only when it helps students to improve human learning practices instead of substituting them (Ng et al., 2021; Zawacki-Richter et al., 2019; Bates, 2019).

5.4. Challenges of AI-Assisted Note-Taking in Bangladeshi Higher Education

This analysis suggests that while digital note-taking by artificial intelligence is an important educational innovation, there are a number of obstacles to its effective implementation in Bangladeshi higher education. The obstacles do not concern only technology but also such factors as digital inequalities, dependency on AI, academic honesty, data privacy, and AI literacy. It is crucial to overcome them for making sure that AI becomes a facilitator of learning and not just of technology use (Holmes et al., 2019; Williamson & Etymon, 2020).

Digital divide forms one of the most critical obstacles. Successful application of the AI-based note-taking technologies requires access to reliable internet connection, digital devices, and necessary digital competencies. The uneven availability of these resources is a problem faced by a number of learners, thereby resulting in inequalities in learning opportunities. In addition to the inequalities in technological access, digital divide thus also entails inequalities in using technology (van Disk, 2020; Selwyn, 2016; Zawacki-Richter et al., 2019).

The other issue is that of too much reliance on the AI-generated content. LLMs allow the creation of summaries, explanations, and study material in seconds, but this heavy reliance might undermine the students' willingness to interact with the original academic sources. Meaningful learning involves critical thinking and analysis, which might become harder with the AI replacing the learning process (Canseco et al., 2023; Mayer, 2021; Carr, 2010).

Integrity in academics is another increasing problem. With the advent of notes and writing provided by artificial intelligence, it becomes easier for the students to do their academic work without having sufficient engagement from them. It is necessary for universities to have policies on how to use AI ethically while maintaining integrity in academics (Cotton et al., 2023; Holmes et al., 2019; Ng et al., 2021).

Challenge	Educational Implication
Digital divide	Unequal access to AI-supported learning
AI dependency	Reduced critical thinking and independent learning
Academic integrity	Increased risk of unethical AI use
Privacy and data security	Potential misuse of academic information
Limited AI literacy	Difficulty evaluating AI-generated content

Table 3: Key Challenges of AI-Powered Digital Note-Taking

The development of such capabilities in Bangladeshi higher education necessitates better digital infrastructure, AI learning programs, ethical standards and institutional support for responsible use of artificial intelligence. Otherwise, the educational benefits that are available through the technological capabilities of AI-powered digital note taking will be wasted (Bates, 2019; Williamson & Etymon, 2020; Ng et al., 2021).

5.5. Towards a Hybrid Learning Strategy

It is important to note that the future of learning in higher education will have to lie in a combined approach of human intelligence with artificial intelligence-based digital technologies, and not in an approach where there is competition between the two. The use of AI technology for taking notes could help learners manage their information, customize their learning experience, and get rid of redundant tasks, but it is still true that learning requires the students to evaluate evidence and build knowledge independently (Holmes et al., 2019; Mayer, 2021; Canseco et al., 2023).

Hybrid learning takes advantage of the benefits provided by traditional note taking, technology, and artificial intelligence into one single platform of education. Traditional note taking ensures the use of cognitive skills and memorization. Technology makes information accessible and organized for the learners. Artificial intelligence is able to summarize, explain, and connect different concepts. The combination of these methods provides an opportunity to take advantage

of the efficiency of technology while not neglecting the importance of critical and reflective thinking (Mueller & Oppenheimer, 2014; Siemens, 2005; Vygotsky, 1978).

In the case of higher education in Bangladesh, effective application of such a model goes beyond mere availability of AI technologies. The universities may take initiatives to make their students acquainted with AI technology, frame some ethical policies regarding their use, and facilitate the incorporation of AI technology in the curriculum by teachers as an auxiliary means of learning (Bates, 2019; Ng et al., 2021; Williamson & Etymon, 2020).

6. Conclusion

This study illustrates that the emergence of AI-based digital note taking marks an important innovation in the field of learning strategy development in higher education institutions. Instead of following the conventional approaches to note taking, AI-enhanced tools like Catgut, Google Gemini, Notebook, and Notion AI make it possible for learners to analyze and organize their knowledge using interactive digital spaces. It is proven that the application of the discussed tools allows developing personalized learning strategies, increasing the efficiency of academic work, and fostering the development of academic skills in managing information.

From the theory analysis through the constructivist learning theory, connectives theory, and cognitive load theory, it is evident that the AI should work in complementing the cognitive functions of learners rather than being a substitute. Although AI may save unnecessary effort and help in managing information, the involvement of students in the processes of interpreting and constructing knowledge needs to be active. The usage of digital note-taking by AI in higher education institutions of Bangladesh presents useful opportunities for establishing learning practices that are flexible and learner-centered. However, issues of digital divide, AI dependence, academic dishonesty, privacy, and lack of AI literacy pose many challenges.

Future research can explore the practical experiences of Bangladeshi university students and teachers through empirical studies, including interviews, surveys, and classroom observations. Further studies can also examine the effectiveness of specific AI-powered note-taking platforms and investigate how AI literacy programmes influence students' academic practices and ethical use of artificial intelligence.

Authors' Contribution

Tanzina Nazim Nira¹ contributed to proofreading, grammar correction, and manuscript formatting. Both authors reviewed and approved the final version of the manuscript. Sharif Ratul Hassan² contributed to the main concept development, research design, and writing of the manuscript.

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