

**Learning 2.0: Exploring the Perceived Impact of Artificial
Intelligence on Students' Learning Experiences and Academic
Performance Across Disciplines**



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**Learning 2.0: Exploring the Perceived Impact of Artificial Intelligence on Students’
Learning Experiences and Academic Performance Across Disciplines**

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CERTIFICATE OF APPROVAL

I hereby declare that this thesis is the student's own work and effort. All sources of information incorporated here have been duly acknowledged. This thesis has been submitted with my approval.

A handwritten signature in dark ink, appearing to read 'M. Hasan', with a long horizontal flourish extending to the right.

Md. Mahadhi Hasan, PhD

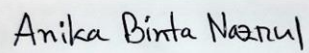
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Declaration

I hereby declare that this thesis, entitled “Learning 2.0: Exploring the Perceived Impact of Artificial Intelligence on Students’ Learning Experiences and Academic Performance Across Disciplines” is the result of my own independent work and investigation. It has not been submitted, either in whole or in part, for a degree or diploma at this or any other institution of higher education.

All sources used and any assistance received during the preparation of this thesis have been acknowledged.

A rectangular box containing a handwritten signature in black ink. The signature is written in a cursive style and reads "Anika Binta Nazrul".

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List of Abbreviations

AI	Artificial Intelligence
ANOVA	Analysis of Variance
AnyLogic	AnyLogic simulation modeling software
AR	Augmented Reality
BBA	Business Administration
ChatGPT	Chat Generative Pre-Trained Transformer
Cronbach's α	Cronbach's Alpha (statistical measure for internal consistency)
CSE	Computer Science and Engineering
EFL	English as a Foreign Language
F	F-statistic (used in ANOVA testing)
HSD	Honestly Significant Difference
IBM	International Business Machines
ITS	Intelligent Teaching Systems
M	Mean (statistical term)
MATLAB	Matrix LABoratory
	More Knowledgeable Others (from Vygotsky's Social Constructivism
MKO	Theory)
p	p-value (statistical term for significance testing)
SD	Standard Deviation
STEM	Science, Technology, Engineering, and Mathematics
TAM	Technology Acceptance Model
VR	virtual reality
ZPD	Zone of Proximal Development
η^2	Eta-squared (statistical measure for effect size)

Abstract

The incorporation of Artificial Intelligence (AI) tools in higher education is significantly increasing their traction across various academic disciplines, especially in increasing students' learning experiences and academic performance. This study examines the perceived impacts of AI tools, such as ChatGPT, Grammarly, and Quillbot, on undergraduate students of private universities in Bangladesh. It focused on four major academic disciplines: STEM, Humanities, Social Sciences, and Business. The primary aim of this study is to explore how students perceive the influence of these tools on their learning experiences and academic performance. To collect both quantitative and qualitative data, a mixed-methods approach was used. A purposive sampling technique was used to select 407 students for the survey to ensure representation across all disciplines. The survey was done with the help of Google Forms using Likert-scale items. It was validated through pilot-testing and receiving expert feedback. This helped in achieving high Cronbach's alpha score for internal consistency. With that, in-depth interviews were taken with seven students who were selected based on their diverse opinions about AI tools. Then statistical analysis that include descriptive statistics and one-way ANOVA revealed impactful differences in the effectiveness of AI tools across disciplines, where STEM students showed higher advantages of AI tools in academic performance, especially in grades and feedback. On the other hand, Humanities students expressed specific skepticism, especially regarding the impact of AI tools on creativity and critical thinking. The findings also demonstrate that while AI tools significantly improve learning experiences, their impact differs across disciplines. The study draws attention to the need for discipline-specific AI tools to maximize the effectiveness of these tools in higher education. The results also showcased the importance of addressing ethical concerns and making sure equitable access to AI tools across academic disciplines.

Keywords: Artificial intelligence (AI), Learning Experiences, Academic Performance, STEM, Humanities, Social Sciences, Business, ChatGPT, Grammarly, Quillbot, ethical concerns, equitable access.

Chapter One

Introduction

1.1 General Overview

Artificial Intelligence, globally known as AI, has rapidly evolved. Its influence on various fields, including education, has been investigated for a while now (Ahmed, 2024; Al-Zahrani & Alasmari, 2024). The study of AI leads to the term Learning 2.0; it refers to transforming traditional education to the e-learning phase, which is enhanced with technological ideas and tools. It deals with AI and how this has created a personalized and interactive learning experience. While it cannot be denied that educational applications of AI is moving across all academic disciplines, its impact significantly varies between quantitative areas such as STEM, and qualitative disciplines in Humanities, which include English language and literature studies. In the context of this study, “Learning 2.0” represents the modern shift in education where tools of AI, such as ChatGPT, Quillbot, Grammarly, or recently invented tools like Gemini and DeepSeek work to facilitate autonomous learning with feedback and academic support, increasing students’ learning experiences and academic performance across disciplines. In particular, for English majors, the incorporation of AI tools helps increasing language learning writing skills, and reshape the way students engage with literature, creative writing, and language acquisition in both positive and negative ways. With the advancement of AI, the concept of Learning 2.0 has emerged rapidly by representing a new era of education that combines digital technology with online platforms and tools made by AI (Pratama et al., 2023). It also encircles e-learning in a way that the learning systems are now offering personalized educational experiences made for each student’s needs (Ahmed et al., 2024). It creates a dependency on AI platforms such as ChatGPT, Grammarly, and

Quillbot and reshapes how students learn educational content, increasing both learning experiences and academic performance (Hasan et al., 2024; Li et al., 2024). This transformation can be especially impactful for Humanities, specifically the students of English, for whom AI tools provide feedback to ensure deeper understanding of linguistic nuances, but somehow gets distracted from offering the creativity that English students crave for.

1.2 Background of the Study

The progressive advancement of AI in education, from initial machine-learning models to sophisticated platforms created by AI that provide personalized and adaptable learning experiences, is referred to as the evolution of AI in education. Initially developed in the 1960s with the introduction of expert systems, artificial intelligence (AI) has been used historically in education. Luckin et al. (2016) claim that these technologies set the stage for further advancements in intelligent teaching systems (ITS) throughout the 1980s. These systems built the basis for it. Artificial intelligence has developed into more interactive and adaptable learning systems that can fit students' demands due to the fast improvements in machine learning, natural language processing, and big data analytics (Baker and Inventado, 2014).

Applications of artificial intelligence (AI) in the classrooms have greatly progressed and resulted in notable changes in student involvement, assessment tools, and material delivery (Siemens, 2013). Applications created by AI help teacher's module individualized lesson plans, automate monotonous works, and find students who might need more help (Holmes et al., 2019). Nowadays, AI tools are being used by educational institutions more and more to improve students' academic performance. Also, learning processes that depend on AI are allowing students to use

skills which was not possible to utilize in conventional classrooms. Although artificial intelligence has many positive outcomes, its application in educational areas brings specific difficulties that cannot be ignored (Collin et al., 2024).

1.3 Statement of the Problem

Artificial Intelligence (AI) tools in higher education have received tremendous attention in recent years. Due to these tools being rapidly involved and AI tools maintainers continuously upgrading the servers to meet the users' expectations, they increase students' learning outcomes in various ways. AI tools such as ChatGPT, Grammarly, and Quillbot, are increasingly being incorporated into educational system. They are helping in allowing student engagement, improving learning experiences, and academic performance across various disciplines (Zawacki-Richter et al., 2019). While these tools provide immediate feedback to the users, adaptive sessions that give the students bigger advantages, and personalized learning for students of disciplines like STEM, specific concerns about potential negative impacts on creativity and critical thinking are increasing (Kooli, 2023). For example, the inability of AI tools to offer versatile analyses or interpretive opinions in areas like English language or literature raises questions about its impact in fostering original thoughts and showing human touch in academic works (Livberber & Ayvaz, 2023; Shafique et al., 2023). Similarly, Social Science students may benefit from the efficiency of AI tools in summarizing large amounts of information; however, the inability of the tools to replicate the intellectual thoroughness required for complicated theories and critical discourse remains a vital limitation (Nguyen et al., 2022).

Recent studies shows the dual impact of AI across academic disciplines. Within Humanities, specifically in TESOL, AI tools increase language acquisition and proficiency (Yiling

et al., 2025). At the same time, these tools are potentially decreasing critical discourse in writing skills (Pitychoutis, 2024). In STEM area, AI ensures problem-solving in variety of scientific and mathematical areas, but it also consider to have its impact on metacognitive skills (ElSayary, 2024). Social Sciences on the other hand faces ethical complications due to algorithmic biases in educational contexts (Archambault et al., 2024), while Business students gets the benefits of simulations created by AI tools that enhance their critical thinking and helps in making decision (Jaxon, 2024). These variations in disciplines shows a universal tension. It can be said that the benefits of AI and optimizing it for learning experiences and academic performance while trying to preserve cognitive skills has become a global concern, especially in EFL language education, where having the best proficiency in the language with critical thinking is considered a benchmark for creativity (Hwang et al., 2025)

Despite the increasing transformation of AI tools in recent days, there is limited research that can examine their long-term impact on learning experiences and academic performance across various educational areas in Bangladeshi context. Specifically, the impact of AI tools on the ability of students to connect thoroughly with course content and perform academically well remain underexplored. Research indicates that STEM students benefit from the ability of AI tools to process data and assist in major tasks such as coding or data analysis; these tools are regularly accepted and used in this area of study (Wang et al., 2024). For instance, ChatGPT as a tool is often used to generate codes and solve mathematical problems. It also works better with data analysis which makes it a valuable tool for STEM students (Min et al., 2025). Additionally, Grammarly and Quillbot are known for their perceived impact on clarity and structure in scientific writing (Wang et al., 2025).

In the light of these developments, AI tools' level of engagement in learning, and their comprehensive learning capacity is being questioned too. Although students frequently utilize platforms such as ChatGPT, Grammarly, and Quillbot, there is a significant gap of study on the effectiveness of artificial intelligence tools in increasing learning outcomes across various academic fields (Teräs, 2022). The ethical and cognitive consequences of learning based on AI in those particular areas have received very little attention, especially in non-Western nations where access to artificial intelligence technology is still in the experimental and early stages (Kooli, 2023). This means that previous studies on the impact of artificial intelligence often lack regional insights and information specific to particular disciplines, especially in Bangladesh context. Although recently, Zhang et al. (2025) focused on evaluating DeepSeek in Chinese contexts and demonstrated how AI tools can behave differently based on sociocultural context and language factors; a significant gap remains in knowing how learning tools created by AI impact students' experiences in other educational contexts, such as Bangladesh or other non-Western academic institutions (Pande et al., 2024).

The gap in research surrounding the perceived impact of AI tools in learning experiences and academic performance across various disciplines calls for further investigation. Therefore, the purpose of this research is to investigate the perspectives of undergraduate students of private university regarding the contributions that artificial intelligence (AI) has made to their educational experience. Although few comparative studies have been conducted that explore the differences that artificial intelligence has made in STEM versus social science and Humanities students (Varghese et al., 2025); They have not adequately addressed whether AI tools contribute to or

make issues in the development of creativity and critical thinking in these students or any other discipline of the educational process. Although STEM students can easily access information from AI tools and incorporate them into their studies, due to that area not being creative but proof-based; students from other disciplines (Humanities, Social Sciences) depending on artificial intelligence may miss to show the creativity and human touch in their academic activities (Shafique et al., 2023; Wang et al., 2025).

To address this gap, this research examines the perceived impact of AI tools on the learning experiences and academic performance of undergraduate students at private universities in Bangladesh, especially focusing on study areas of STEM, Humanities, and Social Sciences, and Business. This study aims to provide a more comprehensive opinion of the impact of AI tools in transforming students' learning, engagement, performance, with a specific emphasis on the potential differences across academic disciplines (Devasena, 2024).

1.4 Research Objectives

RO1: To assess the perceptions of undergraduate students from different academic disciplines of private universities in Bangladesh about the role of artificial intelligence in enhancing their learning experiences.

RO2: To identify how the learning tools made by artificial intelligence (AI) influences the academic performance of undergraduate students from different academic disciplines of private universities in Bangladesh.

1.5 Research Questions

The research questions are:

RQ 1: How do students from different academic disciplines perceive the impact of AI tools in enhancing their learning experiences?

RQ 2: How do students from different academic disciplines perceive the impact of AI tools in enhancing their academic performance?

1.6 Theoretical Framework

This study is grounded in three primary theoretical frameworks: First, Jean Piaget's Constructivist Learning Theory (1950) explains active participation and experiential learning. This theory shows that knowledge is structured by interactions. It can be done with an easy personalized learning path by AI that increases problem-solving skills and academic performance. However, as Alzubi et al. (2025) note in their study of EFL students, contents generated by AI often make complex literary analyses simple and potentially disrupt their creative synthesis which is a key requirement in disciplines like English literature. This aligns with Humanities' scholars as well who argue that algorithmic nature of AI struggles to replicate the 'human touch' in its generated writing which is essential for critical discourse (Shafique et al., 2023; Livberber & Ayvaz, 2023).

Lev Vygotsky's Social Constructivism Theory (1978) extends Piaget's idea by offering the Zone of Proximal Development (ZPD). This refers to the gap between what a learner can achieve on their own and with support. AI tools act as digital More Knowledgeable Others (MKOs) which provides scaffolding and personalized feedback that can lessen this gap. But, the lack of human

touch in AI tools may reduce the depth of creative learning, especially in disciplines like Humanities and Social Sciences that require collaboration and critical discussions (Hasan et al., 2024; Nguyen et al., 2022; Min, Lee, & Jho, 2025).

Fred D. Davis's Technology Acceptance Model (TAM) (1989) explores how users perceive the usefulness and ease of technology, which influences their connection with AI tools. While AI increases efficiency, specific concerns about over dependability and academic integrity remain, especially in humanities disciplines (Khan et al., 2024; Mutawa, 2024; Winiarska-Brodowska & Feher, 2024). This study blends these three frameworks for the first time to examine the perceived impact of AI on learning experiences and academic performance of undergraduate students across disciplines in private universities in Bangladesh. The Figure 1 for Theoretical Framework: AI in Education is given below:

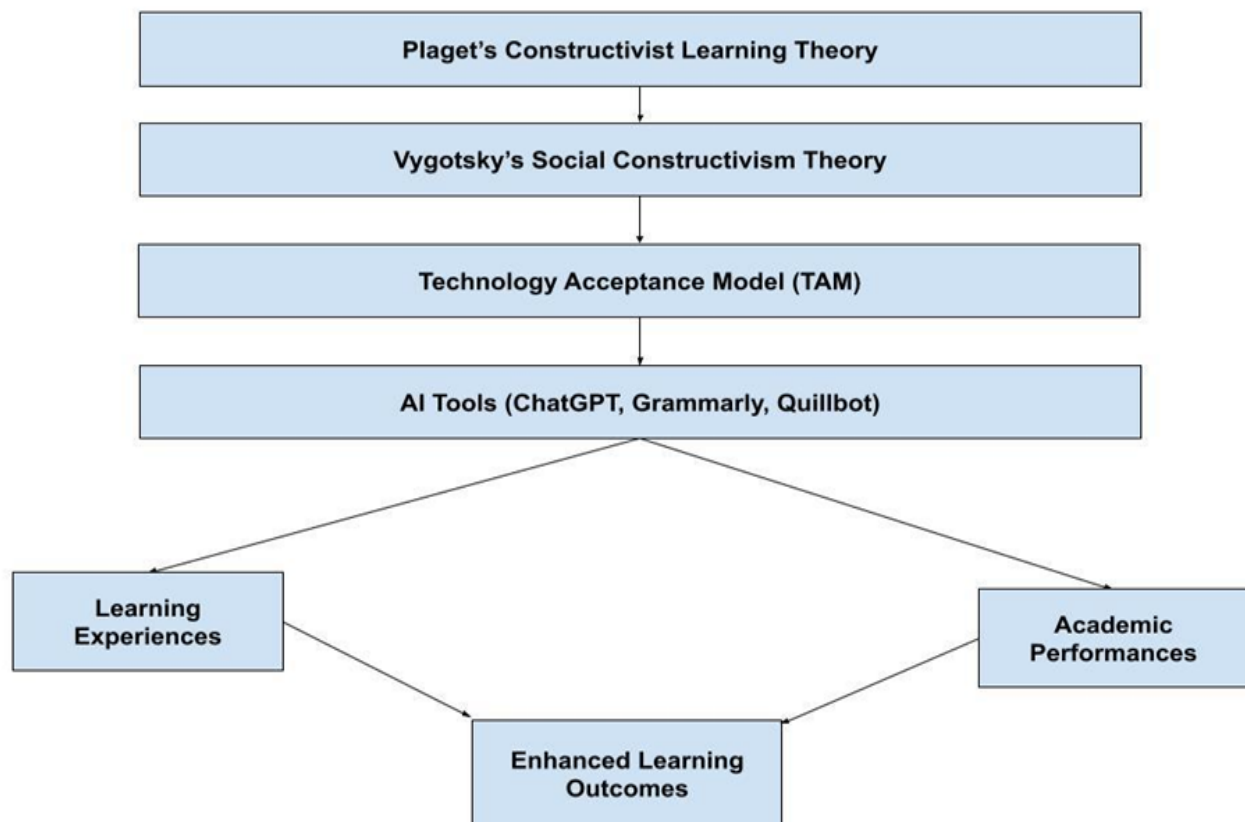


Figure 1

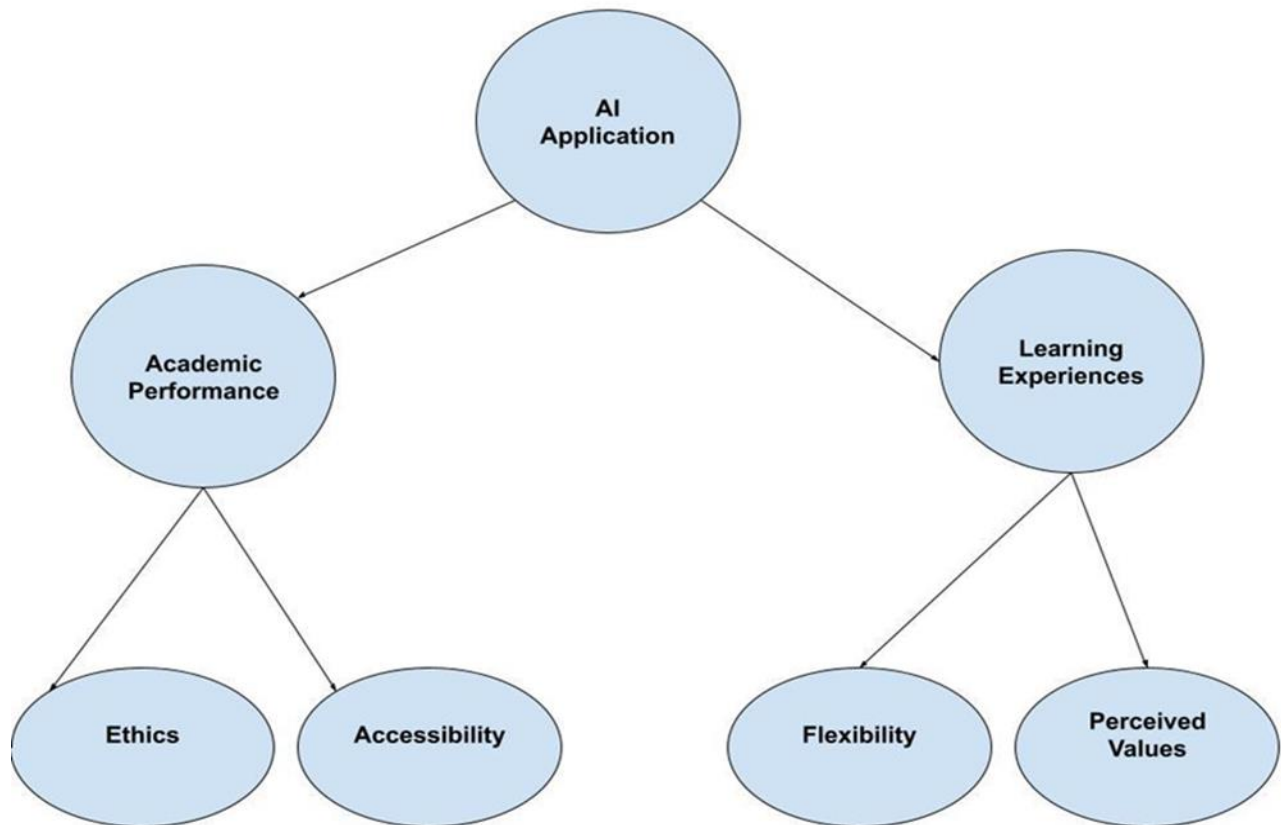
Theoretical Framework: AI in Education

1.7 Conceptual Framework

The conceptual framework of this study explores the impact of Artificial Intelligence (AI) on two key variables: students' learning experiences and academic performance. Apart from artificial intelligence, various other elements affect the interaction between these results and AI. Concerns include ethics, accessibility, flexibility, and perceived data value. This conceptual framework creates a merge between the key variables: Learning experiences, academic performance, and artificial intelligence. This framework illustrates how tools made by AI influence

study comprehension, educational outcomes, and student engagement (Antonio et al., 2023). Overall, this conceptual framework offers to present a refined understanding of the role of artificial intelligence in modern education and recommends strategies for its effective incorporation.

Figure 2



Conceptual Framework: AI in Education

1.8 Scope of the Study

This research is conducted to explore the perceived impact of artificial intelligence (AI) and the learning tools that are created by it on various academic disciplines within the surroundings of undergraduate students of private universities in Bangladesh. To be specific, it mainly focuses on students from different departments that belong to STEM, Social Sciences, Humanities, and Business. The primary objective of this study is to understand the applications of artificial

intelligence in scholarly research, assessments, and the distribution of information by analyzing the perception of artificial intelligence among students across multiple disciplines (Shimu and Haolader, 2025). There are ongoing studies that are being conducted to see how students feel about learning environments surrounded by artificial intelligence. But this paper calls attention to both the advantages and challenges of combining AI into higher education, particularly in increasing the learning experiences and academic performance of students. While the research incorporates four major academic disciplines (Humanities, STEM, Social Sciences, and Business), particular focus is placed on TESOL, within the Humanities. It specially combines language acquisition with development of critical thinking, which is one of the main areas of potential impact of AI tools as disruptor (Alzubi, Nazim, & Alyami, 2025; Ulla & Teng, 2025).

1.9 Significance of the Study

Artificial intelligence is changing education by giving major advantages & some significant challenges to teachers, students, and policymakers. For teachers, some customized teaching strategies are given with the help of tools made by artificial intelligence, such as grading being automated grading, plagiarism detection systems, and learning systems that decrease workload (Holmes, Bialik, and Fadel, 2019; Krishnakumar and Kumar, 2024). However, there are concerns about the lack of human intuition and fear about ethical issues, such as being biased in assessment and feedback made by artificial intelligence (Collin, Lepage, & Nebel, 2024). Nowadays, students benefit the most from platforms like Quillbot, ChatGPT, Grammarly, etc. These are some of the systems made by artificial intelligence to increase learning experiences and engagement (Hasan et al., 2024; Li et al., 2024; Tlili et al., 2025). Yet it cannot be ignored that their over-dependence on artificial intelligence raises questions about their critical thinking skills,

especially in fields like the Humanities and Social Sciences. These are the areas of learning where creativity and critical thinking are major parts of education (Min, Lee, & Jho, 2025; Mutawa, 2024; Shafique et al., 2023). On the other hand, policymakers see facilities given by artificial intelligence as something that helps them make important decisions, supports academic administration, and increases convenience in education at the same time (Al-Zahrani & Alasmari, 2024; Pande et al., 2024; Ravshanovna, 2025). But even here, some challenges remain. Critical barriers such as preserving the privacy of users' data, division in digital options based on area or access, and ethical concerns are questioned (Kooli, 2023; Zhang et al., 2025; Nguyen et al., 2022). So, while artificial intelligence is indeed increasing learning, teaching, and administrative processes, concerns regarding ethical issues and responsible use of AI need to be examined. So that its sustainability in education can be ensured.

1.10 Definition of Terms

1.10.1 Artificial Intelligence (AI)

Artificial Intelligence (AI) refers to the systems of computers that are designed to perform tasks like human beings. They can solve problems, make decisions, and process language according to the commands they are given in the system. In education, AI increases the learning process through tutoring, grading, and customized feedback options (Holmes et al., 2019; Luckin et al., 2016). Nowadays, tools such as ChatGPT, Grammarly, and Quillbot are improving efficiency in learning, but they also raise questions about over-dependency and ethical issues (Hasan et al., 2024; Li et al., 2024). That is why the challenges in maintaining benefits given by artificial intelligence with creativity and critical thinking in education remain a significant concern. (Collin et al., 2024; Nguyen et al., 2022).

1.10.2 Learning 2.0

The term Learning 2.0 represents the incorporation of artificial intelligence and digital tools made by it into education as e-learning. This concept is shifting the background of study by transforming from traditional classroom learning to interactive learning processes. Platforms created by artificial intelligence help students to customize their learning experiences and improve engagement and accessibility altogether (Ahmed et al., 2024; Pratama et al., 2023). The tools made for tutoring and assessment provide academic support according to the needs of students (Pande et al., 2024). But concerns about regular dependency on these digital platforms and the gap in accessibility remain significant (Teräs, 2022; Kooli, 2023).

1.10.3 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) states that information about how individuals accept technology is based on their perceived usefulness and ease of use (Davis, 1989). In education, tools made by artificial intelligence, like chatbots and systems of tutoring, increase learning efficiency (Koç & Savaş, 2024; Ahmed, 2024). So, the acceptance of artificial intelligence by students and teachers depends on usability, accessibility, and ethical considerations (Shafique et al., 2023; Collin et al., 2024).

1.10.4 Vygotsky's Constructivist Learning Theory

The Constructivist Learning Theory by Lev Vygotsky explains the role of social interaction and cultural context in cognitive development. It says that learning happens with the help of proper collaboration with more knowledgeable people. They belong to the part that Vygotsky named as

Zone of Proximal Development (ZPD) (Vygotsky, 1978). Learning platforms created by artificial intelligence connect with this theory by providing adaptive and interactive environments of learning with guided support (Luckin et al., 2016; Shafique et al., 2023). Nevertheless, questions about artificial intelligence and its inability to fully imprint the learning experiences remain, as they do not seem made by humans (Collin et al., 2024).

1.10.5 Piaget's Social Constructivism Theory

The Social Constructivism Theory by Jean Piaget suggests that knowledge is established through real-life experiences and active engagement with the environment that belongs to the learner (Piaget, 1950). In education combined with artificial intelligence, learning tools made by AI help with experiential learning by customizing content based on students' cognitive abilities and stages of development (Ahmed, 2024; Wang et al., 2025). But, while personalized learning is increasingly occurring with the help of artificial intelligence, it may struggle to create deep conceptual understanding in various disciplines that require the human touch in creativity and abstract thinking (Min et al., 2025; Mutawa, 2024).

1.10.6 Higher Education

The level named higher education refers to the post-secondary academic institutions that help in advanced learning and provide research opportunities. Artificial intelligence is transforming the face of higher education through computerized assessments, virtual labs, and personalized study plans (Al-Zahrani & Alasmari, 2024; Li et al., 2024). Despite learning efficiency being improved by artificial intelligence, disciplinary and ethical challenges remain (Pande et al., 2024; Mutawa, 2024).

1.11 Chapter Summary

This chapter explored the perceived impact of artificial intelligence (AI) on undergraduate students in private universities in Bangladesh, including its use in e-learning, adaptive, and tutoring tools like ChatGPT, Grammarly, and Quillbot. The study examines the transformation of AI into Learning 2.0. It is supported by three main theories: Constructivist Learning Theory, Social Constructivism Theory, and the Technology Acceptance Model (TAM). These theories show how AI increases learning experiences and academic performance. At last, the chapter also explains factors such as flexibility, accessibility, and utility altogether. The following chapter for this study reviews the literature about some major effects of AI on students' learning experiences and academic performance which were discussed by multiple scholars in their studies (Shirin, 2022).

Chapter Two

Literature Review

2.1 Introduction

This chapter examine how artificial intelligence (AI) is updating educational areas by increasing student engagement with customized learning and immediate feedback. It also investigates the growing development of critical thinking skills, influence of AI on academic performance, and the improvements in efficiency and productivity. At the same time, the chapter discusses AI and disciplinary variations that showcases how the influence of AI tools impacts students across different academic disciplines. Despite this rapid adoption, a significant gap in understanding the perceived impact of AI across disciplines remains and this study aims to address that gap.

2.2 AI and Learning Experiences

During the last few years, some significant research has been done on how artificial intelligence (AI) affects students' different learning experiences. For example, Doty and Lipien (2024) showcased how students' attitude about ChatGPT and other AI operations are going on for online learning experiences. It has also significantly changed traditional learning paradigms by impacting students' learning processes (Ahmed, 2024; Al-Zahrani & Alasmari, 2024). In the modern world, educational systems that use AI help each student learn in their own way, get them more involved, and help them think more critically. The role of AI in higher education promotes faculty support, curriculum design, and student learning management systems (Ahmed, 2024; Al-Zahrani & Alasmari, 2024). Learning combined with AI platforms usually analyzes student

performance first and then suggests customized learning techniques that are customized. This step significantly improves student engagement and retention (Murugan et al., 2025). However, Shirin (2022) and Livberber and Ayvaz (2023) show concerns about how the accessibility of AI for total incorporation into higher education cannot be ignored.

Internationally, AI is being mixed into various education systems. Wang et al. (2023) explore the contribution of artificial intelligence in supporting international students, stating information about how AI-based academic assistance platforms bridge the gap between linguistic and cultural barriers. Farahani and Ghasemi (2024) point out how unequal access to infrastructure of AI, especially in urban-rural areas can cause educational inequalities. Giri (2024) discusses the role of AI in student evaluation and assessment, emphasizing how AI-driven grading systems reduce teachers' workload while maintaining fairness in evaluation. However, Giri (2024) also explains the ethical concerns that come with AI assessment by mentioning the lack of human intuition in it.

Personalized learning that is supported by artificial intelligence (AI) might change the lessons to fit the specific needs of each student. Adaptive learning systems do this by watching how students connect and adjusting the lessons right away. Luckin et al. (2016) state that adaptable learning systems that are made by artificial intelligence help students understand and remember what they are learning by giving them information that is tailored to their specific needs. Some examples of platforms that have been improved by artificial intelligence are Khan Academy, Coursera, and Duolingo. Machine learning methods are used in these systems to look at how users respond and then change the lessons to match.

According to a study by Chinta et al. (2024), training datasets are biased by nature. This means that personalized data made by AI may affect students from areas that are not well-represented without meaning to. Tutoring systems that are facilitated by artificial intelligence and virtual assistants adapt themselves to the learning materials based on students' strengths and weaknesses and provide targeted recommendations (Khan et al., 2024). However, biases that occur because of algorithms raise concerns about digital literacy gaps, and it remains a significant problem in educational settings that use artificial intelligence (Shafique et al., 2023). At the same time studies like Doty and Lipien (2024), which are based on and targeted towards countries like the United States, and Antonio et al. (2023), which focuses on the mediating role of AI in smart learning environments in Kurdish region express the challenge of using AI research findings to non-Western countries such as Bangladesh, where educational system, especially in higher section has infrastructures and cultural factors that differ significantly.

2.2.1 Student Engagement

Technologies that are created by artificial intelligence are essential for getting students more involved. There are many features that intelligent tutoring systems (ITS) can offer, such as quick feedback, automated testing, and engaging learning settings that get students involved. These skills can be used by individuals (Nwana, 1990). Now that artificial intelligence can make content, it has changed education by making learning more engaging. This broad group includes things like simulations, virtual reality (VR), and augmented reality (AR). Fatima et al. (2024) says that medical students who use virtual dissection tools powered by artificial intelligence understand and are more confident in human anatomy than those who use traditional texts. The results of a study with 401 Chinese students show that social media and artificial intelligence (AI)

are good for mental health and academic performance (Zhu, 2024). It became clear from the results of this study how artificial intelligence can be used to make the learning setting livelier and more interesting. On the other hand, depending too much on learning approaches made by AI could make people less able to communicate with each other and more dependent on technology, which has people worried about the long-term effects of this trend. Some studies demand that platforms such as ChatGPT help in collaborating constructively with knowledge and increase students' thinking skills as well as problem-solving minds (Koç & Savaş, 2024). However, limited research still explores the long-term impact of artificial intelligence on collaborative learning in various educational disciplines (Livberber & Ayvaz, 2023).

2.2.2 Development of Critical Thinking Skills

Research has shown that artificial intelligence (AI) can increase the critical thinking skills of students; by clearing the eBay for higher-order cognitive tasks such as evaluating, synthesizing, and analyzing. Basic thinking tasks are automated to make this possible. According to a study by Norvig and Russell (2021), using artificial intelligence tools to help with data collection and initial analysis frees up students to focus on problem-solving and learning concepts. AI tools are increasingly upgrading students' learning experiences, but in specific backgrounds. For example, Khan et al. (2024) explored the role of AI tools in increasing English writing skills among EFL university students in Bangladesh and showed how supporting writings by AI can promote structured thinking as an important element of critical thinking development. However, the study is exclusive for EFL students and the focus is on their linguistics skills only, which leaves a gap in understanding how AI tools might impact broader critical thinking elements across different academic disciplines. Especially where analytical and different cognitive demands are placed on

students. In contrast, DeepCoder, a program created by artificial intelligence, shows how AI can generate code autonomously by learning from past examples of programming (Balog et al., 2017). Similarly, cognitive abilities in computing by IBM Watson show the ability of artificial intelligence to process large amounts of data by analyzing human language and then increasing the process of decoding that data. This process makes AI tools an important option in the STEM education system (Chen et al., 2016). According to Chiu et al. (2025), these tools help specifically STEM students focus on logic and mathematical design and also make it easier for them to write scientific code that runs quickly. This makes it possible for students to take on more difficult tasks to upgrade their learning. Also, Premkumar et al. (2024) did a study that showed students who mostly used information generated by artificial intelligence (AI) for their writing tasks had lower levels of critical thought than students who used traditional research methods. Which means even though AI tools are working well in specific areas of study, unintentional difficulties are increasing due to these tools not being available for all the disciplines.

2.3 AI and Academic Performance

The perceived impact of artificial intelligence (AI) on academic performance is significant with both advantages and disadvantages characteristics for students' academic outcomes. Existing literature like Baker and Inventado (2014) shows that artificial intelligence has an influence on how well students do in education in predicting and improving academic outcomes. Both good and bad things have happened because of these findings. By giving students personalized experiences and constant feedback, artificial intelligence (AI) has been shown to improve how well they learn with every prompt they receive from various users. The application of artificial intelligence in education goes beyond learning experiences to signify the influence on academic

performance (Wang et al., 2025). Detection of plagiarism, grading, and assessment with tools of AI reduces cognitive load and allows students to shift their focus to more critical tasks (Yun et al., 2024). At the same time, Islam et al. (2024) explore EFL teachers' points of views on the influence of AI in pedagogical outcomes and academic integrity. But then again, the study is focused teachers, not on the students who are using the AI tools the most. Also, some studies also suggest that extreme dependency on artificial intelligence for the educational process may hamper students' critical thinking skills more than it does them good, as it might invade their analytical abilities too much (Mouta et al., 2023). This means that problems exist that need to be fixed, such as moral barriers and depending too much on technology.

2.3.1 Efficiency and Productivity

A substantial body of literature demonstrates that artificial intelligence (AI) can increase students' academic performance in educational settings. Krishnakumar and Kumar (2024) suggest that teachers can use review methods improved by AI to find out which students are weak and give them personalized comments. In the end, this leads to better learning outcomes for the students. At the same time, the research by Zhu (2024) showed that using AI to improve smart learning has a big effect on how well students do in school and how healthy their minds are. According to the experts, exchanges on social media played a part in making this happen. Research on 8th-grade students who used tutoring systems based on AI during a quasi-experimental experiment showed that they did better in math and science than students who only got standard classroom education (Khazanchi et al., 2024). Also, models and virtual labs that are powered by artificial intelligence have helped teach STEM subjects. Technology has made it possible for students to do real experiments without being limited by their physical abilities. Artificial intelligence-powered

chemistry simulations help students understand complicated chemical structures, which leads to better knowledge and results on tests (Wang et al., 2021). Despite these advantages, questions remain unanswered about the ethical incorporation of information created by AI in academia (Ravshanovna, 2025). The reason is that research shows how academic writing tools such as Grammarly and Quillbot increase students' writing skills and reduce stress (Nguyen et al., 2022); it seldom focuses on whether students from every discipline have the same advantage in their learning experiences and academic performance or not.

2.3.2 AI and Disciplinary Variations

Excessive dependency on AI tools can hinder the critical thinking of students and their problem-solving abilities. In a study, students who used knowledge from artificial intelligence scored 6.71 points worse on average than their peers. According to Garcia and Lopez (2023), their study shows that students may become less unique and less analytically rigorous when they rely on creative artificial intelligence. There are serious ethical problems with using AI to teach, which need to be recognized as major problems. It is important to carefully consider issues like personal data protection, academic success integrity, and the possibility of algorithmic bias to make sure that AI is used in education in an ethical way (Dignum, 2021). Then comes the effectiveness of AI and how it varies across disciplines. With STEM students benefiting the most from the tools made available by AI, their way of solving problems in education is advanced enough compared to students in Humanities and social sciences (Mutawa, 2024). Humanities students still struggle with content generated by AI as it lacks the depth and human creativity that an individual would have in them (Winiarska-Brodowska & Feher, 2024).

Within the discipline of Humanities, AI shows different challenges that cannot be ignored: for the study area of TESOL, the application of AI has its impact on language production, real-time feedback and interaction. But, the usage of those AI tools shows concerns about the influence AI has on language learning and the generated content might be decreasing authenticity of the study area (Schmidt & Strassner, 2022).

This means the acceptance and effects of artificial intelligence are not fairly spread across all academic fields. In recent years, researchers have found that students in STEM fields are more open to using learning tools made by AI than students in the Humanities. Because of the nature of the work that students have to do, this might happen (Li et al., 2022). A big part of computer science students uses code help that is based on artificial intelligence. GitHub and Copilot are examples of this kind of help. On the other hand, it cannot be used in many fields, like writing. Humanities students are using writing tools like Grammarly, even though there are ongoing concerns about copying caused by AI. Also, models and virtual labs that are powered by artificial intelligence have helped teach STEM subjects. Technology has made it possible for students to do real experiments without being limited by their physical abilities. Artificial intelligence-powered chemistry simulations help students understand complicated chemical structures, which leads to better knowledge and results on tests (Nadim & Di Fuccio, 2025). This keeps happening as even multinational operations like Google are being criticized for encouraging copying.

2.4 Gaps in the Literature

Despite the growing volume of research on AI in education, significant gaps remain in understanding its full perceived impact on students', especially in higher education. There aren't

many ongoing studies that look at how artificial intelligence affects students' learning experiences and academic performance over time. At first, there were not enough future studies about how tools created by AI work among university students in Bangladesh (Sultana & Faruk, 2024). At the same time, concerns about how artificial intelligence will affect education in the long run have not been answered (Rekha et al., 2024). It is important to have a full understanding of how artificial intelligence technologies and their growing complexity affect learning experiences in terms of ethics. Second, there is a significant lack of studies that can analyze how different academic disciplines utilize learning with the help of AI in academic performance (Pande et al., 2024). While tools made by AI improve learning proficiency, it cannot be ignored that dependency on these technologies reduces critical thinking skills, especially in social sciences and Humanities. Unlike STEM areas, where AI can be seen as something that solves problems, Humanities require human touch in their argumentative and interpretive approach to learning, which AI somehow oversimplifies and diminishes original thought altogether (Li et al., 2024; Wang et al., 2025) Third, ethical concerns that include integrity related to academia and the extreme dependency on AI require further research (Shimu & Haolader, 2025).

Although the literature has multiple gaps to address regarding the impact of artificial intelligence on students' learning experiences and academic performance, this study focuses specifically on how different academic disciplines utilize AI in learning and academic achievement. The decision to examine this particular gap is based on the scope of the research timeline and feasibility. The stated gap is also time-efficient and relevant to the current situation of artificial intelligence trends, and offers an opportunity to propose improvements in the research area.

Ultimately, if the gap is not addressed, the unbalanced incorporation of artificial intelligence across academic disciplines may increase the differences in learning experiences. Because even though STEM students are getting the most advantages from AI tools, social sciences, and Humanities students struggle with content made by AI as it lacks human touch and depth when it comes to creativity and critical thinking (Li et al., 2024; Wang et al., 2025). This significant imbalance could lead to a major deterioration in analytical skills and critical thinking in various fields of education that depend on originality and interpretation the most (Nguyen et al., 2022; Shafique et al., 2023). Also, without a methodical understanding of the impact of artificial intelligence across various academic disciplines, educational policies may not be able to ensure equal access to artificial intelligence. This will further increase the gap by deepening the digital divide and decreasing the potential of artificial intelligence as a supportive technology rather than a dominating tool of learning (Collin et al., 2024; Shimu & Haolader, 2025).

2.5 Chapter Summary

This chapter reviews previous studies on the impact of artificial intelligence in higher education. It mainly focused on its perceived impact on student learning experiences and academic performance across various disciplines. It gives a deeper outlook of the research that has already been done on how artificial intelligence (AI) affects students' capability to learn and do well in higher education. Even though AI has a lot of potential for customized learning, student engagement, and academic success, it also raised some critical challenges about social issues and differences between various academic areas. So, even though AI increases the efficiency in higher education, language learning, student engagement, and educational sustainability, its effectiveness

differs by discipline. This is why some specific concerns regarding extreme dependency on artificial intelligence raise questions that include ethical implications and the effectiveness of AI in specific disciplines of higher studies. The next chapter describes the research methodology used for this study to address the identified gap step-by-step.

Chapter Three

Methodology

3. Introduction

This chapter presents the research design, including data collection and analytical techniques. The section addresses how these steps are used to answer the research questions in this study. To collect the data, a mixed-method technique was used to gain an extensive understanding of how students from various academic backgrounds perceive the impact of AI tools on their learning experiences and academic performance. The methodology for proper structure and transparency is presented below in subheadings.

3.1 Research Design

The research used a mixed-method approach with combined parallel, where step-by-step quantitative and qualitative data were collected. They were then analyzed separately to incorporate the interpretation during the process (Creswell, 2007) This design was selected specifically to make sure that the strengths of the two methods complement one another for the sake of the study (Creswell, 2007). The survey delivers wide-ranging, generalizable knowledge, and the interviews following the survey provide contextual, in-depth information from the participants. By incorporating these two methods, the study aimed to answer the research questions comprehensively, thereby offering a rich and refined comprehension of the perceived impact of AI tools on students' learning experiences and academic performance.

3.2 Study Population and Sampling

The key respondents for this study include undergraduate students from private universities in Bangladesh who belong to four academic areas: STEM, Social Sciences, Humanities, and Business. The study covered various sectors of these academic disciplines. This includes Electrical and Electronic Engineering (EEE), Computer Science and Engineering (CSE), Business Administration (BBA), English (Applied Linguistics, Literature), Media Studies and Journalism, as well as other fields within STEM, Social Sciences, Humanities, and Business. These subjects were selected to ensure a broad representation of students learning experiences and viewpoints across different range of study. The study's cross-disciplinary inspection allows the comparison between how AI tools affects skill development in STEM field technically, and how the same tools works for interpretative analysis in Humanities, which includes language learning in TESOL, factual research in Social Sciences, and practical concepts of making decisions in Business discipline.

The structure of purposive sampling was used to select 407 students for the survey to make sure every discipline was represented throughout the process. This approach was chosen to explore the broad spectrum of experiences and viewpoints of the students. Seven students were selected from the respondents for interviews based on their varied opinions in the survey. For example, their views about AI tool usage, attitudes towards AI in general, and its impact on academic performance were discussed in the interviews. By selecting this option, it was ensured that the data collected from the respondents reflects various perspectives and increases the qualitative findings. It also contributed to a more profound understanding of the phenomena being analyzed due to the study.

3.3 Instrument Development and Validation

3.3.1 Survey Questionnaire

The survey questionnaire was adapted from previous research (DeVellis, 2016) to ensure the relevance and reliability of the process. The items were categorically selected and adjusted to align with the research questions of the study. The questionnaire was designed based on the main variables of the study: learning experiences and academic performance. Each part of the questionnaire includes Likert scale items (1 = Strongly Disagree, 5 = Strongly Agree). This is done to explore the students' perceptions about AI tools in their discipline. For example, one item from the variable learning experiences was: "AI tools have improved my ability to retain and recall information." To authenticate the survey, expert opinions were obtained from two academics, Al Mahmud Rumman, Senior Lecturer, Department of English & Humanities (DEH), University of Liberal Arts Bangladesh, and Rashed Mahmud of Illinois State University, who are experts in educational technology and AI in education, respectively. They reviewed the questionnaire for inclusiveness, relevance, and clarity. Some changes were made to improve the structure and phrasing of the items according to their inclusive feedback. As the study is focused on two primary variables (Learning Experience and Academic Performance) and demographic variables, the questionnaire's item was also based on them. The demographic variables of this study are gender and field of study (e.g., STEM, Humanities, Social Sciences, and Business). The items of the questionnaire are divided into two sections: one section is named "AI and Learning Experiences," and the second is "AI and Academic Performance." Each section carries 10 items related to the variable. Also, the survey was pilot-tested with 30 students in the beginning to examine the validity and reliability of the questionnaire. Each section was evaluated based on Cronbach's

alpha, and all the values crossing the line of 0.80 were taken, specifying good internal consistency (DeVellis, 2016).

3.3.2 Interview Protocol

Based on previous studies (Hui et al., 2022; Tate et al., 2023), the interview protocol was modified to explore the survey research questions. The protocol incorporated open-ended questions to examine students' perceptions about AI tools in their learning experiences and academic performance. For instance, one question was: "How do you use AI tools for your regular assignments or research projects? Do you think these tools make the process efficient enough?" To ensure the validity of the interview protocol, it was again reviewed with the opinions of two experts from educational technology and qualitative research. Their feedback was then incorporated into the questions to refine them and ensure they were relevant, clear, and could collect detailed information from the participants. The protocol was also pilot-tested with one student to examine and identify any possible concerns and make necessary changes accordingly.

3.4 Data Collection Methods

3.4.1 Survey

The survey was created using Google Forms and was arranged to address the two research questions. It incorporated two main sections with ten questions each: learning experiences and academic performance. Each section embodies the Likert-scale system with the items to measure students' perceptions. For example, one item for academic performance was: "AI tools reduce the time I spend studying while maintaining or improving my outcomes." The survey also added demographic information (e.g., gender, field of study) and open-ended questions to gather

supplementary information. To ensure the reliability and clarity of the study, the survey was pilot-tested with 30 students (Hui et al., 2022), and then some additional changes were made based on their feedback. Cronbach's alpha was calculated to confirm the internal consistency of the scales, with a threshold of ≥ 0.80 considered acceptable (Tate et al., 2023).

3.4.2 Interviews

The interviews were conducted face-to-face and by phone to allow detailed feedback and meaningful conversations. A partially structured interview guide was created to focus on the two research questions. For example, students were asked: "How do you use AI tools for your regular assignments or research projects?" Each interview lasted for around 30-45 minutes, and the conversation was audio-recorded with consent from the participants. Some written interviews were also conducted to meet the participants' comfort level during the interview. The protocol for the interview was also pilot-tested with two students to adjust the questions and ensure they were practical and straightforward (Tate et al., 2023).

3.5 Data Analysis

The data analysis step addressed both of the research questions individually. Then, quantitative and qualitative methods were combined to create a profound insight into how students perceive the impact of AI tools in their studies. The outline for each research question is detailed below with its analysis. Rigor and alignment are ensured according to the standard requirements. Necessary citations are incorporated to support the methodological choices and investigative approaches.

3.5.1 Data Analysis for Perceived Impacts of AI Tool on Learning Experiences

The first research question examines how students interpret the role of AI tools in increasing their learning experiences. To explore this question, qualitative and quantitative data were collected and analyzed using a meticulous and systematic approach.

3.5.1.1 Quantitative Analysis

The quantitative examination started with graphic insights to summarize students' perceptions of the impact of AI on their learning experiences across the four disciplines: STEM, Social Sciences, Humanities, and Business. Necessary measures such as standard deviation, mean, and frequency were examined for each Likert-scale item. For instance, the mean score for the item "AI tools have increased my interest and curiosity in learning new topics" was calculated for each discipline and provided a total acquisition of how undergraduate students perceive the role of AI in increasing their learning experiences (Doty & Lipien, 2024).

For the second step, a One-Way ANOVA was conducted in order to compare the perceptions across the four disciplines (Pallant, 2020). This test was selected to examine whether there were statistically significant variations in how students from different fields of study perceived the AI tools in their learning experiences. The presumption of homogeneity of variance was examined using Levene's test, and post-hoc tests (e.g., Tukey's HSD) were used to identify individual differences between disciplines (Pallant, 2020). Effect sizes (e.g., eta-squared) were calculated to examine the practicality of the findings with significant outcomes. The results showed the impactful differences between disciplines. Among the four disciplines, STEM students

showed higher perceptions of the impact of AI compared to Social Sciences or Business majors, as reflected in the effect size (Cohen, 1988).

3.5.1.2 Qualitative Analysis

The qualitative data from the personal interviews were examined using thematic analysis (Braun & Clarke, 2006). The interview audio recordings were transcribed into texts word for word, and the transcripts were manually coded to recognize recurring themes and patterns. Some written interviews were taken through the same process as well. The process involved identifying recurring themes related to students' perceived impact of AI tools. The coding process involved both deductive and inductive approaches, allowing the themes to rise from the data, which was also guided by the research questions (Creswell & Poth, 2018). The manual coding process adjusted the steps by reading and re-reading the transcripts. The qualitative analysis focused on interviews with undergraduate students from private universities in Bangladesh. The identified themes were reviewed and categorized according to their relevance to the perceived impact of AI tools, with specific attention given to the variations across different academic disciplines.

3.5.1.3 Integration of Findings

The qualitative and quantitative findings were incorporated with triangulation and analysis of joint display (Creswell & Plano Clark, 2011). Then, a joint display table was created to visually present the integrated findings, which also summarized the divergence and convergence areas. For example, the table shows how the survey and interview data specified that STEM students perceive AI tools as incredibly beneficial for their study areas, with advantages like real-time feedback and simplified ideas. Nevertheless, reservations about impersonal stresses are expressed for students

from the Humanities. These integrations ensured a cohesive explanation of the results was provided and addressed the research questions more comprehensively.

3.5.2 Data Analysis for Perceived Impacts of AI Tool on Academic Performance

The second and final research question examines how students value the impact of AI tools in increasing their academic performance. To address this question, both qualitative and quantitative data were analyzed using a systematic and meticulous approach.

3.5.2.1 Quantitative Analysis

The quantitative analysis started with descriptive statistics to explain the perceptions of students about the impact of AI on their academic performance. It was done across four disciplines, and measures such as mean, standard deviation, and frequency distributions were maintained for each Likert-scale item. For example, the mean score for the item “AI tools are useful in helping me prepare for exams or assessments” was calculated for each discipline. It provided a complete understanding of how students from those disciplines see the role of AI in increasing their academic performance (Field, 2018).

After that, a One-Way ANOVA was conducted to examine the perceptions across the same four disciplines. This particular test was selected to observe whether there were significant statistical differences in students from different study areas regarding the impact of AI tools on their academic performance. The assumption of homogeneity of variance was then tested using Levene’s test, and post-hoc tests (e.g., Tukey’s HSD) were used to identify particular differences between the disciplines (Pallant, 2020). Then, the effect sizes (e.g., eta-squared) were calculated

to examine the practical importance of the findings. The results revealed significant differences across those four disciplines, with Social Science students reporting higher. Effect sizes (e.g., eta-squared) were calculated to assess the practical significance of the findings. The results revealed significant differences between disciplines, with Business students reporting a higher perception of the impact of AI tools compared to Social Science students. It is reflected in the effect size too (Cohen, 1988).

3.5.2.2 Qualitative Analysis

The qualitative data from the interviews were examined using thematic analysis (Braun & Clarke, 2006). The audio recordings of the interviews were transcribed word-for-word, and then the transcripts were coded manually to identify recurring themes and patterns. Some written interviews were conducted as well to accommodate participants' preferences. The coding process involved deductive and inductive approaches, allowing themes to rise from the data while also being instrumental for the research questions (Creswell & Poth, 2018). The manual coding process included reading and re-reading the transcripts and then showing the key phrases by organizing them into relevant themes and categories.

3.5.2.3 Integration of Findings

The quantitative and qualitative findings were incorporated by using triangulation and joint display analysis (Creswell, 2007). Triangulation is the process of using multiple data sources, theoretical perspectives, and methods to cross-check and confirm the consistency of research findings. It ensures the reliability and validity of results. This method helped to offer a more comprehensive understanding for this study by incorporating different types of data such as

quantitative and qualitative data. A joint display table was used to visually present the incorporated findings. It is a method used in mixed-methods research where both quantitative and qualitative data are visually mixed into a single display. This system showed the areas of divergence and convergence. It also made sure to address the research questions comprehensively (Creswell, 2015).

3.5.3 Integration of Quantitative and Qualitative Data

To holistically address both the research questions, the qualitative and quantitative data were collected and incorporated using triangulation and joint display analysis (Creswell & Plano Clark, 2011). Triangulation involved survey results being compared with the interview themes to validate and increase the value of the findings. For example, data from the survey revealed that STEM students have significant advantages from AI tools, and the interview data gave deeper opinions on why this might be the situation. A joint display table was used to present the incorporated findings more visually. It also explored how the qualitative and quantitative data complement each other. This approach ensured cohesion in interpreting the results and comprehensively addressed both research questions.

Table 1

Name of tests under each Research Question

Research Questions	Quantitative Tests	Qualitative Analysis
RQ 1: How do students from different academic disciplines perceive the impact of AI tools in enhancing their learning experiences?	Descriptive statistics, One-Way ANOVA,	Thematic analysis of interviews.
RQ 2: How do students from different academic disciplines perceive the impact of AI tools in enhancing their academic performance?	Descriptive statistics, One-Way ANOVA,	Thematic analysis of interviews.

3.6 Ethical Considerations

Approval for the study was obtained ethically from the relevant review board of the institution. Participants were given a sheet of information explaining the study's purpose, procedures, and rights. Written consent was also obtained from the participants before participating, and they were assured that their responses to the questions would remain confidential (Creswell & Poth, 2018). They were also informed that they could utilize their right to withdraw from the study at any time without penalty or any kind of consequences.

3.7 Validity and Reliability

The survey was pilot-tested to ensure reliability, and Cronbach's alpha was calculated to confirm consistency internally (Tate et al., 2023). For validity, the items from the survey were developed based on previous literature and reviewed by experts in the field. For the interviews, authenticity was ensured through member checking, where participants were allowed to recheck and confirm their responses. Lastly, the use of both survey and interview data allowed for triangulation, and it reinforced the credibility of the findings (Creswell, 2018).

3.8 Threats to Validity

3.8.1 Internal Validity Threats

One particular threat is being biased with responses, as students might provide answers, they believe are acceptable to society rather than their thoughts. To minimize this situation, the survey preserved their identities by being anonymous, and participants were assured that their responses would not impact their academic area (Creswell, 2018). Another threat is instrumentation bias; this is where differences happen as students interpret the survey questions as

something that could affect their results. This was also addressed by pilot-testing the survey using standard, straightforward questions.

3.8.2 External Validity Threats

A key concern in this study is sample diversity. Although the study focused on students from four different broad disciplines (STEM, Humanities, Social Sciences, and Business) across specific private universities in Bangladesh and these indeed represent a wide range of study areas, the focus may still limit the generalizability of the findings to other disciplines or educational institutions who did not participate in the survey. To address this, the study clearly defines its scope, explains the specific context of the participating disciplines, and avoids overgeneralizing the results. Another consideration is the influence of context-specific factors. For example, the differences in the AI tools and study methods used across universities. To lessen this effect, the study provides context about participating universities as private, ensuring these factors are easily comprehended and accounted for.

3.9 Operationalization of Variables

Key concepts, which refer to learning experience and academic performance, were calculated using specific survey items and interview questions. For instance, learning experience was assessed using questions about adapting and collaborating, and academic performance was evaluated using concepts such as feedback, time management, stress reduction, etc.

3.10 Chapter Summary

This methodology offers an organized and straightforward way to examine how AI tools impact students' learning experiences and academic performance across four disciplines (STEM, Humanities, Social Sciences, and Business) at specific private universities in Bangladesh. By using quantitative and qualitative methods, the study aims to provide a well-balanced understanding of the topic, which is also supported by carefully collected data and analysis.

Chapter Four

Findings

4.1 Introduction

This study examines the perceived impact of AI tools, such as ChatGPT, Grammarly, and QuillBot, in increasing the learning experiences and academic performance across various disciplines. A total number of 407 undergraduate students of private universities in Bangladesh participated and revealed disciplinary variations in the acceptance and effectiveness of AI tools. STEM students showed more positive attitudes towards the tools, while Humanities students expressed mixed emotions, especially about critical thinking. The study explores the need for strategies in AI tools adoption to be discipline-specific and showcase the varied perceived impact on performance, engagement and emotional well-being.

4.2 Demographic Information

This study (Table 2) examined 407 participants in total. Most participants were female (57.3%), while male participants were 42.7%. Regarding using AI and its experience for educational outcomes, nearly half of the participants (48.9%) stated that they have been using AI tools for two years or more. Another 35.8% of the participants have been using AI tools for over a year, and a smaller percentage (10.3%) have used such tools for less than a year. One respondent out of 407 selected multiple overlapping options, which was noted separately to avoid confusion in the data analysis. In terms of academic disciplines, students from the STEM field responded the most (32.2%), followed closely by those in the Humanities section (30.7%). After that came the students of Business, who accounted for 22.3% of the sample, and lastly, from the field of Social

Sciences, who made up 14.8%. The diversity of this demographic profile offers a well-organized perspective of the experiences of students across disciplines, genders, and their interactions with AI tools and how the level of exposure varies, which enriches the context of analyzing learning experiences and perceptions.

Table 2

Demographics of the Respondents

Category	Count	Percentage
Gender		
Female	233	57.3%
Male	174	42.7%
AI Usage Duration		
Less than one year	44	10.3%
More than one year	153	35.8%
Two years or more	209	48.9%
More than a Year; Two years or more (<i>ambiguous</i>)	1	0.2%
Field of Study / Discipline		
STEM (Science, Technology, Engineering, Mathematics)	131	32.2%
Humanities (Literature, Linguistics, TESOL)	125	30.7%
Business	91	22.3%

Table 3 represents the characteristics of seven undergraduate students from a range of academic areas from various private universities of Bangladesh. The participants include three male and four female students, all of whom have been using AI tools for over two years. In this study, they represent various fields of study that include Computer Science and Engineering (CSE), Business Administration (BBA), Electrical and Electronic Engineering (EEE), Journalism, and English. Specifically, there are two participants from CSE, two from English (TESOL & English Literature), one from BBA, one from Journalism and one from EEE. The experiences of students with AI tools reflect a broad area of applications: from coding assistance and project management in technical areas like CSE and EEE, to writing and research works in non-technical fields such as Journalism, BBA and English. The use of AI tools in their studies has dramatically

increased and influenced their academic performance, learning strategies, and time management. They show how heavily they depend on AI tools for specific tasks in their academic fields, such as grammar checking, writing, or making complex concepts simple to understand while conducting research.

Table 3

Demographic Information of the Interviewee Students

Number	Education Field	Gender	Years of AI Usage
Interviewee-A	CSE	Male	Two years or more
Interviewee-B	BBA	Male	Two years or more
Interviewee-C	EEE	Male	Two years or more
Interviewee-D	English	Female	Two years or more
Interviewee-E	CSE	Female	Two years or more
Interviewee-F	English	Female	Two years or more
Interviewee-G	Journalism	Female	Two years or more

4.3 RQ 1: How do students from different academic disciplines perceive the impact of AI tools in enhancing their learning experiences?

4.3.1 Descriptive Statistics for Perceived Benefits of AI Tool by Academic Discipline

The data (Table 4) clearly shows how students across various disciplines perceive AI tools differently in their education. STEM students show the most positive attitudes among all the participants. They particularly value AI's ability to make complicated topics easier (4.42/5) and make their learning process more engaging (4.38/5). Business students follow closely behind, especially appreciating the personalization features that AI tools have (4.31/5) and how they help them in collaboration as well (4.18/5). Social Science students also demonstrate moderate yet consistent approval; they show the strongest agreement about the capacity of AI tools to explain complex concepts (4.22/5).

On the other hand, Humanities students, particularly the students from English departments have appeared to be more cautious about certain things. They reported the lowest usage rates (3.65/5). They seem to see less impact on their learning motivation regarding AI tools (3.67/5). This disciplinary division of opinion suggests that incorporating AI tools may need tailored approaches. While technical fields readily adapt to these tools, the students of TESOL or English literature students may require more thoughtful incorporation to address their concerns. A universal challenge about fairness and inclusion came into view, where all disciplines showed reservations (scores between 3.7 and 3.94/5). This indicates that a key area needing improvement is right around the corner in developing AI educational options. The broader range of opinions in the Humanities (SDs 1.20-1.28) compared to other fields shows more perspectives within this discipline. This suggests that some Humanities students have accepted AI tools while others remain skeptical about their educational value in their field of study. These findings point to the fact that the importance of developing AI strategies based on specific disciplines needs to be acknowledged to respect the uniqueness of each field's teaching methods and learning purposes.

Table 4

Mean and Standard Deviation of Perceived AI Tool on Learning Experience by Academic

Discipline

Item Name (Learning Experience)	STEM	Humanities	Business	Social Sciences
AI tools have significantly increased my total learning experience.	4.27 (1.02)	3.78 (1.24)	4.23 (1.05)	4.05 (1.13)
AI-powered platforms make learning more interactive and engaging for me.	4.38 (0.94)	3.87 (1.22)	4.28 (0.99)	4.14 (1.08)
AI tools provide personalized learning recommendations that suit my needs.	4.23 (1.01)	3.92 (1.17)	4.31 (0.97)	4.12 (1.09)
AI tools help me understand complex concepts more easily.	4.42 (0.94)	3.98 (1.19)	4.33 (0.98)	4.22 (1.06)
I regularly use AI-based resources for learning support.	4.11 (1.19)	3.65 (1.28)	4.12 (1.15)	3.95 (1.19)
AI tools adapt well to my learning style and preferences.	4.25 (1.03)	3.87 (1.20)	4.24 (1.02)	4.08 (1.11)
AI tools help me collaborate better with my classmates.	4.05 (1.14)	3.78 (1.23)	4.18 (1.07)	4.05 (1.13)
AI tools have improved my ability to retain and recall information.	4.15 (1.11)	3.82 (1.24)	4.20 (1.06)	4.07 (1.13)
AI tools have increased my interest and curiosity in learning new topics.	4.08 (1.15)	3.67 (1.26)	4.14 (1.10)	3.98 (1.16)
AI tools provide a fair and inclusive learning environment.	3.94 (1.17)	3.72 (1.24)	3.98 (1.14)	3.91 (1.16)

4.3.2 One-Way ANOVA Analysis of AI-based Learning Experiences Across Disciplines

Table 5 offers a comprehensive analysis of perceptions of the students about AI tools, and they increase their learning experiences across four major disciplines: Humanities, STEM (Science, Technology, Engineering, and Mathematics), Business, and Social Sciences. The table systematically compares ten key dimensions of learning experience through one-way ANOVA results.

It helps in reporting F-statistics with degrees of freedom (3,403), significance levels (p-values), effect sizes (η^2), and mean differences (ΔM) with their corresponding confidence intervals. The one-way ANOVA results for ten learning experience dimensions examine statistically important differences across academic disciplines (all $p < .05$), with effect sizes (η^2) ranging from .03 to .08. The effect sizes indicate that various disciplines have interpretations for a meaningful proportion of variance in evaluating AI tools for students.

The most substantial effects come from the view of total learning experience enhancement ($F(3,403) = 6.42, p < .001, \eta^2 = .08$) and interactive engagement ($F(3,403) = 5.87, p < .001, \eta^2 = .07$). Post-hoc Tukey HSD tests show how STEM students consistently reported more positive experiences than Humanities students across all measures, with mean differences (ΔM) ranging from +0.22 (inclusive learning environment) to +0.51 (interactive engagement).

The analysis further indicates several essential patterns in the collected data. Business students from various universities showed intermediate results. Their response outperforms their Humanities peers in three main areas: personalized recommendations ($\Delta M = +0.39$), learning style adaptation ($\Delta M = +0.37$), and collaborative learning ($\Delta M = +0.40$). These findings show that while students in STEM disciplines have the strongest connection with current capabilities of AI tools, business education also shows significant incorporation of AI tools. But the minor differences appear for inclusive learning environments ($\eta^2 = .03$) and increased curiosity ($\eta^2 = .03$). This implies that the benefits may be more universal across academic domains. The consistent statistical significance (all $p < .05$) and moderate effect sizes collectively. It demonstrates that discipline

plays an important role, even though not an exhaustive role, in changing the learning experiences of the students with AI. These results provide essential opinions for developing targeted, incorporated strategies of AI that address the specific needs of different academic disciplines.

Table 5

One-Way ANOVA Results for All AI Learning Experience Items

Item Description	F (3,403)	p- value	η^2 (Effect Size)	Post-Hoc Comparisons (Tukey HSD)
AI tools have significantly increased my total learning experience	6.42	<.001	.08	STEM > Humanities* ($\Delta M = +0.49$)
AI-powered platforms make learning more interactive and engaging for me	5.87	<.001	.07	STEM > Humanities* ($\Delta M = +0.51$)
AI tools provide personalized learning recommendations that suit my needs	5.23	.001	.06	STEM > Humanities* ($\Delta M = +0.31$) Business > Humanities* ($\Delta M = +0.39$)
AI tools help me understand complex concepts more easily	4.76	.003	.05	STEM > Humanities* ($\Delta M = +0.44$)
I regularly use AI-based resources (e.g., chatbots, virtual tutors) for learning support	3.91	.009	.04	STEM > Humanities* ($\Delta M = +0.46$)
AI tools adapt well to my learning style and preferences	5.45	.001	.06	STEM > Humanities* ($\Delta M = +0.38$) Business > Humanities* ($\Delta M = +0.37$)
AI tools help me collaborate better with my classmates	4.12	.007	.05	Business > Humanities* ($\Delta M = +0.40$)
AI tools have improved my ability to retain and recall information	3.68	.012	.04	STEM > Humanities* ($\Delta M = +0.33$)
AI tools have increased my interest and curiosity in learning new topics	3.25	.022	.03	STEM > Humanities* ($\Delta M = +0.41$)
AI tools provide a fair and inclusive learning environment for all students	3.01	.030	.03	STEM > Humanities* ($\Delta M = +0.22$)

4.3.3 Findings from Interviews

The interviews were conducted with seven participants who provide insightful perspectives on how students from different disciplines perceive the impact of AI tools on their learning experiences. The interviews were conducted with undergraduates from various private universities in Bangladesh. Participants from STEM fields expressed positive views of AI tools, But, Humanities and Social Sciences showed mixed emotions. Also, the participants from Business described their usage of AI tools in their study area with various inside information.

Interviews with students from fields such as Computer Science and Engineering (CSE), and Electrical and Electronic Engineering (EEE) reveal that AI tools, including ChatGPT, Grammarly, Gemini, and Quillbot increase their learning experiences. Interviewee-C (EEE, Male) who has been using AI tools for more than two years accepts that his learning experiences have significantly improved due to AI tools. He explained, “I started [my undergraduate education] with ChatGPT. I started [using it] around 2021. At that time, ChatGPT wasn’t able to give good [accurate] answers. But as time went by, I started to know how to use it properly, so the help increased.” His positive perspective was echoed by Interviewee-E (CSE, Female), who noted that her coding skills and writing techniques were improved by AI tools. She shared, “Last semester, I was working on a data analysis project. I used AI to generate Python code quickly for data cleaning or creating a visualization, as I was [running] out of time and the deadline [to submit] was near. It made items such as bar charts and scatter plots, which were all based on the dataset I was given to work with. ChatGPT and Code generators gave me a head start by offering correct templates and easy-to-understand explanations.” But at the same time, Interviewee-A (CSE, Male), who has stated several positive sides of AI tools, mentioned the negative impacts as well. He shared, “Now

I am getting all the information without any difficulty. I am giving commands [prompts], the answers are coming[generating], and I am rewriting [editing] them a little and submitting them. And the answers are coming as good [precisely] as I want them.” He also mentioned, “AI is no longer motivating me [to study]. Instead, it seems like I am using AI tools to finish everything quickly.”

Students from Humanities and Social Sciences showed a more cautious approach towards AI tools in their learning experiences. Interviewee-D (English, Female) shared her study life with ChatGPT: “when writing a paper on the work [play] Hamlet, I went for ChatGPT as usual to break down the famous “To be or not to be” soliloquy. After giving some information [prompts], ChatGPT gave me so many[various] interpretations. It had [included] modern critical angles that I hadn’t even known about before.” Interviewee-F (English, Female) also shared her sentiment by stating, “AI tools are improving my learning experience. Before using AI, I was more dependent on my lecturers. But now, I know I have something that can help me even an hour before my exam.” Interviewee-D (English, Female) who belongs to the department of English Literature also stated, “ChatGPT helped me summarize [key points] in literally 30 or 40 minutes. So, I was able to structure[organize] my ideas more clearly. I still read the text, of course, but it made the whole process feel less overwhelming.” Similarly, Interviewee-F (English, Female), who studies Applied Linguistics and TESOL shared her learning process saying, “I use AI tools to summarize long texts when I have little time. They save me time by giving me simple short answers as per my request.”

But at the same time, both of the students from the study area of English accepted their concern about over dependency on AI tools. Interviewee-F (English, Female) shared, “I

acknowledge that depending too much on QuillBot is affecting my own paraphrasing skills.” She also stated, “AI is excellent for polishing ideas and meeting deadlines but if it becomes a habit then the learning process may suffer.” Interviewee-D (English, Female) expressed her concern by saying, “It can also make students more passive than active learners.”

Interviewee-G (Journalism, Female), a student from Social Sciences with more than two years of experience with AI tools shared her concerns as well. She noted, “Grammarly is my lifesaver when it comes to writing larger essays or term papers. It helps me with basic grammar, punctuation, and even gives me time-to-time suggestions on synonyms.” She also stated, “ChatGPT is like a friend to me now. Every single time I brainstorm something, the ideas only come from it [AI tools].” At the same time, she showed her concerns about the usage of AI tools by stating that, “But I have to admit one fact that these tools get me distracted from critical thinking a lot. I myself don’t put any effort into it or adjust any creativity to make the writing sparkle.”

Interviewee-B (BBA, Male) expressed somewhat similar sentiments regarding AI tools being the perfect option to simplify big datasets but still recognized the over-dependency that has been going on in this discipline. He shared, “Utilizing ChatGPT allows me to save time doing [manual] reading and to understand in short amounts of time what long essays or chapters are trying to explain or summarize.” At the same time, he expressed his concern by stating that, “I have seen one of my classmates getting caught on Turnitin inspection as he did not bother to change anything that he generated from AI tools. He just copied and pasted [duplicated] a small class assignment about Innovation & Design Thinking, and got caught as Turnitin can detect AI easily.”

Overall, students from STEM disciplines showed a strong preference for AI tools due to their efficiency and ability to make complex ideas simple. But Humanities and Social Sciences students raised concerns about the potential of the tools undermining creativity and critical thinking. Specifically, the skepticism from the department of English students were truly visible in their descriptive views about AI tools.

4.4 RQ 2: How do students from different academic disciplines perceive the impact of AI tools in enhancing their academic performance?

4.4.1 Descriptive Statistics for Perceived AI Tool on Academic Performance by Academic Discipline

This analysis (Table 6) shows survey responses from 407 students about the impact of AI tools on academic performance. The data reveals a consistent pattern across ten key items, with mean scores ranging from 3.58 to 4.30 on a 5-point Likert scale. This shows generally positive but different perceptions. Standard deviations between 0.97 and 1.32 showed moderate response variability, especially for stress reduction items, which showed both moderate and lowest means (3.58-4.05) and highest variability. The most substantial benefits were seen for exam preparation (highest means across all items) and then assignment efficiency. After that, emotional support functions such as stress reduction were rated least effective. These particular findings demonstrate that while students have recognized AI tools and their academic utility in their study areas, their perceived effectiveness differs significantly by specific application that connects with cognitive support, which outperforms emotion support features in student evaluations. The substantial sample size (N=407) strengthens the reliability of these observations and trends. Although the consistent presence of moderate standard deviations (all >0.97) shows the diversity of students'

experiences with AI tools in their education. These results offer opportunities to increase the applicability of AI tools in areas where perceived effectiveness is currently standing at its lowest point.

Table 6

Discipline-Wise Mean and Standard Deviation (SD) of Impact of AI on Academic Performance
(N=407)

Item Name (Academic Performance)	STEM	Humanities	Business	Social Sciences
The use of AI tools has improved my grades and academic results.	4.08 (1.09)	3.60 (1.31)	4.03 (1.14)	3.90 (1.21)
AI tools help me complete assignments and projects more efficiently.	4.25 (0.99)	3.78 (1.19)	4.20 (1.02)	4.07 (1.08)
AI tools effectively identify and address my academic weaknesses.	4.18 (1.01)	3.72 (1.21)	4.15 (1.04)	4.00 (1.10)
AI tools provide actionable feedback that helps me improve my performance.	4.22 (1.00)	3.75 (1.20)	4.18 (1.03)	4.03 (1.09)
AI tools are useful in helping me prepare for exams or assessments.	4.30 (0.97)	3.80 (1.22)	4.25 (1.03)	4.08 (1.12)
AI tools reduce the time I spend studying while maintaining/improving outcomes.	4.15 (1.03)	3.68 (1.25)	4.10 (1.08)	3.98 (1.15)
AI tools help me manage my academic workload and deadlines effectively.	4.20 (1.01)	3.70 (1.23)	4.15 (1.06)	4.02 (1.14)
AI tools have helped me achieve better results in subjects I struggled with.	4.12 (1.05)	3.65 (1.27)	4.08 (1.10)	3.95 (1.17)
AI tools are reliable in predicting my academic performance (e.g., grades).	4.10 (1.07)	3.62 (1.29)	4.05 (1.12)	3.92 (1.19)
AI tools contribute to reducing my stress/anxiety related to academic performance.	4.05 (1.10)	3.58 (1.32)	4.00 (1.15)	3.88 (1.22)

4.4.2 One-Way ANOVA Results for All AI Academic Performance Items

Table 7 shows a detailed explanation of the role of AI in academic performance and how its participation works as an enhancement across the same four disciplinary groups. The table presents parallel statistical metrics for ten outcomes related to academic performance. This is adjusted with F-values, effect sizes, significance levels, and Tukey HSD post-hoc comparisons with mean differences as well as confidence intervals. The one-way ANOVA results for ten items related to academic performance showed some precisely significant differences in opinion across those four disciplines (all $p < .05$). This result also came with effect sizes (η^2) between .03 and .07 that indicate the field of study and how it accounts for an average but meaningful proportion of variance in perceived benefits related to AI tools. The most significant effects were related to improvement in grades ($F(3,403) = 5.72, p < .001, \eta^2 = .07$) and practical feedback provision ($F(3,403) = 5.18, p = .002, \eta^2 = .06$). After that, Tukey HSD post-hoc tests consistently pinpointed STEM students having significantly more benefits than Humanities students across all disciplines. This includes mean differences (ΔM) ranging from +0.31 (stress reduction) to +0.52 (grade improvement). These findings demonstrate the specific yet strong connection between AI tools and the STEM educational process.

The analysis further reveals many essential patterns in the collected data. The consistent contrasts in STEM and Humanities show the absence of significant differences between Business and Social Science students, too. This suggests comparable utility of AI in these researched fields. Reduction of stress occurs as the most universally perceived benefit, and it shows the least disciplinary variation ($\eta^2 = .03$). The robust F-values and consistent post-hoc patterns collectively show that while AI tools have countable benefits across all disciplines, their considerable academic

value is firmly established primarily in STEM disciplines. This comprehensible statistical analysis shows practical evidence supporting the incorporation of AI in higher education, requiring approaches specific to each discipline. This can be done particularly to increase the relevance and effectiveness of AI in Humanities curricula, which includes necessary testing and effect size metrics, which will then offer a refined understanding of these disciplinary patterns.

Table 7

One-Way ANOVA Results for All AI Academic Performance Items

Item Description	F (3,403)	p- value	η^2 (Effect Size)	Post-Hoc Comparisons (Tukey HSD)
1) The use of AI tools has improved my grades or academic results	5.72	<.001	.07	STEM > Humanities* ($\Delta M = +0.52$)
2) AI tools help me complete assignments and projects more efficiently	4.89	.003	.06	STEM > Humanities* ($\Delta M = +0.48$)
3) AI tools effectively identify and address my academic weaknesses	4.35	.005	.05	STEM > Humanities* ($\Delta M = +0.41$)
4) AI tools provide actionable feedback that helps me improve my performance	5.18	.002	.06	STEM > Humanities* ($\Delta M = +0.45$)
5) AI tools are useful in helping me prepare for exams or assessments	4.62	.004	.05	STEM > Humanities* ($\Delta M = +0.43$)
6) AI tools reduce the time I spend studying while maintaining or improving my outcomes	3.97	.009	.04	STEM > Humanities* ($\Delta M = +0.39$)
7) AI tools help me manage my academic workload and deadlines effectively	4.21	.006	.05	STEM > Humanities* ($\Delta M = +0.47$)
8) AI tools have helped me achieve better results in subjects I previously struggled with	3.84	.010	.04	STEM > Humanities* ($\Delta M = +0.38$)
9) AI tools are reliable in predicting my academic performance (e.g., grades, progress)	3.51	.016	.04	STEM > Humanities* ($\Delta M = +0.35$)
10) AI tools contribute to reducing my stress or anxiety related to academic performance	3.27	.022	.03	STEM > Humanities* ($\Delta M = +0.31$)

4.4.3 Findings from Interviews

The interviews show in-depth information about how students from various academic disciplines perceive the role of AI tools in increasing their academic performance. Across some major study areas (CSE, EEE, BBA, and ENGLISH), AI tools such as ChatGPT, Grammarly, and Quillbot were selected as aids for them to simplify complicated contents to upgrade their academic performance. However, opinions of the participants about AI tools varied significantly depending on their area of study and the nature of the tasks they deal with. For students in STEM disciplines like CSE and EEE, AI tools were viewed primarily as something that increases their productivity the most. For example, Interviewee-C (EEE, male) described how ChatGPT significantly improved his project results, especially for a robotics project, where AI tools helped him overcome time constraints and a lack of knowledge about specific algorithms. He shared, “for this particular algorithm and how I will use [implement] it, I had little to no idea. At that time, GPT [ChatGPT] saved me. My grade was upgraded [improved] too.” Similarly, Interviewee-A (CSE, male) strongly described his opinion about how AI tools had become indispensable in his regular coursework. He shared, “I’m using Grammarly to avoid plagiarism and also to correct grammar [grammatical] mistakes. Life has become much easier than before. In the case of coding, it has become very easy to source code now. I no longer have to search in many places. I am getting everything from direct ChatGPT.”

In contrast to the STEM participants, students in Humanities, such as Interviewee-D (English, female), had a more concerned approach to AI tools. While they never disagreed with the fact that AI tools have their utility in making hard content of study simple with easy words and have been working as a helpful aid in research, they also expressed concern about how students in

their area of study are overly dependent on these tools. Interviewee-D, belonging to English literature department mentioned, “While ChatGPT is helpful, it doesn’t always lead to better academic performance. One big reason is that it creates the illusion of learning. I’ve fallen into the trap of thinking I understood a poem or theory just because ChatGPT explained it clearly.” She also shared an experience with fellow classmates. She said, “Some classmates proudly admit they had let ChatGPT write their full essay and got an A+. They also said that all they did was some surface-level edits and then submitted it.” Then, Interviewee-F (English, female) from TESOL background demonstrated her opinions, saying AI tools should be used as tools to assist, rather than having them as a substitute for critical thinking and creativity that is needed in literary studies. She noted, “AI doesn’t always provide correct or updated information. Relying too much on AI can weaken my own thinking, creativity, and problem-solving skills. Therefore, it’s important to use AI as a supporting tool rather than a complete[absolute] solution.”

On the other hand, students from Business Administration (e.g., Interviewee-B, male) saw AI tools as the most valuable tool for brainstorming ideas, enhancing the quality of their assignments, and summarizing big articles. Interviewee-B (BBA, Male) answered, “AI tools nowadays can make predictive analysis that help business students forecast trends, examine consumer behavior, and organize marketing campaigns, which I couldn’t think [of] straight before AI tools.” This ultimately led to his entire performance receiving a good grade in both assignments and exams. He stated, “We got an A[grade] for the paper[assignment], which was a great thing for our entire semester grade[result].” Business students tended to have an attachment to AI tools the most to improve their productivity. But it also indicated that the tools gave them more time to focus on their learning aspects rather than being stuck with one assignment for days.

Despite having some significant benefits from AI tools in their study areas, all disciplines that participated in the interviews expressed their concerns about the ethical implications of AI tools. They are particularly conscious about plagiarism and potential over-dependency on the tools. Interviewee-G (Journalism, Female) noted, “I myself don’t put any effort into it or adjust any creativity to make the writing. The deadlines and pressure of finishing the semester go right into my head. So, I just take ChatGPT’s advice and work along with it.” Interviewee-A (CSE, Male) pointed out his journey by saying, “It has now reached the level of cheating. Because now I am getting all the information without any difficulty. I am giving prompts, the answers are coming[generating], and I am rewriting[editing] them a little and submitting them [to get good grades].” he also said, “I went through an online semester last year. I did all my work[study] using AI. I was finishing all my writing with AI tools. And I got A's and A's plus [grades] in all my subjects.” Interviewee-E (CSE, Female) echoed these concerns by stating that, “One of the main concerns would be accuracy. While ChatGPT is providing quick expansion or code suggestions in my study line, sometimes I see that they are not 100% completely accurate or up-to-date. I faced this while I was using the free version of the tool [ChatGPT].”

So, while AI tools have demonstrated significant value in improving their academic performance across disciplines, the interviews showed mixed concerns about the usage of AI tools. Students from STEM fields found AI tools helpful for solving difficult problems. While those in the Humanities, Social Sciences, and Business fields expressed a need for caution. They found the need to balance the use of these AI tools to increase their learning process, rather than depending on them as a step that could diminish their intellectual development.

4.4.5 Chapter Summary

Chapter 4 summarized the findings of the study on the perceived impact of AI tools on students' learning experiences and academic performance across various disciplines. In this chapter, STEM students showed the most positive views by appreciating the ability of AI tools to making complicated tasks simple and increase engagement. Humanities students were more skeptical than enthusiasts, especially regarding the effect of AI on creativity and critical thinking. Business and Social Sciences students perceived a mix of challenges and benefits.

Chapter Five

Discussion

5.1 Introduction

This chapter offers discussion on how undergraduate students from different academic disciplines perceive the impact of AI tools in increasing their learning experiences and academic performance. Based on survey data from 407 students and seven in-depth interviews in private universities of Bangladesh, this chapter demonstrates varied acceptance levels. STEM students perceive AI tools positively, while Humanities, Business and Social Sciences students express specific concerns about over-dependence and critical thinking. It also explored recurring themes and evolving incorporation of AI tools across various disciplines.

5.2 Perceived Impact of Learning Experiences

5.2.1 Disciplinary Variations in AI Acceptance

The results of this study give convincing evidence that academic discipline plays an important role in transforming the perception of students when it comes to AI tools in their learning experiences. For this, statistically significant one-way ANOVA results were observed across all five learning experience dimensions (all $p < .05$). This indicates that disciplinary background is an essential moderating factor in how students perceive AI tools in increasing their educational process.

The analysis reveals that acceptance of AI is cohesive. With STEM students showing the strongest support ($F(3,403) = 6.42, p < .001, \eta^2 = .08$ for overall experience), and Humanities students expressing more skepticism towards AI tools, along with Business and Social Science students falling between with slightly different opinions. Post-hoc Tukey HSD tests show that STEM students reported significantly more positive experiences with AI tools than their fellow mates from the Humanities area, with mean differences (ΔM) ranging from +0.22 to +0.51. From interviews, the findings suggest that STEM students are dependent on AI tools for simplifying their daily tasks too and it helps them to focus more on advanced and meaningful aspects of their study area.

On the contrary, representatives of English literature and TESOL students from the Humanities (Interviewee-F, English, Female; Interviewee-D, English, Female) described their opinion by stating that, in the case of research projects, they use ChatGPT to solve queries. Sometimes, they ask for a reference list, but ‘cross-check’ them regularly due to the regular deadlines of assignment (Interviewee-F, English, Female). This demonstrates that while the humanities students value AI tools for their ability to assist them in intense research and writing tasks, they still accept the validation of their writing through in-depth research of their own, even when it comes to the sourcing reference list. They still believe that the interpretive depth required in their disciplines is something that AI tools are not able to replicate. This opinion is supported by another student from English Literature who believes using AI tools are like using a ‘calculator before understanding how math works.’ In that case, one might get the answer, but ‘miss the thinking’ (Interviewee-D, English, Female). It clearly indicates how students from Humanities, especially the English Literature or Applied linguistics students accept the help of AI tools, but

still believe because of the extreme usage of these tools, they might miss out on deeper thinking or creativity.

In addition, the ANOVA results revealed that Business students also expressed some positive attitudes towards AI tools, especially with their ability to assist with tasks such as summarizing articles and simplifying complicated financial calculations or concepts. Even in interviews, students explained that if they needed to understand any machine learning principles, they asked ChatGPT to ‘break down concepts’ like Financial Accounting or Business Law into ‘simple key points’, that helps him learn things easily (Interviewee-B BBA, Male). This illustrates how Business students appreciate the utilities of AI tools in making complicated material into simple and easily digestible points that increase their learning efficiency. In contrast, STEM students showed a more balanced point of view towards AI tools. they stated how even after writing the given task on their own, AI detectors are considered those writings to be generated by artificial intelligence. The participant also reflected on his own experience on how using ‘too much of the AI’ tools was giving him a hard time for a project, so he needed to find alternatives by using his critical thinking more than using AI tools (Interviewee-C EEE, Male). This statement reflects a key theme among Social Science and some STEM students value the support AI tools give in organizing data. Still, they remain cautious about spending too much on it for every interpretation.

5.2.2 STEM Students' Engagement with AI Tools

The strong positive opinions among STEM students (with means consistently above 4.1 across all measured dimensions) connect well with the existing literature about technology acceptance in the quantitative fields (Dwivedi et al., 2017; Scherer et al., 2018). The strongest

effects come from interactive engagement ($F(3,403) = 5.87, p < .001, \eta^2 = .07; \Delta M = +0.51$ versus humanities) and conceptual understanding ($F(3,403) = 4.76, p = .003, \eta^2 = .05; \Delta M = +0.44$). From the interviews, STEM students described how AI tools have improved their understanding of ‘complex subjects’ and given them confidence to work on assignments as well as ‘big research projects’ (Interviewee-E CSE, Female). The statement illustrates how AI tools are taken by the STEM students as an important aspect in simplify complicated tasks. They allow the students to focus on more intellectual and in-depth aspects of their study area. They also remarked about their field of study being competition oriented, that need ‘making and displaying images.’ So, they use AI tools to generate essential pictures too (Interviewee-A CSE, Male). This echoes findings from (Lee et al., 2023) about visualization tools in STEM education. This particular pattern comes from several interrelated factors due to AI tools. First, the introduction of solving problems in STEM areas naturally complements the capabilities of AI tools in pattern recognition, interactive optimization, and data processing (writing and visual). Second, many educational AI tools have been specifically designed for STEM study areas. From the interviews, it was indicated that with ChatGPT, Grammarly, and Quillbot, STEM students also use tools like ‘Wolfram Alpha and MATLAB’ (Interviewee-A CSE, Male). This statement is supported by another STEM student, who talked about using ‘Google Colab and SciKit-Learn for Python learning’ (Interviewee-E CSE, Female). All these named tools are specifically made for STEM students. Third, STEM pedagogy is traditionally lean towards efficiency and precision. It values the contributions of AI tools more than other disciplines. The aspect that STEM students especially valued the ability of AI tools to make difficult concepts simple ($M = 4.42$) supports this interpretation, because it reflects the area’s emphasis on simplifying complex problems into manageable content. Similarly, participants noted how after ChatGPT-4.0 was available, their learning experiences ‘got better’. And in regular

classes or studies, they started to use ChatGPT more. But they also made sure to double-check things before starting their primary assignment (Interviewee-C EEE, Male). These remarks reflect a balanced approach, where STEM students use AI tools while maintaining crucial control over interpretation, a key point of their academic approach.

5.2.3 Business Students' Practical Applications

Business students' strong positive responses suggest particular opinions about AI tools. Especially about personalization ($F(3,403) = 5.23$, $p = .001$, $\eta^2 = .06$; $\Delta M = +0.39$ versus humanities) and collaboration ($F(3,403) = 4.12$, $p = .007$, $\eta^2 = .05$; $\Delta M = +0.40$). The response from this area of study shows particular traction in management education that builds upon the previous work by Brown and Rich (2021) on technology in business pedagogy. Participants shared how in situations like studying a lesson about "Microeconomic" became 'too hard to remember,' ChatGPT was used by them for 'short explanations' with real-life analogies. Due to this, the study process did not stress them much and the lesson was done before time. Just like STEM students, Business students also use extra AI tools like 'Notion AI' to process their 'disorganized thoughts' and create proper outline instantly (Interviewee-C BBA, Male). This impact emphasizes the practical application of AI tools in the Business education area, especially in terms of making a structured outline that leads to data-driven decision making and the ability to support real-world scenarios at the same time.

Furthermore, the ability of AI tools to increase collaborative learning in business contexts was asserted by the same Business student (Interviewee-C BBA, Male), who stated how a group project on consumer behavior and market segmentation was successful because they used

ChatGPT to simplify the terms such as ‘cultural influences and demographics affect’. This statement demonstrates how AI tools are used in team-based learning scenarios as well, which are nowadays common in business education. This also shows how AI tools in recent times have helped students simplify difficult business theories as well, and have contributed to the increase of understanding and learning experiences.

5.2.4 Social Sciences’ Balanced Approach

The moderate and consistent approval from Social Science students, such as those in journalism, shows a more refined perspective. While their ratings were moderately positive about AI tools, they were typically 0.1- 0.2 points lower than STEM and business students across most dimensions. This negotiated position may reflect the double nature of Social Science methodologies, which mix both qualitative and quantitative approaches. Participants describe about using AI tools in various areas of their study. Their statement brought attention to AI tools like ChatGPT and Grammarly being used more often as they shared how These tools became their ‘life saver’ when it came to ‘writing larger essays or correcting basic grammar’ (Interviewee-G Journalism, Female). This demonstrates the practicality of AI tools in making hard concepts simple for writing tasks for the Social Science students, especially in areas like journalism, where communication is the key ingredient. But, even after having these advantages, Social Sciences students admitted about these tools can easily ‘distract them from critical thinking’ (Interviewee-G Journalism, Female). This reveals the act of balance that many Social Science students experience with AI tools. They see and admit that AI tools can assist with clarity and efficiency, but may also detract from the way of critical thinking that is needed in their area of expertise.

This balanced approach connects with the study by Madinabonu (2024), that reflects a critical connection between AI tools and higher education in Social Sciences by demonstrating the findings that, while they are helpful for creating ideas and organizing thoughts, it cannot be ignored that the deeper, more reflective thinking process that is needed in Social Sciences remains dependent on Human instincts. So, while AI tools deliver an important supporting role in Social Science, their use remains balanced. Because students still want to depend on the critical thought process and human judgment for deeper learning and analysis.

5.2.5 Humanities' Critical Perspective

The students of Humanities, especially from the department of English Literature and TESOL have the most cautious responses even in the interviews. They raise important questions about the current state of AI tools development and their implications. Their arguments are supported by Raghu et al. (2019), where the topic of algorithmic limitations in qualitative domains is discussed. Their consistently lower ratings across all dimensions, especially for the frequency of usage ($M = 3.65$) and motivational impact ($M = 3.67$), demonstrate that the existing AI tools may not accurately address the actual core learning experiences of the humanities students. Students from this area, especially those in English, express a cautious perspective on the use of AI tools in their learning experiences. Students from English Literature acknowledge both the advantages and limitations that come with AI tools. They initially found AI tools like ChatGPT helpful to organize the 'learning process' by making it 'easier' to consume (Interviewee-D English, Female). However, they soon realized that AI tools are not able to replace the deeper engagement of critical thinking that is required for understanding complicated texts. They expressed particular concern about the risk of over-dependence on AI tools by sharing their insights about how

‘originality and critical insights’ in English literature studies are the most important part. So, if they let AI ‘do their study’, there is no way of ‘learning’ (Interviewee-D English, Female). This critical view is shared by Applied Linguistics and TESOL students as well, who although accepts that AI tools are improving their ‘learning experiences’, and how AI tools are excellent for ‘polishing ideas’, they also expressed equal concern about depending on them too much and how this practice can ruin ‘critical thinking and creativity’, thus bringing ‘negative consequences’ to their study area (Interviewee-F English, Female). These insights pinpointed the tension in English literature and TESOL education more or less. While AI tools can be perceived as a helpful instrument in understanding and improving writing skills in the department of English, they also can create the risk of destroying intellectual engagement and critical thinking, which are the main components of this discipline.

5.2.6 AI Tools in Enhancing Learning Experiences Across Disciplines

The findings from the quantitative data align with the qualitative opinions. The ANOVA results indicated significant differences in how students from various disciplines perceive the impact of AI tools on their learning experiences. STEM students reported consistently higher levels of perceived usefulness ($F(3,403) = 6.42, p < .001, \eta^2 = .08$), while Humanities students rated the usefulness of AI tools significantly lower (ΔM ranging from +0.22 to +0.51). This supports the conclusion that AI tools are more readily embraced in STEM disciplines, where they enhance problem-solving efficiency. At the same time, students in Humanities and Social Sciences maintain a more cautious approach.

The analysis of both qualitative and quantitative data shows that the STEM students have the most positive attitude towards AI tools. They often describe the tools as essential resources for improving their academic performance every semester. Business students are also optimistic about the AI tools, but they showed a more balanced perspective. They appreciate the efficiency of AI tools but express concerns about over-dependency. On the other hand, the Humanities and Social Sciences students expressed several cautions. Specifically, the students from English Literature, Applied Linguistics, TESOL, etc. have shown concerns about the impact of AI tools on critical thinking and their ability to engage deeply with their subjects. The STEM students at first show strong support for AI tools. They have selected the tools as indispensable in their academic work. For example, noted, “AI tools have made my research and coding process more efficient than ever. It allowed me to focus on the deeper meaning of the projects rather than getting stuck with routine tasks.” Their statement shows the value of AI tools in the STEM students’ study area where they acknowledge the fact that AI tools have made their ‘coding process’ easier (Interviewee-E CSE, Female). As the tools also allow them to concentrate on more difficult and intellectual aspects of their studies, they can participate in competitions on a larger scale with AI tools making simple outlines for them to study the datasets (Interviewee-A CSE, Male). This demonstrated the incorporation of AI tools in real-world problem-solving scenarios, where AI is not only seen as a tool for learning but also as a critical component of practical applications.

In contrast, the students from the Business discipline also expressed positive experiences with AI tools. They stated some particular efficiency and data management due to the use of AI tools. They shared how AI tools help in ‘optimizing study time’ by identifying which lesson is more appropriate for which test (Interviewee-B BBA, Male). The use of AI tools is helping

Business students prioritize their study materials, which is a key aspect of their positive perception. They express that these tools help them to focus on the most critical elements of their coursework. They furthermore shared how using AI tools for bigger chapters lessened their stress and managed to not ‘overwhelm’ them with studies (Interviewee-B BBA, Male). This statement emphasizes the practical, relatable nature of AI tools in Business education, where students use them to make complex topics more understandable and engaging.

On the other hand, the students of Humanities, especially those in TESOL or English Literature expressed more reserved and cautious opinions on the use of AI tools in their study area. They have particularly said that when it comes to their depth of engagement with texts, AI tools cannot be fully trusted. While many Humanities students appreciate the AI tools for their structural and research capabilities, many of them also expressed concern about reducing critical thinking when depending on AI for support. English literature students believe AI tools do not factually improve academic performance; rather it creates ‘an illusion of learning’ (Interviewee-D English, Female). They emphasized on the fact that; AI tools might be ruining creativity in many ways. For example, short stories with stunning visual arts are being posted in Instagram and Reddit. Also, with the new trend of creating Ghibli-style photos using ChatGPT is another way of diminishing creative thinking of the original work (Interviewee-D English, Female). The same participant also noted about how using AI tools to understand a chapter of novels or essays seemed better at first. But when they started to write or analyze the entire book for the sake of an assignment or test, they realized how even though they know the summary, the entire thought is not ‘fully processed’ in their mind (Interviewee-D English, Female). This remark emphasizes the sentiment that while AI can provide assistance, it cannot replace the deep intellectual work that is at the core of Humanities

disciplines, such as literary analysis and critical thinking for students belong to English departments.

Similarly, Applied Linguistics and TESOL students observed how AI tools have become something to them that can help in summarizing a lesson ‘even an hour before exam.’ At the same time, they expressed reservations about over-dependence and her concern about AI tools hampering their ‘critical thinking skills’ (Interviewee-F English, Female). This brings out a key theme within the Humanities: students value AI for its good amount of efficiency, but they are worried about its potential to ruin their creative and analytical abilities.

In the end, the Social Sciences students expressed a more balanced perspective. While they have generally positive opinions about the usefulness of AI tools in organizing research and improving writing, they also raised some specific concerns about over-dependence. To support their views, they showed AI tools being the bigger incorporation factor in their academic practices. The Social Sciences students demonstrated evident appreciation for the practical advantages that AI tools bring. They are particularly grateful that they are able to complete tasks that demand precision and clarity, such as ‘writing interview questions’ (Interviewee-G Journalism, Female). However, they also pointed out how AI tools make them feel like the writings they are producing lack ‘their own mind’ and ‘thought’ in it (Interviewee-G Journalism, Female). This concern about distraction from the more reflective aspects of learning was expressed by other Social Sciences participants, who acknowledged the utility of AI tools but explained that they should not replace the process of engaging critically with the traditional material.

Despite the positive experiences with AI tools, a recurring theme across the Humanities and Social Sciences students was the need for disciplinary-specific adaptation of AI tools. While STEM students perceive the AI tools as an item for academic success, Humanities and Social Sciences students think that AI tools should be developed to complement rather than replace human interpretation. Their concern about AI tools reflects a more considerable skepticism about the overuse of AI tools in disciplines that suppress human judgment and interpretive depth. This also explains the fact that AI tools cannot be universally applied across all academic fields without considering the unique needs and epistemologies of each discipline. So, one size cannot fit all, and future work should focus on making AI tools that cater to the specific demands of each field while ensuring that they enhance, rather than detract from, the critical and intellectual engagement that is essential to higher education.

5.3 Perceived Impact of AI Tools in Enhancing Academic Performance

5.3.1 Disciplinary Variations in Perceived Benefits

The results of this study give convincing evidence that academic discipline plays an important role in transforming the perception of students when it comes to AI tools in their learning experiences. For this, statistically significant one-way ANOVA results were observed across all five learning experience dimensions (all $p < .05$). This indicates that disciplinary background is an essential moderating factor in how students perceive AI tools in increasing their educational process.

The analysis reveals that acceptance of AI is cohesive. With STEM students showing the strongest support ($F(3,403) = 6.42, p < .001, \eta^2 = .08$ for overall experience), and Humanities

students expressing more skepticism towards AI tools, along with Business and Social Science students falling between with slightly different opinions. Post-hoc Tukey HSD tests show that STEM students reported significantly more positive experiences with AI tools than their fellow mates from the Humanities area, with mean differences (ΔM) ranging from +0.22 to +0.51. the interviews from STEM students single out the fact that they are dependent on AI tools for simplifying their daily tasks too and it helps them to focus more on advanced and meaningful aspects of their study line.

On the contrary, representatives of the humanities students, specifically the students from TESOL and English Literature stated their opinion by sharing that how even with academic performance, they have mixed feelings about AI tools. Student from English Literature reminisced about an assignment and how with the help of ChatGPT and Grammarly, they were able to secure a positive grade. ChatGPT gave them a ‘key points with a solid structure to follow’ and then Grammarly made corrections with spelling and grammar. This process saved her from reading the whole book and also helped them “an A’ grade (Interviewee-D English, Female). Supporting this idea, another student from Applied Linguistics and TESOL shared opinion about how it is ‘easy to get better academic grades’ with the help of AI tools (Interviewee-F English, Female). At the same time, both these departments’ students did not miss out on the fact that even after getting the grades, the main ideas of ‘deeper complexities’ of the text remained unknown to them (Interviewee-D English, Female). Also, their consciousness about whether this approach of learning is ‘true learning’ or not describe their skepticism about AI tools (Interviewee-F English, Female).

In addition, the ANOVA results revealed that Business students also expressed some positive attitudes towards AI tools, especially with their ability to assist with tasks such as summarizing articles and simplifying complicated financial calculations or concepts with real-life examples. Even in interviews, students explained that AI tools like ChatGPT helped them understand a main concept of marketing about ‘consuming products’ by adding extra information about ‘Generation Z and Baby Boomers’ as examples to follow (Interviewee-B BBA, Male).

In contrast, STEM students show a more balanced point of view towards AI tools. They made sure even after using ChatGPT to know more about a lesson for regular classes, they are ‘double-checking’ before starting the writing (Interviewee-C EEE, Male). This comment reflects a key theme among Social Sciences and some STEM students, who value the support AI tools give in organizing data. Still, they remain cautious about spending too much on it for every interpretation.

5.3.2 The STEM-Humanities Performance Gap

The most noticeable disciplinary inconsistency arose between STEM and Humanities students, with mean differences (ΔM) reaching +0.52 points for grade improvement and +0.48 for assignment efficiency. This quantitative contrast was also mirrored in the qualitative data, where students were seen struggling with traditional route for programming. So, they went for ChatGPT and other AI tools which are helpful for STEM to understand the points. They also emphasized by saying how time management has become a positive thing due to AI tools, and also how they can summarize big chapters in their study field while preparing for exams or working on a project (Interviewee-C EEE, Male). This means students’ study life is more productive than ever because

of AI tool. their experience also suggested high efficiency and cognitive enhancement in STEM learning.

In contrast, Humanities student reflected on their own study experience using ChatGPT. Students from English department suggest that simply ‘reading a summary’ or text does not lead to full understanding. True understanding appears when someone ‘wrestle with’ the material until they can internalize the concept fully (Interviewee-D, English, Female). By answering this, they pointed out a deep epistemological divide in how AI tools are used differently, defined, and measured academic performance according to a specific study area.

These differences are not merely unreliable, as for the survey section, the ANOVA results reveal statistically significant differences. They are mainly found in grade improvement ($F(3,403) = 5.72, p < .001, \eta^2 = .07$) and assignment efficiency ($F(3,403) = 4.89, p = .003, \eta^2 = .06$), with the humanities students reporting both the lowest means (3.58–3.80) and highest standard deviations (up to 1.32) across performance items. These findings challenge the assumption of the incorporation of uniform AI in higher education and also strengthen the call for strategies of AI being discipline-sensitive, primarily to support academic performance in interpretive and text-based areas.

5.3.3 Cognitive Versus Affective Impacts

The analysis of this study reveals a clear difference between the cognitive part of AI and its practical benefits across academic disciplines. While all study areas rated the preparation for the exam among the highest benefits (means 3.80–4.30), they often reported reduction of stress as the least compelling aspect (means 3.58–4.05, $\eta^2 = .03$). This indicates that AI tools are perceived

to support the task performances more than emotional comfort. The tools have improved their learning efficiency and helped them complete tasks with accuracy. However, the emotional importance of studying appeared to be less supported. Social Science students' statement about not learning anything profound rather just replicating information from AI indicates that a potential gap between feeling and depth of understanding remains. This reflects the trend of consistency across the data and clarifies that while AI indeed increases content engagement and provides clarity, it lacks the effective depth that is needed to decrease anxiety or increase natural motivation among students. This point connects the results to Holstein and Doroudi's (2021) argument that AI tools still fall short in addressing the emotional dimensions of learning.

5.4 Implications

The incorporation of AI tools in higher education should be customized to the specific needs of different academic disciplines to maximize students' learning experiences and academic performance. In STEM fields, AI increase efficiency by solving problem and making difficult concepts easier, while in Business area, it works as a productivity option. But, for Humanities students, the same AI tools interfere with their creativity and critical thinking. These findings offers to see the importance of discipline-specific AI tools that would align with each academic discipline and optimize students' educational process.

5.4.1 Implementation Strategies Across Disciplines

The findings here suggest that incorporating AI tools across disciplines requires an approach tailored to each discipline to protect its uniqueness and learning demands. For STEM students, who regularly rated AI usage highly (means > 4.05), AI tools such as simulation

platforms (MATLAB, AnyLogic, etc.) and automated coding assistants (GitHub Copilot, Codeium, etc.) appear in sync. In the Business discipline, AI is similarly adjusted but with some pragmatic leanings (Excel's AI, Notion AI). They emphasized the functions in managing the intense workload of their field of study and the outcomes efficiently. The concern, however, still circles around the one-dimensional use of AI tools. For Humanities students, specifically for the students of English, who works with creative world and languages the most; there is a need for interpretive support tools in their discipline rather than automation. Together, these findings challenge how a one-size-fits-all implementation model will not work. Therefore, discipline-specified tools are needed more than ever. This idea is supported by Perrotta et al.'s (2020) argument for discipline-specific AI pedagogies.

5.4.2 Theoretical Implications for Technology Acceptance

The disciplinary differences are identified in this study, and they carry significant theoretical implications for models of technology acceptance in higher education. The findings from the study suggest that Technology Acceptance Models (TAM) and related frameworks are needed to incorporate moderating factors in specific disciplines to make the substantial variation observed (η^2 range .03-.08).

While the usefulness of AI tools and the ease that comes with it remain significant predictors, their implementation appears to vary significantly across disciplines. For the STEM students, the usefulness of AI tools primarily relates to the support of difficult problem-solving and efficiency gaining, because they value the ability of AI tools in their area of study to simplify complicated technical tasks and improve learning experiences. Also, AI tools directly influence

their grades and results by helping them with critical coding and mathematical problem-solving, which increase their academic performance.

In contrast, the humanities students explore the usefulness of AI tools in terms of their ability to increase efficiency, rather than seeing them as a replacement for human interpretation. Their opinions also indicate that the humanities students are more concerned with how AI tools influence the depth of critical thought and learning engagement, which are the core elements of their study area. Therefore, the English Literature or TESOL students from Humanities desire for more significant theoretical models that can be used for disciplinary epistemologies and pedagogical traditions. This chain of thought extends the work of Zawacki-Richter et al. (2019) on educational technology acceptance.

5.4.3 Implications for Policy Makers

As AI tools are gradually upgrading and incorporating into higher education, there is a clear need of policies that can promote equitable access and effective implementation across various disciplines. They should consider developing specific frameworks that allow AI tools to be customized to the specific needs of different academic areas that would ensure both STEM and non-STEM students are harnessing the full potential of these tools. In particular, the study explores how students from different disciplines perceive and use AI tools. A generalized adoption strategy may not be the only option. So, some discipline-specified guidelines for AI tools adoption should be ensured.

The findings offer some specific concerns about English majors, including TESOL, literature, and applied linguistics. It is important to have more customized approach for these departments to use AI tools, as these are the areas of study where language acquisition, critical thinking, and literary analysis are central. So, for these majors, AI tools should not only support language learning but also offers independent thoughts and creativity. Therefore, policymakers should focus more into developing guidelines that ensure AI tools used in English studies are designed specifically to restoring critical engagement with texts and not just offer accuracy of language. Specifically, for TESOL students, AI tools should be adopted to offer more customized feedback on organized writing, while also encouraging interaction with different linguistic concepts.

On the other hand, literature student would benefit from AI tools that can assist in literary themes, symbolism, and analyzing narrative techniques, rather than just summarizing the chapter with simple words and removing the deeper meaning behind those literary contexts. In applied linguistics, AI tools should be connected to the distinctions of language research that requires proper theory, supporting data analysis and creating deep analytical ability aligned with the collected data. With these implications, English majors can balance the potential of AI tolls better in both learning experiences and academic performances.

Therefore, the findings demonstrate that AI tools cannot be treated uniformly across all the major higher education disciplines. Their adoption and perceived usefulness should be seen and understood within the context of disciplinary needs, epistemological values, and academic

practices. If the adoption and implementation of AI tools are discipline-specified, it would effectively support both learning experiences and academic performance across all study areas.

5.5 Future Research

While this study provides some important insights into the perceived impact of AI tools on students' learning experiences and academic performance, it also opens several options for further exploration. The findings indicate that AI tools vary their ways of working when it comes to the effectiveness across academic disciplines. But, there are still many questions left answered, especially about the longitudinal impact of these tools. So, future research should consider studies related to the long-term effect of these tools to assess how AI influence students' learning experiences and academic performance. Such studies could provide deeper understandings about skill development, retention rates and full academic success.

Another promising sector for research can be the examination of gender differences in the way students engage with AI tools in higher education. While this study did not explicitly explore gender as a variable, future studies could investigate whether male and female students have different opinions of the impact of AI tools in their respective academic discipline. It can also raise questions about societal expectations and digital literacy levels that influence the acceptance and use of AI tools in higher education.

5.6 Contributions of the Study

This study makes significant contributions to the field of education by examining how AI tools, such as ChatGPT, Grammarly, and Quillbot have various impact on both learning

experiences and academic performance across different disciplines in Bangladesh. The findings shed light on how these AI tools are perceived by undergraduate students from private universities in Bangladesh. The findings also demonstrate how their effects vary according to the study area. This research addresses significant gaps in existing literature, especially the impact of AI tools in the disciplinary variations. It provides perceptions into how these AI tools can be better implemented in non-Western educational backgrounds. One of the primary contributions of this study is the identification of disciplinary differences in the perceived benefits of AI tools in increasing learning experiences. The study showed how STEM students perceive AI tools as the most positive impact on their studies by making complex concepts simple, improving their skills in problem solving, and increase student engagement. In contrast, Humanities students expressed reservations, specifically stating their concern regarding AI tools compromising creativity and critical thinking, which are the key elements in their academic background. The findings recommends that while AI tools can indeed help in efficiency and productivity, there is a need for discipline-specified strategies to optimize their applications.

Another key contribution lies in considering the impact of AI tools on academic performance. STEM students experience significant improvement in academic results, particularly in areas that require technical skills such as coding, data analysis, mathematics, robotic project making, etc. On the other way around, students in Humanities and Social Sciences showed more mixed reactions. For them, while AI tools were effective enough for assisting with assignments and exams, these tools were perceived to have a limited effect on recreating or balancing creativity and deep critical thinking in their disciplines. The study urges the need for a balanced incorporation

of AI tools that supports both cognitive development and academic efficiency, especially in study areas where the more creative a student is, the greater their lead in academic success.

Previous studies, such as Shirin (2022) and Ahmed et al. (2024), have stated the positive role of AI in increasing learning experiences. However, this study expands that discussion by showing the effects of AI tools on academic performance vary significantly across various disciplines. The research also extends the findings of Nguyen et al. (2022), who demonstrated the advantages of AI in STEM fields, by examining how AI tools have effect on academic performance in study areas like Humanities and Social Sciences too. This extension adds more involvement to the existing literature by showcasing that AI is not a universal solution but it can be an important supporting system by making it adapt into discipline-specific options.

Finally, this study also makes a theoretical contribution by extending Vygotsky's Social Constructivism Theory and Piaget's Constructivist Learning Theories by exploring how AI tools work as digital More Knowledgeable Others (MKOs) by providing customized, real-time feedback that scaffolds students' learning experiences across disciplines. By offering adaptive learning strategies, these tools connect with Piaget's emphasis on experiential learning by increasing engagement and understanding. Also, this research expands on Vygotsky's Zone of Proximal Development (ZPD) by showcasing how AI tools decrease gap between independent and guided learning. These findings suggest that while AI tools increases the pace in traditional learning process, their applications must be customized to meet the unique demands of different academic discipline.

5.7 Limitations of the Study

Although the study offers some valuable results about undergraduate students' perceptions of AI tools across multiple disciplines, it has several limitations. First, the study was limited to private universities in Bangladesh only, which may affect the generalizability of the findings to other educational contexts. This includes public universities or international settings outside Bangladesh. Although the sample size was considerable (407 survey responses and seven interviews), the study was conducted as a cross-sectional study within a single academic semester, which limits its ability to capture changes in perception of the students over time.

At the same time, some logistical difficulties affected the qualitative phase: some interviews had to be conducted in written format due to selected participants' reluctance toward audio recording. After that, multiple rescheduling impacted the consistency of the interview process for a while. Furthermore, three interviews out of seven were transcribed and translated from Bangla to English. This process may have introduced some subtle translation-related interpretation issues. Because it focuses on students from four different areas (STEM, Humanities, Social Sciences, and Business) across various yet some specific private universities in Bangladesh, the results may not apply to other universities and fields, especially those that did not participate in the survey or the interview. Also, the design of the study looks at the data from one point in time. So, it is challenging to conclude precise cause and effect. Finally, even though the interviews are as detailed as possible, the small sample size may not fully capture students' different experiences across these universities and disciplines. Future research could also address these limitations with multi-institutional collaborations, longitudinal approaches, and mixed-methods designs as recommended in recent methodological critiques by Bash et al. (2020).

5.8 Future Studies

Although this study provides valuable aspects into the disciplinary variations in the use of AI tools to increase both learning experiences and academic performance for undergraduate students, several key areas need further investigation. To better understand the evolving role of AI in higher education, future research could focus on some significant directions. First, by extending the discussion on the impact of AI in education, the study already showcases the need for discipline-specified AI strategies that combine with unique needs and demands of each academic field. It suggests that STEM discipline can seek the advantages from AI tools in terms of technical skills development. So now, Humanities and Social Sciences may require more tailored incorporation to preserve their study area's creativity and critical thinking.

Second, as this study is primarily focused on Bangladesh, future research could take advantage from cross-cultural comparison to understand how the incorporation AI tools varies across different educational background. Especially in non-Western countries could offer important aspects into how sociocultural factors dominants educational infrastructures and influence the effectiveness of AI tools in higher education.

Moreover, the study calls for future research to examine the long-term effects of AI tools by focusing on their impact on collaborative learning, student development, and creative process, especially in disciplines that depends heavily on human touch in their learning process. Also, qualitative investigations can be done to provide deeper insights into the specific concerns and aspirations that different student groups are associated with educational AI

Finally, experimental studies could be arranged to assess the actual learning impacts of AI tools in specific disciplines and their implications for those study areas compared to more traditional approaches. Finally, future research should explore how faculty perceptions and practices influence students' attitudes towards AI tools across academic disciplines and how they build on them.

5.9 Conclusion

In conclusion, this study makes various important contributions to the impact of AI tools on undergraduate students' learning experiences and academic performance across various disciplines in private universities of Bangladesh. With the help of a mixed-method approach, that included both quantitative data from 407 students and qualitative opinions from interviews, the study reveals that the academic value of AI tools is neither uniform nor context-neutral. The quantitative data is incorporated with qualitative findings, which states the diverse opinions toward AI in different academic areas. For example, while STEM students see AI as a significant and valuable option to their academic work, Humanities students express certain skepticism and concerns regarding loss of creativity and human touch in their critical engagement with texts.

Notably, the research provides extensive evidence of disciplinary variations in student perceptions of AI tools. It challenges the assumptions about uniform technology adoption patterns across various academic fields. It also identifies fairness and inclusion as shared concerns among students across various disciplines. The study demonstrates the importance of addressing the bias in algorithms and transparency in AI tools regardless of academic disciplines. Most importantly, the results call for the implementation of specific field strategies that acknowledge the unique

pedagogical traditions and epistemologies of each discipline. These concerns about fairness call for broader educational research for more transparent and inclusive AI practices in Academia.

Ultimately, the findings of this study explore the need for a personalized approach to the incorporation of AI tools in higher education. As AI tools continue to update and progress across higher education, the findings from this study can be seen as information for both practice and research. It can also guide institutions and educators to lean more towards effective and equitable incorporation of AI tools, which are sensitive to disciplinary differences.

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Appendices

Appendix A: Invitation Letter

Dear Participants,

My name is Anika Binta Nazrul, and I am currently finishing my Master's in Applied Linguistics and TESOL at the University of Liberal Arts Bangladesh. As part of my thesis titled "Learning 2.0: Exploring the Impact of Artificial Intelligence on Students' Learning Experiences and Academic Performances Across Disciplines," I am conducting a survey to gather insights on how AI influences students' learning processes and their academic outcomes across different fields of study. Your participation in this survey is highly valuable to my research, and I would greatly appreciate your time and input. The survey aims to explore various aspects of AI in education, and your responses will significantly contribute to our understanding of its impact. Please note that your participation is voluntary, and all responses will be kept confidential. If you have any questions or need further clarification regarding the survey or my research, feel free to reach out to me directly at anika.nazrul.deh@ulab.edu.bd

Thank you in advance for considering my request, and I look forward to your valuable participation.

Best regards,

Anika Binta Nazrul

M.A. in Applied Linguistics and TESOL

University of Liberal Arts Bangladesh, Dhaka.

anika.nazrul.deh@ulab.edu.bd

Appendix B: Survey Questionnaire

Gender

- ☐ Male
- ☐ Female

Level of Education

- ☐ Undergraduates

How long have you been using tools invented by AI for educational purposes?

- ☐ Less than one year
- ☐ More than a Year
- ☐ Two years or more

Field of Study/Discipline

- ☐ STEM
- ☐ Social Sciences
- ☐ Humanities
- ☐ Business

Survey Questionnaire

SL.No.	Items	SD	D	N	SA	A
	AI and Learning Experiences					
1	AI tools have significantly increased my total learning experience.					
2	AI-powered platforms make learning more interactive and engaging for me.					
3	AI tools provide personalized learning recommendations that suit my needs.					
4	AI tools help me understand complex concepts more easily.					
5	I regularly use AI-based resources (e.g., chatbots and virtual tutors) for learning support.					
6	AI tools adapt well to my learning style and preferences.					
7	AI tools help me collaborate better with my classmates.					
8	AI tools have improved my ability to retain and recall information.					
9	AI tools have increased my interest and curiosity in learning new topics.					
10	AI tools provide a fair and inclusive learning environment for all students.					
	AI and Academic Performances					
1	The use of AI tools has improved my grades or academic results.					
2	AI tools help me complete assignments and projects more efficiently.					
3	AI tools effectively identify and address my academic weaknesses.					
4	AI tools provide actionable feedback that helps me improve my performance.					
5	AI tools are useful in helping me prepare for exams or assessments.					
6	AI tools reduce the time I spend studying while maintaining or improving my outcomes.					
7	AI tools help me manage my academic workload and deadlines effectively.					
8	AI tools have helped me achieve better results in subjects I previously struggled with.					
9	AI tools are reliable in predicting my academic performance (e.g., grades, progress).					
10	AI tools contribute to reducing my stress or anxiety related to academic performance.					

Appendix C: In-depth Interview Protocol

Gender

- ☐ Male
- ☐ Female

Level of Education

- ☐ Undergraduates

Have you received any kind of training on how to use AI for your learning process?

- ☐ Yes
- ☐ No

Questions

- 1) How do you use AI tools (e.g., ChatGPT, Grammarly, Quillbot, or Gemini) to make your learning easier? Which tools do you find most helpful for your study?
- 2) Do you think AI tools are improving your learning experience? Can you provide an example of how it's helped you understand a topic better?
- 3) Do you feel more motivated to study when using AI tools? Can you give an example of when AI tools helped you stay focused on your studies?
- 4) How have AI tools helped improve your academic performance, grades, or your understanding of difficult topics?
- 5) Do you think AI tools are more suitable for students in technical fields (e.g., STEM) compared to non-technical fields (e.g., humanities, business)? Why or why not?

- 6) How do you use AI tools for your regular assignments or research projects? Do you think these tools make the process efficient enough?
- 7) Have AI tools helped you manage your study time more effectively?
- 8) Are there any concerns about using AI tools for your studies, such as accuracy, plagiarism, or dependency on AI?
- 9) What do you see in the future for AI tools in your studies? Do you see AI tools becoming more important in your studies over the next few years?
- 10) In what ways do you think AI can improve the learning experience and academic performance of students in your discipline?

Appendix D: Survey Questions (Expert Validation Copy)

Appendix A

Invitation Letter

Dear Participants,

My name is Anika Binta Nazrul, and I am currently finishing my Master's in Applied Linguistics and TESOL at the University of Liberal Arts Bangladesh. As part of my thesis titled "Learning 2.0: Exploring the Impact of Artificial Intelligence on Students' Learning Experiences and Academic Performances Across Disciplines," I am conducting a survey to gather insights on how AI influences students' learning processes and their academic outcomes across different fields of study. Your participation in this survey is highly valuable to my research, and I would greatly appreciate your time and input. The survey aims to explore various aspects of AI in education, and your responses will contribute significantly to the understanding of its impact. Please note that your participation is voluntary, and all responses will be kept confidential. If you have any questions or need further clarification regarding the survey or my research, feel free to reach out to me directly at anika.nazrul.deh@ulab.edu.bd. Thank you in advance for considering my request, and I look forward to your valuable participation.

Best regards,

Anika Binta Nazrul

M.A. in Applied Linguistics and TESOL

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Demographic Information

Gender

- ☐ Male
- ☐ Female

Level of Education

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Field of Study/Discipline

- ☐ STEM
- ☐ Social Sciences
- ☐ Humanities
- ☐ Business

Survey Questionnaire

SL.No.	Items	SD	D	N	SA	A
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2	AI-powered platforms make learning more interactive and engaging for me.					
3	AI tools provide personalized learning recommendations that suit my needs.					
4	AI tools help me understand complex concepts more easily.					
5	I regularly use AI-based resources (e.g., chatbots, and virtual tutors) for learning support.					
6	AI tools adapt well to my learning style and preferences.					
7	AI tools help me collaborate better with my classmates.					
8	AI tools have improved my ability to retain and recall information.					
9	AI tools have increased my interest and curiosity in learning new topics.					
10	AI tools provide a fair and inclusive learning environment for all students.					
	AI and Academic Performances					
1	The use of AI tools has improved my grades and academic results.					
2	AI tools help me complete assignments and projects more efficiently.					
3	AI tools effectively identify and address my academic weaknesses.					
4	AI tools provide actionable feedback that helps me improve my performance.					
5	AI tools are useful in helping me prepare for exams or assessments.					
6	AI tools reduce the time I spend studying while maintaining or improving my outcomes.					
7	AI tools help me manage my academic workload and deadlines effectively.					
8	AI tools have helped me achieve better results in subjects I previously struggled with.					
9	AI tools are reliable in predicting my academic performance (e.g., grades, and progress).					
10	AI tools contribute to reducing my stress or anxiety related to academic performance.					

Evaluator's Comment	The questionnaire looks perfect. Please start collecting the data. Best wishes!
Evaluator's Signature	
Name of the Evaluator	Al Mahmud Rumman, Senior Lecturer, Department of English & Humanities (DEH), University of Liberal Arts Bangladesh.

Appendix B

In-depth Interview Protocol

Gender

- ☐ Male
- ☐ Female

Level of Education

- ☐ Undergraduates

Have you received any kind of training on how to use AI for your learning process?

- ☐ Yes
- ☐ No

Questions

1. How do you use AI tools (e.g., ChatGPT, Grammarly, Quillbot, or Gemini) to make your learning easier? Which tools do you find most helpful for your study?
2. Do you think AI tools are improving your learning experience? Can you provide an example of how it's helped you understand a topic better?
3. Do you feel more motivated to study when using AI tools? Can you give any example of when AI tools helped you stay focused in your studies?
4. How have AI tools helped improve your academic performance, grades or your understanding of difficult topics?
5. Do you think AI tools are more suitable for students in technical fields (e.g., STEM) compared to non-technical fields (e.g., humanities, business)? Why or why not?
6. How do you use AI tools for your regular assignments or research projects? Do you think these tools make the process efficient enough?
7. Have AI tools helped you manage your study time more effectively?
8. Are there any concerns about using AI tools for your studies, such as accuracy, plagiarism, or dependency on AI?
9. What do you see in the future for AI tools in your studies? Do you see AI tools becoming more important in your studies over the next few years?
10. In what ways do you think AI can improve the learning experience and academic performance of students in your discipline?

Evaluator's Comment	The interview questions look seamless. Please start collecting the data. Best wishes!	
Evaluator's Signature		
Name of the Evaluator	Al Mahmud Rumman, Senior Lecturer, Department of English & Humanities (DEH), University of Liberal Arts Bangladesh.	