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The Integration of Course-Related Application Software in Tertiary Education: Enhancing Skill Sets among the Private University's Students in Bangladesh

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Abstract

The increasing need for tech-savvy professionals is rapidly transforming business education. Many universities are now integrating application software into their courses to better prepare students. This paper explores how incorporating such software can improve students' skills through hands-on learning experiences. This study uses a qualitative method, gathering primary data through interviews and discussions with participants. It also evaluates students' strengths and weaknesses in comprehension and analytical skills, using a scenario-based approach for analysis. The results indicate that incorporating application software into business education offers valuable hands-on learning experiences, helping students develop future-ready skills. The study shows that this integration not only enhances students' skill sets but also boosts digital literacy, critical thinking, and communication skills essential for the modern workplace. In today's workplace, integrating application software into business education is increasingly important. When combined with experiential learning methods, this software enhances students' learning and helps them develop essential future skills. This research has limitations, including its focus on qualitative analysis of course-related application software's impacts. A mixed-methods approach and a cross-university impact assessment could provide more comprehensive and insightful results.

1. Introduction

The extensive use of computers, which symbolize information technology, in all spheres of life and employment, has made courses related to computer applications, a crucial component of talent development. These applications (online and offline) have clear benefits in developing students' practical and innovative skills because of their strong emphasis on computer application innovation and practice (Chenglin &

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Jianwei, 2016). The study implemented the effect of course-related software applications based on an examination of the state of education, with the reform of the mode of instruction serving as the pivotal point. The role of teachers in determining the extent of technology incorporation into teaching is critical to the success of e-learning programs. Students will use these systems in their learning if teachers embrace the concept of online instruction and perform their practices through e-learning systems. Higher education institutions all over the world are working on developing long-term e-learning programs to expand learning and promote conventional teaching approaches.

Technological advancements in educational technology have created chances to shed light on how students engage with a particular learning environment. Large amounts of academic data are now readily available, which may provide valuable insights into how students use the resources of higher education. Additional research may also reveal patterns, mechanisms, and outcomes of learning behavior. From a holistic perspective, learning analytics models, forecasts, and optimizes learning patterns, learning behaviors, and decision-making in real time using static and dynamic learning knowledge from electronic learning environments, institutional structures, and social media. In a similar vein, learning analytics is predicted to benefit all parties involved in the higher education industry, including educators, researchers, teachers, course designers, context developers, and administrators. Learning analytics can be especially helpful to students by providing proactive and personalized support for their learning path. For example, students frequently enter higher or tertiary education with unrealistic expectations and perceptions of their academic competence, as well as with inadequate preparation for their studies. Significant reasons for leaving before graduation from the institution include the incapacity to handle academic requirements and the unrealistic views and aspirations of university life, particularly concerning academic competencies (Ifenthaler *et al.*, 2019).

Students' learning experiences are positively impacted by software applications related to their courses. They lessen test anxiety in students and assist them in better controlling their learning and achieving their objectives (Iowna *et al.*, 2021). Students' academic achievement and proficiency with software-assisted mind and argument mapping applications are greatly improved when these applications are used in the learning and teaching processes (Hülya & İrfan, 2020). Student behaviors and experiences are influenced by learning management systems and course design, with learning management systems that emphasize student interaction through discussion forums offering more learning support (Carrie *et al.*, 2020). Project-based learning and other active learning approaches enhance learning outcomes, course success rates, and student engagement (Paula *et al.*, 2021). Additionally, in certain subjects, like Geotechnics in Civil Engineering, the use of software tailored to the needs of the students improves their learning and motivation (Garcia *et al.*, 2018).

The growing utilization of technology in all learning, training, and advancement contexts has produced a lot of discussion. Students in higher education report that a range of technologies and applications corroborate their learning, research, and collaborative activities, even though technology may not have radically altered teaching methods (Dowling *et al.*, 2020). Even though the findings seem to signify that students' expectations regarding technology adaptation are being met, the students still wish to see teachers use technology in the classroom much more effectively. The study gives teachers examples of how to use technology to boost their learning, teachers may find these examples advantageous and helpful in developing and teaching their courses. The study illustrates some wider practical effects for training and improvement in a corporate setting, going beyond the perspective of higher education.

1.2 Rationales of Research Study:

Research on using course-related software by university students has been conducted for several reasons. One rationale is to investigate the impact of technology integration on teaching and learning practices in mental health-related activity courses. Another rationale is to improve the teaching quality of software operation and enhance the learning effect of course-related software to enhance pre-achieved professional skills. Additionally, the research aims to understand faculty use of course-related software and identify factors that influence its adoption, such as perceived ease of use and experience with the software. Furthermore, research explores the use of course-related software to cultivate students' ability to use and address practical problems. Lastly, the research examines students' perceptions of using course-related software and identifies potential barriers to its use, to increase student engagement and utilization and reduce the gap between theoretical knowledge gain and practical applications of learning outcomes.

1.3 Theoretical Basis:

The argument of this manuscript is based on the augmented theory of successful intelligence. According to Sternberg (2020), Successful intelligence is defined as follows: (1) the capacity to identify, develop, and, to the extent feasible, attain personal goals within a given sociocultural context; (2) the ability to leverage one's strengths and compensate for one's weaknesses; (3) the capacity to adjust to, mold, and choose environments; and (4) the application of a blend of analytical, creative, and practical skills. Successfully intelligent people identify the opportunities that exist or may be created in life and then go about making the most of them.

2. Literature Review

2.1 Learning Software Impacts Student's Behaviour and Learning Experiences

Students' learning experiences are improved by using software applications relevant to their courses. It boosts academic performance, attendance in class, and curiosity in learning (Elena & Valentina, 2022). Students in mechanical engineering gain problem-solving abilities and control strategies through the use of simulation

software and pertinent industry-related projects (Nirmal *et al.*, 2023). Applications for mind/argument mapping supported by software help students succeed academically and acquire a variety of skills relevant to teaching (Hülya & İrfan, 2020). Student behaviors and experiences are influenced by the structure and design of the online learning platform; system design and course type interact to impact student engagement and learning support. The learning process and perceived learning outcomes are both indirectly impacted by e-learning experiences, which have a strong correlation with each other (Yunia *et al.*, 2019). All things considered, using software programs improves learning through raising student engagement, skill development, and academic achievement.

2.2 E-learning Challenges

E-learning in developing countries faces several challenges. Firstly, there is a lack of proper telecommunications infrastructure, necessary electronic standards, hardware, and software, which hinders the implementation of virtual learning (Masoomeh *et al.*, 2022). Secondly, there is a cultural attitude toward second-rate education, which affects the perception and acceptance of e-learning (Alam et al., 2023). Thirdly, there is a lack of familiarity with the virtual learning environment and low hardware and software literacy among learners (Najeem *et al.*, 2022). Fourthly, fear, anxiety, and distractions pose socio-psychiatric challenges in facing the virtual learning environment (Payel & Donghee, 2022). Fifthly, assessing the quality of learning and the lack of effective student-teacher interaction are challenges in virtual education (Boahemaa, 2023). Lastly, ethical issues such as information plagiarism and the lack of intellectual property rights and copyright law need to be addressed. These challenges highlight the need for infrastructure development, technology standards, cultural change, and ethical considerations to improve e-learning in developing countries.

2.3 Emotional Intelligence and it's likely Impacts

Emotional and cognitive intelligence have been found to influence learning outcomes through the use of course-related software (Hermann, 2023). It is found in the existing literature that positive emotions have been correlated with better performance, while negative emotions are correlated with worse performance (Waruno *et al.*, 2022). Affective factors such as motivation, optimism, and behavioral engagement have a moderate impact on learning performance (Elizabeth & Aldo, 2021). Additionally, emotional intelligence can be taught through an online learning model, which can result in positive change and flow within the learning environment (Desi & Rian, 2022). The COVID-19 situation has emphasized the significance of remote learning and emotional intelligence in influencing student anxiety, fatigue, and educational success (Fahad *et al.*, 2021). Online classes and emotional intelligence significantly affect the perceived study stress, burnout, and performance of students. Hence, sentimental, and cognitive intelligence have a huge impact on learning outcomes and can be utilized with the help of software related to the course.

2.4 Students' Cognitive Capability Building

Key factors that influence students' ability to apply theory to practice in a software-based learning environment include attendance, effort expectancy, hedonic motivation, confidence, frequency of communication in mobile chat rooms, and programming intention (Sujin, 2022). Additionally, students' human capital, such as prior online education experiences, can influence their self-efficacy and perceptions of the learning environment (Quintin *et al.*, 2019). Practical examples and the use of systematic literature reviews (SLRs) have been found to be effective in teaching evidence-based software engineering (EBSE) principles (Sebastián *et al.*, 2021). Experiential learning opportunities, such as participating in real-world software development projects provide students with the opportunity to apply their knowledge in the classroom and gain a deeper understanding of software development. For students to develop software testing skills, it is also important to expose them to real-world software testing practices in a variety of contexts related to their academic courses.

Table 1: The recent literature review is summarized

SL	Authors' Names	Year of Publication	Title of the Article	Insights
1	Wagino, Maksum, Purwanto, Simatupang, Lapisa, & Indrawan,	2024	Enhancing Learning Outcomes and Student Engagement: Integrating E-Learning Innovations into Problem-Based Higher Education	The incorporation of e-learning advancements such as problem-based learning alongside Information and Communication Technology (ICT) in the realm of higher education has been found to improve educational achievements, foster critical thinking abilities, and increase student involvement, as evidenced in the research study.
2	Yıldızlı, & Şimşek, (2020)	2020	The Effects of Software-Aided Mind and Argument Mapping on Learning in Higher Education.	The incorporation of software-assisted mind and argument mapping in higher education serves to improve academic performance and the acquisition of skills, providing a comprehensive perspective and enabling

				the comparison of various theories.
3	Fatimah Sherbeny, Askal Ayalew Ali	2022	Application-Based Learning and Digital Tools to Enhance Student Outcomes in Socio-Behavioral and Economic Sciences	Utilizing application-based learning and digital technologies within the fields of socio-behavioral and economic sciences has been shown to improve student results through the facilitation of active learning, development of critical thinking abilities, enhancement of problem-solving skills, and establishment of real-world applicability within higher education.
4	Zena Abdulameer Mohammad	2023	Subject Review: The Effectiveness of Integrating E-Learning on Learning Outcome and Student Perceptions in Tertiary Education	The integration of course-related application software in tertiary education has theoretical implications that revolve around the enhancement of student learning outcomes. These implications are manifested through improved engagement, collaboration, and community building within e-learning environments.
5	Ojeda, Morreale, & Kwak	2024	Web-based Course Assessment System of Student Learning Outcomes: A Pilot Study	The incorporation of online course evaluation systems has the potential to improve faculty supervision, monitoring, and decision-making, consequently leading to enhanced student educational achievements by facilitating efficient procedures and utilizing interactive data presentation techniques.

6	Hubertz & Van Campenhout	2022	Teaching and Iterative Improvement: The Impact of Instructor Implementation of Courseware on Student Outcomes.	The utilization of courseware by educators has a beneficial influence on student engagement and results. The incorporation of courseware within higher education has the potential to improve student learning achievements by employing efficient implementation strategies.
7	Hubertz & Van Campenhout	2022	Smart Application for Smart Learning: How the Influence of the Factors on Student Swimming Learning Outcomes in Sports Education	The integration of smart swimming applications in sports education enhances student learning outcomes by influencing factors like motivation, physical activity, nutritional status, and V02Max, leading to improved learning quality.
8	Nemtinov, Rodina. Borisenko Morozov, Yu. Protasova, Nemtinov	2023	Integrated Use of Various Software Environments for Increasing the Level of Visualization and Perception of Information	The incorporation of tailored software within higher education positively impacts the academic achievements of students through the facilitation of engaging virtual simulations, enhancement of information retention, and cultivation of collaborative and communicative aptitudes.
9	Shaikh, & Kumar	2022	Implementing an Automated Application for Attainment Calculations of Program Outcomes in Outcome-based Education.	The manuscript concentrates on the automation of attainment computations for both program outcomes and course outcomes within engineering curricula, aiming to improve assessment precision and support the

				implementation of outcome-based education in higher education institutions.
10	Akintayo, Eden, Ayeni, & Onyebuchi	2024	Evaluating the Impact of Educational Technology on Learning Outcomes in the Higher Education Sector: a Systematic Review.	The incorporation of course-specific application software in higher education can improve student involvement, memory retention, and critical thinking abilities, ultimately leading to positive academic achievements.
11	Mun, & Ha	2022	A Theoretical Framework for Analyzing Student Achievement in Software Education.	The theoretical framework presented in the study introduces a strategic matrix designed for software education, with the goal of elevating student performance through the examination of intentions and pedagogical approaches, thus potentially enhancing educational results in higher education.
12	Khoo Hight, Cowie, Torrens, & Ferrarelli	2014	Software Literacy and Student Learning in the Tertiary Environment: PowerPoint and Beyond	Incorporating academic software such as PowerPoint into higher education contributes to the improvement of software proficiency; however, it may not comprehensively cultivate analytical thinking regarding subject-specific expertise, consequently influencing the academic achievements of students.

13	Stepanyan, Mather, & Payne	2007	Integrating Social Software into Course Design and Tracking Student Engagement: Early Results and Research Perspectives	Incorporating social software into the design of courses has the potential to impact student engagement and academic achievements in higher education, as evidenced by preliminary results from the initial research investigation.
14	Untener Mott, & Jones	2015	Preparing Students for Industry by Integrating Commercial Software into Coursework.	Incorporating commercial software into academic curricula enriches the application of theoretical knowledge without necessitating significant modifications to the syllabus, consequently enhancing students' educational achievements by facilitating smooth incorporation and continuous feedback mechanisms, thereby contributing to the preparedness of individuals for both the academic and industrial domains.
15	Steenkamp, & Rudman	2013	Incorporating Online Tools in Tertiary Education	Utilizing digital platforms commonly used by college students can improve academic achievements by catering to their inclinations and capabilities for engaging with interactive, visually stimulating settings.

Source: Authors

2.5 Scholarly Contribution of the Table

This table consolidates a diverse array of research findings on the impact of application software and digital tools in higher education. The insights drawn from the table offer significant scholarly contributions to the understanding of how various technological integrations influence educational outcomes:

2.5.1 Enhancement of Learning Outcomes

The integration of digital tools and application software in business and higher education has been shown to enhance learning results in numerous studies. For instance, studies by Wagino *et al.,* (2024) and Sherbeny & Ali (2022) show how application-based learning and e-learning innovations promote critical thinking, strengthen problem-solving abilities, and raise student engagement.

2.5.2 Improvement in Student Engagement and Performance

The table illustrates how technology may greatly improve student engagement and performance. Examples of this include courseware (Hubertz & Van Campenhout, 2022) and software-assisted mind mapping (Yıldızlı & imşek, 2020). This lends credence to the idea that more active and participatory learning environments, facilitated by technology, lead to improved academic performance.

2.5.3 Support for Digital Literacy and Critical Thinking

Research indicates that digital technologies enhance academic performance and foster the development of critical thinking and digital literacy in addition to improving academic achievement (Akintayo *et al.,* 2024; Steenkamp & Rudman, 2013). This is consistent with the requirement that students be prepared for the digital workforce by contemporary educational institutions.

2.5.4 Utility of Course-Specific and Commercial Software

The study emphasizes how important it is to incorporate commercial and course-specific software into curriculum. Research by Untener *et al.,* (2015) and Shaikh & Kumar (2022) shows how this kind of software can improve educational outcomes and get students ready for the workforce by connecting theoretical knowledge with real-world applications.

2.5.5 Future Research Directions

The table also proposes domains that want additional investigation, like the efficacy of diverse software environments (Nemtinov *et al.,* 2023) and the possibility of employing mixed methods approaches to furnish more profound perspectives into the effects of technology on education. To confirm and expand on recent findings, more research at other universities and educational settings is needed.

In summary, the table's compilation of research highlights the transformative potential of application software and digital tools in higher education, emphasizing their role in enhancing learning outcomes, engagement, and skill development.

3. Methodology

This research employs a qualitative approach to find out the answers to the research questions. A systematic methodological process is maintained to collect data for this study. For example, an in-depth interview as well as observation method is adopted to collect data. After that, the interview data was transcribed thoroughly. The

transcribed data was then coded. The coded raw data is then sub-categorized and categorized respectively. Finally, themes emerged.

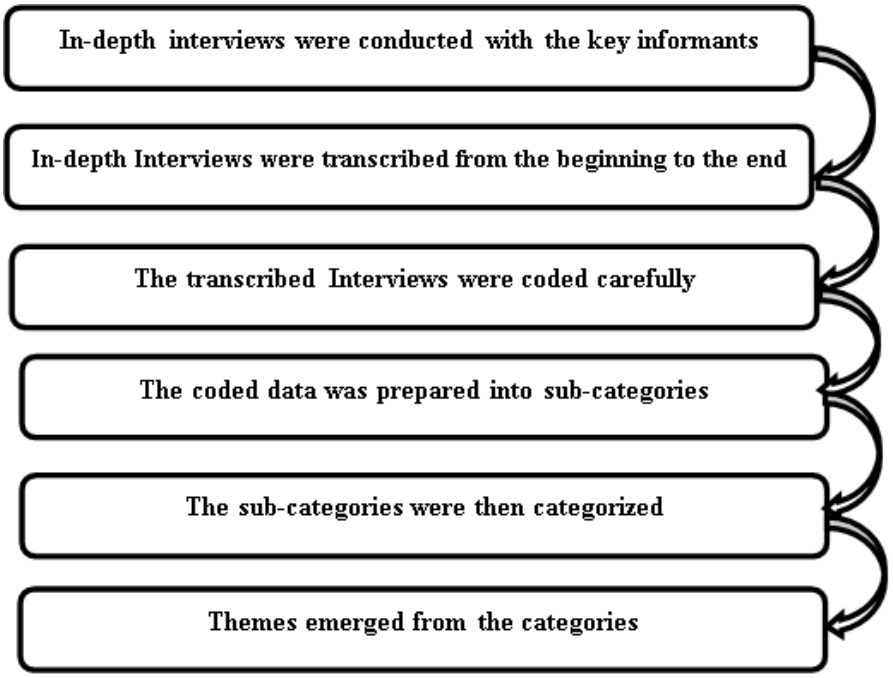

Figure 1: Shows the chronology of the entire research methodology. Source: Rana *et al.,* (2022)

The primary data was acquired through conducting interviews and engaging in discussions with the participants. The analytical processes employed for this study were analyzing students' strengths and weaknesses in comprehension and analytical ability, which was complemented by the scenario approach. In addition, the knowledge and experience of the author in this field were utilized, with a specific emphasis on pertinent case studies and solutions by using course-related software, to ensure the robustness and credibility of this research.

Several methodologies are used for teaching software-related courses. One approach is a methodology, which integrates the inverted classroom model, pair programming, and an online support course. This methodology has been to enhance students' academic performance and their understanding of concepts (Helga *et al*, 2022). A number of software relating to their registered courses for the semesters was used to assign online presentations to 193 post-graduate and undergraduate (MBA and BBA) students.

Another method is Project Based Learning, which involves students generating questions as a learning strategy. This approach is supported by an e-learning platform and has been shown to help students regulate their learning and reduce the tension of taking regular class tests (Ioana *et al*., 2021). An educative

methodology based on Pre-conceptual Schemes is proposed for teaching software requirements. This methodology aims to minimize inconsistencies and misinterpretations in requirements specifications (Jovani *et al*, 2021). Additionally, an approach involving the close involvement of a software house company has been found to complement traditional teaching methods. This approach uses agile Scrum methodology and provides students with real-world experience in software development and an effective way of using software (Jose *et al*., 2022) which gives them hands-on practice that may require to be implemented for career enhancements. Problem-based learning, techniques to understand various course-related online software, and role-playing are also used to engage students more productively. In some cases, Excel spreadsheets with visual basic applications (VBA) are applied.

4. Discussion:

The astonishing progress in science, technology, and healthcare has completely redefined the course of human existence. The respondents now possess a myriad of work possibilities, displaying a propensity to transition between occupations more frequently compared to previous eras. Moreover, they exhibit a greater openness to geographical mobility, and their professional journeys span a lengthier period of time. Consequently, the pursuit of continuous education, which endeavors to propel one's intellectual growth, and lifelong learning, which involves the acquisition of fresh professional qualifications, have become pivotal facets of global educational policy. The proper implementation of these two principles, by instilling novel proficiency that enhances both personal and occupational realms, exerts a momentous impact on the overall welfare of society.

4.1 Descriptive Statistics

Table 2: Respondent's course performance:

Semester	Course	Level	No. of Students	Good 80% and above score	Average below 80% and above 60%	Below average less than 60%	Type of online application used
Summer 2023	Strategic Management	MBA	32	90%	0%	10%	ERP
Fall 2023	Strategic Management	MBA	15	93%	0%	7%	ERP
Summer 2023	Marketing Communications	MBA	9	100%	0%	0%	CRM
Fall 2023	Marketing Communications	MBA	5	100%	0%	0%	CRM

Semester	Course	Level	No. of Students	Good 80% and above score	Average below 80% and above 60%	Below average less than 60%	Type of online application used
Summer 2023	Business Communications	BBA	55	89%	0%	11%	CRM
Fall 2023	Business Communications	BBA	50	90%	5%	5%	CRM
Summer 2023	Compensation Management	BBA	8	100%	0%	0%	HRM
Fall 2023	Compensation Management	BBA	19	100%	0%	0%	HRM

Source: Authors

The above table shows the actual performance of students in two consecutive semesters. It doesn't indicate normal theoretical presentation (non-software environment) would achieve lower marks in their academic performance, but the rationale is that to ensure that students are able to apply theory to practice in a software-based learning environment, innovative teaching strategies can be implemented. One such strategy is "case guidance multi-project synchronous implementation," which focuses on the analysis and design of software projects selected by students and provides teacher case guidance (Dun & Yao, 2023). This strategy connects theoretical knowledge with teaching practice, helping students better understand and apply object-oriented analysis and design. Additionally, reshaping the teaching process and reforming the course assessment to adapt to this strategy can further enhance students' interest and sense of access to the course (Sujin *et al.,* 2022). Another approach is to develop interactive tools that allow students to visually evaluate model structures and explore model outcomes through simulation. By using these strategies and tools, students can effectively bridge the gap between theory and practice in a software-based learning environment.

Students were assigned project work based on their enrolled courses. Their main tasks involved operating the relevant software and producing outcomes reflecting the course content to be applied in a simulated real-life situation. This is a kind of virtual experience that they have to portray in their career after graduation. Students were evaluated based on their efficient use of software, productive outcomes according to the requirement, presentation skills, and discussion regarding their in-depth understanding of the course by using the related software.

The utilization of software that is related to the course has a beneficial influence on the acquisition of knowledge by students. It fosters a keen interest in

the process of learning, enhances attendance in classes, and elevates academic achievements (Elena & Valentina, 2022).

4.2 Educational Technologies: Methodological Progress and Challenges:

The area of educational technology has made significant progress in terms of methodology. Methodological developments in machine learning, data mining, and learning analytics have greatly extended the scope of study that can be conducted using modern educational technologies (Bottou, 2014). Teachers, academics, and instructional planners may use technology to monitor students' interactions with learning materials to provide more real-time support for students. The essence of these tools, as well as the opportunity to ask rich research questions, opens new possibilities for collecting, analyzing, and synthesizing data in previously unthinkable ways. Educational researchers are now employing statistical techniques such as hierarchical linear modeling, growth curve analysis, and latent profile analysis based on this influx of data from rich research questions on both the mechanism and outcomes of learning (Lee, 2010), to gain a better understanding of human learning, motivation, and commitment.

The use of conversational agents and interactive technologies is another field of educational technology that necessitates methodological consideration (Rus *et al*., 2013). Conversational agents and internet-based interactive technologies may collect comprehensive information from students in log files that monitor learning, emotions, and achievement in a fine-grained manner. The agents have the ability to precisely monitor what is said and how it is said. However, using agents can be difficult, particularly when online delivery is needed. One of the most significant methodological problems in educational technology is the scarcity of systematic scientific research that examines the effects of various features of modern technologies. More ambitious research initiatives, backed by a national agenda, are needed to rigorously investigate the effects of technology-rich environments through experimental work. There is a strong need to have rigorous conversations about these methodological issues, as well as others, raised by educational technology advancements. Intelligent frameworks that combine advanced learner and instructor models would be one of the educational innovations of the future (Ma *et al*., 2014).

Learners' mental, meta-cognitive, and cognitive states will be monitored and modeled, and they will communicate with them through avatars that serve as pedagogical agents. The systems can facilitate collective learning by simulating peer agents with whom the learner will practice cooperative learning techniques. While challenges prevail in embedding such diagnostic, complex assessments in multimedia learning environments, applying adaptive models of assessment to each learning activity allows for continuous assessment and improves accuracy (Dede, 2013).

4.3 The Challenges of E-Learning in Developing Countries

In the highly competitive realm of global higher education, numerous emerging universities are actively vying for prominence. However, it is disheartening to acknowledge that most developing nations are still in the nascent stages of implementing e-learning initiatives (Shahmoradi *et al*., 2018). Recent research has underscored the pivotal role of corporate environments and strategic planning in influencing individuals' adoption of e-learning programs (Adelabu *et al*., 2014). According to Nurakun *et al*., (2018), a critical factor impeding instructors' utilization of e-learning in a blended learning environment is their limited exposure to online education. The primary barriers hindering the progress and acceptance of e-learning, as identified by Wang *et al*., (2018), encompass cultural disparities, unequal levels of knowledge literacy, the absence of conducive e-learning settings, and the dearth of frameworks for content development. Moreover, Kisanga and Ireson (2015) have put forth that subpar interface design and software, inadequate funding, a scarcity of expertise, teachers' reluctance to embrace change, and financial constraints pose formidable challenges to the successful implementation or adaptation of e-learning.

4.4 Using Data-Driven Decision-Making (DIDM) to Improve Teaching and Learning

Learning Analytics is the formation and use of data analysis approaches for the purposes of better understanding and promoting learning processes and outcomes to address specific requirements, expectations, and issues relevant to educational contexts and data sources (Siemens & Long, 2011). It is a combination of both academic areas of research and technology support to make necessary improvements in the quality of the educational standards by facilitating academicians, educators, teachers, researchers, students, and other educational stakeholders through data-informed decision-making. Learning Analytics has been viewed as a vital technological advancement of the 21st century with strong expectations that would have a significant impact on improved learning outcomes and teaching activities (Johnson *et al*., 2016), both in order to enhance academic performance over shorter time and to strengthen our perception of learning over longer cycles. Although data collection and analysis for understanding and supporting learning is not a new effort, there are three critical features that differentiate learning analytics from prior educational research: the data upon which work focuses, the types of analyses used, and the methods in which it is used.

4.5 Effect of Course-related Software on Learners' Cognitive Intelligence

Cognitive intelligence is in general terms can be considered an intellectual capability that involves the mental skill to reason, plan, resolve issues, assume conceptually, understand complex concepts, fast learner, and learn from proficiency. It reflects a wider and much deeper ability to understand the surroundings, to keep in pace with them, having a sense of things, or trying to work out a solution or to try. Cognitive intelligence is the combination of skills related to vocal, mathematical, and skills to

observe from various angles of perception that have visualization, use of memory, word fluency and vocabulary, verbal relations, sensory activity speed, induction, and inference (Sternberg, 1996).

The cognitive intelligence of learners has been extensively studied in various academic articles to ascertain the effects of software related to courses. A study conducted on this matter uncovered that the design of instructional software that incorporates peer tutoring significantly enhances learners' computational thinking abilities and greatly improves their overall learning experiences (Hyemi *et al*., 2023). Another study demonstrated that attitudes towards programming can be positively influenced through software development courses, particularly for individuals who lack confidence in their programming skills (Attila & Jozsef, 2023). Furthermore, it was discovered that the utilization of digital courseware in online classes leads to improved student performance, with those who actively participated in three or more surveys experiencing even better outcomes. Additionally, the optimization of students' cognitive capabilities was observed through the implementation of web-enhanced courses that employed various learning methods and media to support their cognitive development (Andy *et al*., 2021). In summary, educational software consistently showcases a remarkable positive impact on learners' cognitive intelligence, effectively enhancing their critical thinking abilities, attitudes, and overall academic performance across a broad range of educational settings.

4.6 Effect of Course-related Software on Learners' Emotional Intelligence

Emotional Intelligence (EI) is a mental skill by which a person is capable of observing, understanding, perceive own, and others' emotional states which in turn regulates his own emotions, thoughts, and actions (Mayer & Salovey, 1997). People with an increased level of EI have the natural ability to acquire richer vocabulary power to construct and express written, and verbal with tone regulation. They are apt enough to perceive the language of emotion, understand complex and opposing emotions, and know the proper way to deal with them. They succeed in adapting and coping with the sociological pressures and demands that directly affect their mental well-being (Dimitriu & Negrescu, 2015).

A number of scholarly articles have deeply explored the effects of software related to the course on learners' emotional intelligence. A previous study revealed that e-learning and emotional intelligence had a significant impact on students' experiences of stress, burnout, and academic achievement (Fahad *et al*., 2021). Attila and Jozsef conducted a research program on programming skills and discovered that attitudes towards programming could be improved, which is of great importance in software development courses (Attilla & Jozsef, 2023). George and Agnes investigated the role of emotional intelligence in distance learners studying English and concluded that emotional intelligence helped these students manage their emotions and meet their academic targets (George & Agnes, 2021). Experimental research looked at the influence of neurolinguistic programming (NLP) strategies and suggested that NLP was an effective tool for developing

learners' emotional intelligence (Xiuyun *et al*., 2023). Lastly, Susana et al.'s qualitative research study found that active methods like Problem-Based Learning and Inverted Classroom could help improve emotional intelligence skills in university students (Susana *et al*., 2021).

4.7 Factors that Influence the Effectiveness of Course-related Software

The effectiveness of software linked to courses relies on the quality of the media, the caliber of the students, the excellence of the modules/materials, the proficiency of the learning methods, and the expertise of the tutors/trainers (Auksė & Lina, 2021) Furthermore, certain personality traits such as conscientiousness and extraversion have been discovered to be connected to the effectiveness of teams in software development (Ely *et al*., 2022). There are other factors as well that can influence the efficacy of software related to courses, including work-related obstacles like disparities in time zones, lack of information, and the absence of a clear objective (Dewi *et al*., 2020). The lack of information and inadequate foreign language skills can also have an adverse effect on the effectiveness of teams (Wei *et al*., 2021). Additionally, a higher degree of virtualization is correlated with more frequent work-related challenges and team performance (Ban *et al*., 2022). The provision of support from management and the design of e-learning has been determined to positively impact the engagement of students in online learning.

4.8 Challenges to be Taken into Consideration for Evaluating the Performance of Students using Course-related Software

Evaluating students' performance based on their use of course-related software presents several challenges. One challenge is the need to address technical problems that students may encounter while using the software, such as connectivity issues or software glitches (Besir & Andrew, 2019). Another challenge is the pedagogical difficulties that may arise, as instructors need to ensure that the software effectively supports subject learning and encourages higher-order thinking skills (Zamani *et al*., 2015). Additionally, the well-being of students can be profoundly influenced by mental health issues, and it is crucial to take into account the potential repercussions of technology utilization on their academic performance (Mushtaq *et al*., 2019). Furthermore, evaluating students' performance requires considering the suitability of the software for different disciplines and academic contexts (Michelle, 2012) Lastly, teachers need guidance in structuring the evaluation process, considering factors such as the software's educational affordances, usability, and fit with preferred pedagogies (Stephen, 2021).

Private universities must consider the substantial policy ramifications of course-based application software, such as Learning Management Systems (LMS), Student Information Systems (SIS), and other educational technology platforms. These implications can be categorized into several key areas:

4.8.1 Data Privacy and Security

Compliance with Regulations: Private universities are required to make sure that the usage of these software tools conforms with data protection laws, like FERPA in the United States and GDPR in Europe (Halawi & Makwana, 2023). This includes protecting student information, getting the necessary approvals, and setting up procedures in case of data breaches.

Data Ownership and Control: Clear data ownership regulations are necessary for universities, especially with regard to who can access and control student and faculty data as well as how long it can be kept on file.

4.8.2 Accessibility and Equity

Inclusivity: Software must be used by all students, including those with impairments. One aspect of this is adhering to accessibility guidelines such as WCAG (Web Content Accessibility Guidelines).

Resource Allocation: It can be problematic to guarantee that every student has equitable access to the technology they need, including inexpensive or free access to course-based software.

4.8.3 Academic Integrity

Cheating Prevention: Policies may need to include the usage of software, such as secure online exam proctoring or plagiarism detection systems, to prevent academic dishonesty.

Monitoring and Surveillance: Universities must strike a compromise between protecting students' privacy and keeping an eye on how they use software, while also making sure that surveillance doesn't foster an atmosphere of distrust or hostility.

4.8.4 Cost and Budget

Licensing and Subscriptions: Software license acquisition and maintenance can be expensive. Policies are necessary for private universities to control these expenses and make funding and budgetary decisions.

Economic Impact: Purchasing and maintaining software licenses can be costly. Private universities need policies to manage these costs and make funding and financial decisions.

4.8.5 Integration and Interoperability

System Integration: Policies should cover the integration of several software systems (such as library management, SIS, and LMS) in order to minimize redundancies and streamline administrative procedures.

Vendor Relationships: Formulating guidelines for collaborating with software providers, encompassing contract discussions, SLAs, and departure plans in the event that the program is no longer appropriate.

4.8.6 Training and Support

Faculty and Staff Training: In order for teachers and staff to use new technological tools efficiently, universities must make sure they are properly taught.

Technical Support: Policies should specify the support system that staff and students can use to troubleshoot and get help with software problems.

4.8.7 Pedagogical Impact

Teaching Methods: Curriculum design and instructional strategies might be impacted by software use. Regulations pertaining to the integration of technology into the academic environment may be necessary.

Feedback and Evaluation: Evaluation of course-based software's ability to improve learning outcomes and experiences on a regular basis.

4.8.8 Innovation and Development

Keeping Up to Date: Policies should encourage the use of cutting-edge instruments and technologies while making sure they satisfy the requirements and standards of education of the organization.

Pilot Programs: Encouraging the testing of new software through pilot programs to assess its effects before full-scale introduction.

In general, private universities need to create all-encompassing regulations that cover these aspects to guarantee that the usage and execution of course-based application software enhances both their operational effectiveness and instructional objectives.

Conclusion

For Higher Education Institutions (HEI), the importance of information systems for and the collection of data on different aspects for up-to-date knowledge automation is extremely important. To realize enhanced needs, the requirement for new and innovative ideas and skilled abilities increased at an exorbitant rate. HEI's need to make significant improvements to their curriculum and other facets of the education and learning processes as well as the environment. Such groundbreaking improvements are not only based on stakeholders ' rational expectations but also on operational data gathered on different parameters (Mishra, 2019). Ways of HEIs function have been changed due to the influence of an expanding diversification and a growing number of university students. On the whole, the incorporation of educational software and technology augments the results of student learning and fosters active participation in a multitude of courses.

Course-related software has the ability to be utilized in a myriad of ways to amplify the acquisition of knowledge. One method involves utilizing virtual reality (VR) technology, which creates immersive experiences for users, enabling them to interact with 3D environments and simulate practical scenarios (Anggy *et al*., 2020). Another avenue involves the creation of software that provides support for teaching,

such as SDART, which can be seamlessly integrated with other free software suites (Pablo, 2023), such as EspoCRM, OrangeHRM, WebERP, SuiteCRM, ProjeQtOr, and other types of software, to effectively teach specific subjects and competencies. Furthermore, computer-aided software, like Minitab, can be harnessed to facilitate the learning process in specialized courses, such as statistics, leading to substantial advancements in students' academic performances (Aszila *et al*., 2020). Moreover, online educational modules constructed on survey platforms have the potential to furnish interactive learning experiences, enabling students to actively engage with visual content and receive quantitative assessments and valuable feedback (Linda *et al*., 2021). The array of these distinctive approaches showcases the immense possibilities that course-related software holds in terms of enhancing learning in diverse fields and subjects.

Integrating course-related application software into tertiary education has profound theoretical implications that have the potential to reshape teaching and learning methodologies. For example, it can enhance constructive learning through active engagement, increase personalization and differentiation, facilitate collaborative learning, promote self-directed learning, integrate real-world applications, enhance engagement and motivation, promote data-driven insights, challenge traditional pedagogies, etc.

Like all other research work, this study also has certain limitations. For example, this research only explores the impacts of course-related application software conducting qualitative research. A mixed methodological approach would provide comprehensive insights. Moreover, a cross-university impact assessment scope would also give interesting results. However, the findings from this research will be a very good reference for other researchers to explore further in the field of technology-based education in the coming days. This research will also significantly contribute to the existing literature as there is hardly any presence of scholarly research particularly on course-related application software in higher education in the national and global context. As far as the future direction of this research is concerned, lately, it is widely observed that the education sector is largely dominated by artificial intelligence (AI) that automatically generates educational content for educators. Students and scholars are tending more to adopt AI in the learning process. Hence, the impact assessment approach of this research will also aid in exploring the impacts of AI on the existing learning process.

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Conflict of Interest

The authors of this article do not have any conflict of interest to publish this article in the IUBAT Review.

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