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Exploring Perspectives: The Virtual Classroom's Impact on Student Achievement from the Viewpoints of Both Students and Teachers

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Abstract

With the start of the COVID-19 pandemic, educational institutions were compelled to adopt distance learning as a temporary solution, substituting physical classrooms with virtual ones. However, even post-pandemic, several universities find themselves facing dilemma concerning organizing the education process. This pertains to the decision of whether to revert to virtual classes or to reinstate physical classrooms. In this context, a societal resolution needs to be identified, one that would garner greater acceptance from both teachers and students. However, this is not the sole criterion; efficiency accomplishments also hold important sway in determining the approach to organizing the educational process. In this context, the objective of this study is to explore students' perceptions regarding impact of virtual classrooms on their achievements. Additionally, it aims to examine teachers' viewpoints on the efficacy of virtual classrooms as a teaching environment for enhancing students' academic outcomes. This research employs a mixed-methods approach, utilizing both structured questionnaires and semi-structured individual interviews as data collection tools. The study includes 50 students from the Faculty of Education at the University of Prishtina, 150 students from the Faculty of Social Sciences at AAB College, and 10 teachers from both institutions as participants. Given that the research encompasses two samples, one was chosen randomly to collect quantitative data, while the other was purposively selected for qualitative data collection. Quantitative data analysis involved descriptive analysis and inferential statistics, while qualitative data underwent thematic analysis. The results obtained show a favourable influence of virtual classrooms on students' academic achievements and a positive impact of teaching through virtual classrooms on students' learning attitudes. Furthermore, the result showed that teachers' perceptions indicated a positive stance towards recommending the utilization of virtual classrooms as a fundamental prerequisite for enhancing interaction during lessons and effectively explaining new information to students.

Keywords: Achievements, perception, students, teachers, virtual classrooms

Introduction

Across the globe, teachers have been tasked with overseeing virtual classrooms and engaging with their pupils/students through various platforms and social media, delivering distance learning to over 1.5 billion students affected by school lockdowns due to the COVID-19 pandemic (UNESCO,

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2020). Teaching modules exclusively conducted online have introduced a novel experience for both teachers and students. While this new instructional method cannot completely replace in-person learning, it does offer a chance to reform and contemplate teaching techniques, necessitating innovative approaches that amalgamate extensive and intensive learning practices. Amidst the COVID-19 pandemic, teachers were compelled to swiftly devise solutions to enhance the learning encounters and outcomes of pupils/students in the realm of online education (Bryson, & Andres, 2020). However, even post-pandemic, numerous institutions have once again resorted to utilizing virtual classes. Distance learning, characterized by virtual classrooms or online education, signifies a novel paradigm in the educational system (Dube et al., 2023; Mbhiza, 2021; Mpu et al., 2022; Nel et al., 2021). This approach leverages advanced educational technologies to facilitate seamless interaction between students and teachers, creating an environment where they can 'see' and 'hear' each other as if they were physically present in the same classroom. Distance learning is defined as instructional approach in which teachers and students do not convene in a traditional classroom setting. Instead, they utilize various digital mediums such as the Internet, platforms, email, and mail to facilitate the lesson (Alshorman & Bawaneh, 2018; Johnson & Sdunzik, 2023; Nyika & Motalenyane, 2023). It includes "an innovative system rooted in web-based platforms, digital technologies and other forms of educational resources. Its principal objective is to furnish students with a personalized, learner-centred, open, enjoyable and interactive experience that supports and improves learning processes" (Almeida et al., 2019). Contemporary technologies enabling the establishment of virtual classrooms gained notable traction, particularly during the COVID-19 pandemic era, necessitating global adoption of distance learning methods (Moyo et al., 2022; Todri, 2021). In this context, higher education institutions were compelled to shift from traditional in-classroom instruction to virtual learning, presenting significantly heightened challenges (Alshorman & Bawaneh, 2018; Hove & Dube, 2021; Odularu et al., 2022). Institutions independently opted for platforms, Learning Management Systems (LMSs), and a range of educational technologies according to their preferences, thereby facilitating distance learning and fostering virtual classrooms, as well as facilitating synchronous and asynchronous communication between educators and students. Despite the numerous challenges associated with implementing online learning, including infrastructure and pedagogical aspects, it remains imperative to examine the impact of virtual classrooms on students' academic outcomes

and to acknowledge educators' perspectives regarding the utilization of virtual classrooms in teaching.

The recent strides in educational technologies, coupled with the circumstances arising from the COVID-19 pandemic have prompted numerous educational institutions to contemplate avenues and opportunities for incorporating the latest advancements in educational technologies into the instructional process. This integration has emerged as one of the most prevalent topics in recent years, spurring various researchers to delve into examining potential impacts that this integration can have on the teaching and learning process. The integration of novel educational technologies is regarded as a factor influencing various aspects, including enhanced teaching efficiency, improved teaching strategies, increased commitment to learning, increased interactivity (Permatasari, 2022). In his study, Lari underscores that the integration of technology into the teaching and learning process increases attentiveness during learning and fosters students' motivation to delve deeper into the covered subject matter (Lari, 2014). The positive effects of integrating technology into the daily learning process predominantly align with the original constructivist theory framework. In this scenario, even virtual classrooms, functioning as online learning experiences where a teacher instructs a group of students remotely and in real-time by employing a blend of multimedia resources (Ghirardini 2011), are congruent with the constructivist theory. Virtual classrooms encompass the utilization of the Internet, learning management systems, multimedia, and various web applications, facilitating the access, analysis, creation, and dissemination of data and information. These capabilities, once unimaginable beyond traditional physical classrooms, are now seamlessly integrated (in virtual classrooms). A virtual classroom grants the flexibility to access lectures and educational resources anytime, from anywhere, fostering interaction, cooperation, and student motivation to engage in learning (Zhou et al., 2020). Virtual classes have the potential to outperform traditional face-to-face classrooms in terms of effectiveness (Al-Qahani, 2019, Alhawiti, 2017, Mathew et al.,2019). Within virtual classes, students have ample chances to engage in interactions and communications, both amongst themselves and with the professor, offering extensive opportunities for collaborative learning (Hamouda, 2020; Shava, 2022). The higher engagement in learning facilitated by virtual classrooms affects students' learning outcomes. According to Uzoamaka (2017), learning through virtual classrooms yields a positive impact on learning effectiveness. His research findings, among other aspects, revealed a positive influence of virtual classrooms on students from federal and state

universities in Nigeria. Similarly, a study by Hassan and Baraka (2021) emphasizes the statistically significant effects of virtual classrooms in enhancing student satisfaction rates, interaction levels, and average achievement scores. In his study exploring the impact of the 'live virtual classrooms' in distance learning, Yilmaz (2015) also identified these positive effects on students' achievements. Alhawiti (2017) is another researcher who achieved favourable outcomes in enhancing students' English language skills through instruction in virtual classrooms at Tabuku Community College. His study highlighted that student in the experimental group, who were educated in virtual classrooms, attained superior outcomes in diverse assessments. However, distance learning, specifically through virtual classes, presents a range of challenges for both educators and learners. Challenges such as poor network connectivity, reliance on electricity, and insufficient institutional support contribute to students' reluctance to engage in the learning process through virtual classrooms and distance education (Iqbal et al., 2022). Similarly, teachers encounter comparable challenges, as indicated by a study conducted by Nikolopoulou and Kousloglou (2022). Interestingly, teachers perceive that notwithstanding the aforementioned difficulties, online learning contributes to more lucid instructions and heightened motivation for students' learning endeavours. This theoretical framework explored the potential impact of virtual classrooms on enhancing students' academic performance. By dissecting pivotal factors and mechanisms inherent to virtual classrooms, this framework offers valuable perspectives on how these platforms can effectively enhance student learning outcomes. Therefore, building upon these findings, the present study aimed to investigate the perceptions of both students and teachers regarding the influence of virtual classrooms on student outcomes and their utilization for instructional purposes. The investigation delved into their perspectives on various factors including accessibility, personalization, collaboration, flexibility, engaging content, ongoing assessment, teacher-student interactions, and technological proficiency. Concerning how these multifaceted factors collectively contribute, virtual classrooms demonstrate their capacity to create an effective and inclusive learning environment.

Method

Given that the study's objective is to discern students' perspectives on the impact of virtual classrooms on their academic accomplishments, along with examining teachers' viewpoints on the efficacy of virtual classrooms as a teaching milieu for enhancing student outcomes.

Research Design

A mixed methodology approach was chosen for the study to ensure a comprehensive understanding of the research topic through the integration of both quantitative and qualitative research methods. Quantitative methods facilitate the identification of correlations or patterns in perceptions and achievements within the student sample. This method allows for collecting numerical data and in-depth insights from participants, providing a more holistic perspective on the research questions. The qualitative component provides insights into teachers' perceptions, challenges and experiences that influence their perceptions of the impact of virtual classroom's impact on students' achievements, analysed content analysis. The study includes independent or predictor variables and dependent or criterion variables. In other words, the objective is to determine which predictor variable, specifically the utilization of virtual classrooms, holds the highest predictive value for improved student academic outcomes. To achieve the study's aims, three questions and corresponding hypotheses were formulated, addressing two primary subjects under investigation. The focus of this research encompassed students' perspectives on the impact of virtual classrooms on their academic accomplishments, as well as teachers' viewpoints on the utilization of virtual classrooms and its influence on student achievements.

Research Question

The study has the following research question:

1.What is the correlation between virtual classrooms and students' achievements?

2. Is there a relationship between teaching through virtual classrooms and student engagement in learning?

3. What are the teachers' perceptions regarding the use of virtual classrooms in teaching?

Research Hypotheses

Hypothesis 1: Learning through virtual classrooms leads to improved academic outcomes

Hypothesis 2: The participants perceive that teaching through virtual classrooms increases student engagement in learning.

Population and Sample

The study's sample includes students and teachers. The quantitative data were collected from the student sample, which comprises 50 students from the Faculty of Education at the University of

Prishtina and 150 students from the Faculty of Social Sciences at AAB College. The selection process followed a proportional random approach. Qualitative data were gathered from the teacher sample, which consists of 10 teachers utilizing virtual classrooms for teaching purposes. The selection of participants was purposeful, encompassing educators from two faculties. This approach facilitates the investigation of the third research question and allows for a comprehensive exploration of the subject matter through in-depth research (Matthews &Ross, 2010). The first sample group consisted of student aged 19 to 25 years. The majority of participants, (75%), were first-year bachelor's degree students from the faculties of social sciences and education, while the remaining 25% were second-year master's degree students from the Faculty of Education. The student participants represent eight master's programs, such as Biology, Chemistry, Physics, Geography, Mathematics, History, Technology with ICT and Albanian Language. As for gender distribution, 83.5% were female and 16.5% were male. Also, among the teachers, 60% were female and 40% were male. In the context of age distribution, 78% of teachers fell within the age range of 35 to 50 years, with the remaining 22% aged between 51 and 65 years. Regarding the institution, 80% of the teachers are affiliated with "AAB" College, while the remaining 20% are from the Faculty of Education. All interviewed teachers had utilized the virtual classroom for over two semesters. The interview procedure was conducted online through the use of Google Forms.

Data Collection Tools

Data collection involved utilizing a structured questionnaire and conducting ten semi-structured interviews. The researchers developed the questionnaire, which underwent an initial pilot testing phase with a small non-participating sample of 50 AAB college students. In this case, the validity (clarity, understanding, meaning and connection to the research questions) and its reliability (Cronbach's alpha) of the questionnaire were analysed, yielding a value of 0.65. Following the pilot phase, questions that undermined the clarity and reliability of the original questionnaire were eliminated. Prior to piloting, the questionnaire comprised 17 questions, whereas the final version was streamlined to include 11 questions.

Data Collection

The survey was administered online using Google Forms. The interview encompassed various topics, including experience with virtual classrooms, benefits from using virtual classrooms such as enhanced student engagement and participation, student learning outcomes, student

engagement, overall perceptions and future outlook. Interview was conducted online, and ethical considerations, such as participant anonymity, were carefully addressed throughout the research process.

Data Analysis

Several statistical analyses, such as reliability analysis, descriptive analysis, and correlation, were employed to accomplish the study's objectives. The data collected from the questionnaires were statistically analysed by employing SPSS 26.00. Cronbach's alpha reliability coefficient was utilized to analyse the internal consistency of the questionnaire.

Table 1

The Questionnaire's Reliability

Cronbach's alpha	N of items
0.827	11

Table 1 shows the questionnaire's reliability regarding the use of virtual classrooms, yielding a reliability coefficient of .827. This indicates that the questions effectively measured pertinent data. In order to assess the distribution of the data, a normality test was conducted.

Table 2

Test of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Learning through virtual classrooms						
Students' achievements	0,124	200	0.000	0.957	200	0.001

Table 2 reveals that the data exhibits a non-parametric distribution. Consequently, to validate the hypotheses, non-parametric statistical tests were employed.

Findings

Before delving into the specific analyses of this research, we are providing an overview of general data concerning the utilization of virtual classrooms. In order to gauge students' familiarity with virtual classrooms, the following question was posed:

To what extent are you familiar with using virtual classrooms? The collected responses from the students are depicted in Figure 1.

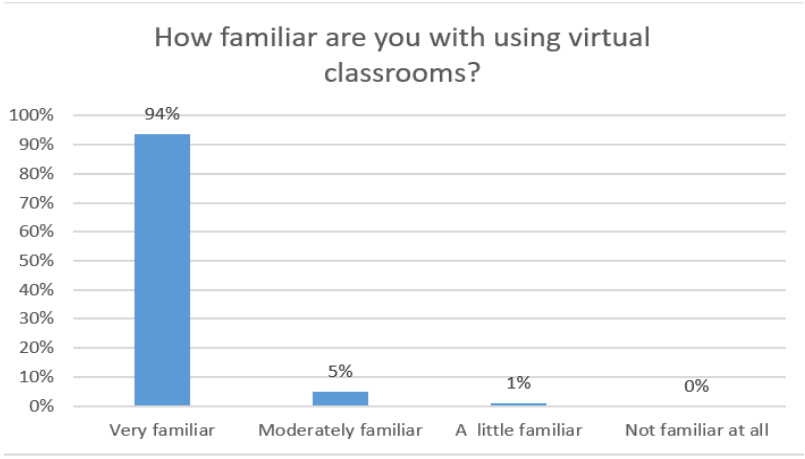

Figure 1. Results from the Question 'How Familiar are You with Using Virtual Classrooms?'

As depicted in Figure 1, a significant majority of students are well-acquainted with the utilization of virtual classrooms, which is a positive indication. Additionally, Figure 2 reveals that all students have affirmed that their teachers employ virtual classes.

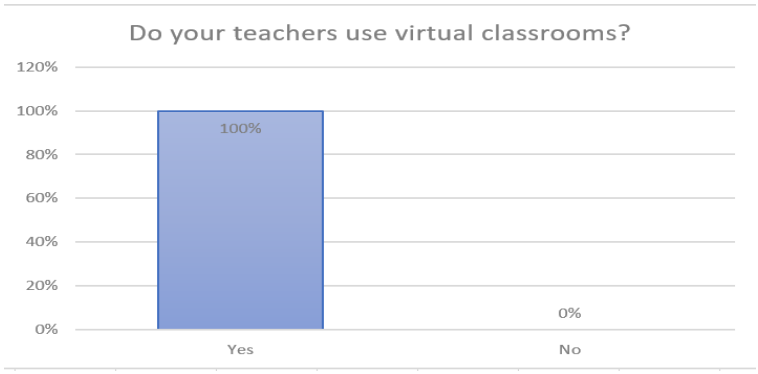

Figure 2. Utilization of Virtual Classrooms by Teachers

When queried about their preference for class types, students provided their feedback, with 51% indicating a preference for virtual classes and 49% expressing a preference for in-person classes

(Figure 3). Open-ended questions were posed to students regarding their preferences for one classroom environment over the other, yielding responses with the following reasons: Virtual classrooms - are more suitable as they can be accessed home, offer visual aids, and provide better chances for interaction through chat or oral communication. In-person classrooms - are preferred for the social aspect, direct teaching, and face-to-face contact with the teachers and peers.

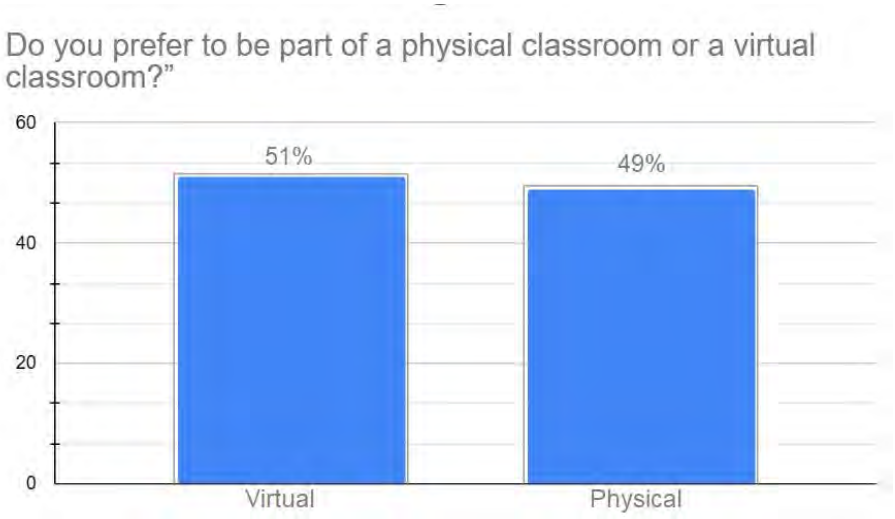

Figure 3. Preference for Physical Classroom vs. Virtual Classroom

Descriptive statistics

Descriptive statistics, including measures such as mean and standard deviation, were utilized for all variables. The mean represents the central point of the data, dividing 50% of the cases from the other 50%. Meanwhile, the standard deviation was employed to gauge the dispersion of the data from the mean. A larger standard deviation indicates greater variability or spread of the data points away from the mean.

Table 3

Descriptive Statistics

	N	Mean	Std. deviation
I find learning contents presented by the teacher through a virtual classroom more interesting.	200	4.17	.833

Learning through a virtual classroom is more effective.	200	4.27	.837
I am able to better understand the learning content when the teacher teaches through a virtual classroom.	200	4.10	.944
The presentation of learning content in the virtual classroom through different applications is more appealing.	200	4.35	.906
Interaction in the virtual classroom increases interest in learning.	200	4.07	.935
The presentation of learning content through the virtual classroom helps me use my time effectively.	200	3.87	.915
Learning through virtual classrooms increases my academic productivity.	200	4.05	.937
The virtual classroom is a suitable environment for learning and summarizing the learning content together with the teacher.	200	4.09	.955
The manner in which learning content is presented in the virtual classroom increases critical thinking related to the topic being discussed.	200	3.97	.961
Learning outcomes are better when teaching is carried out through virtual classrooms.	200	4.06	.878
I have a higher grade in subjects where teaching was carried out using the virtual classroom.	200	3.91	1.013
Valid N (listwise)	200		

Based on the data presented in Table 3, it is evident that the statement 'I find learning contents presented by the teacher through a virtual classroom more interesting', has a mean value of 4.17 and standard deviation of .833. This suggests that, on average, students find the learning materials presented through a virtual classroom to be more engaging. For the question of 'Learning through a virtual classroom is more effective', the mean (M) is 4.27 with a standard deviation (SD) of 0.837. For the question of 'I am able to better understand the learning content when the teacher teaches through a virtual classroom', the mean is 4.10 with a standard deviation of 0.944.'The presentation of learning content in the virtual classroom through different applications is more appealing' (M=4.35; SD=.906). 'Interaction in the virtual classroom increases interest in learning' (M=4.07; SD=.935). 'The presentation of learning content through the virtual classroom helps me use my time effectively'(M=3.87; SD=.915). 'Learning through virtual classrooms increases my academic productivity' (M=4.05; SD=.937). 'The virtual classroom is a suitable environment for learning and summarizing the learning content together with the teacher' (M=4.09; SD=.955). "The manner in which learning content is presented in the virtual classroom increases critical thinking related to the topic being discussed." (M=3.97; SD=.961). 'Learning outcomes are better when teaching is carried out through virtual classrooms' (M=4.06; SD=.878). As well as for 'I have a higher grade in subjects where teaching was carried out using the virtual classroom2 (M=3.91; SD=1.013). From the aforementioned analysis, it can be concluded that students perceive the virtual classroom as an avenue for more effective learning. They view it as an engaging learning environment where presented content is more appealing and comprehensible, resulting in improved learning outcomes when compared to traditional methods. Additionally, students recognize the virtual classroom as a platform that fosters increased interactivity and the cultivation of critical thinking skills.

Enhancing academic performance through virtual classrooms

The quantitative data at hand were analysed using the Spearman correlation, a statistical method appropriate for non-parametrically distributed data.

Table 4

Analysis Through the Spearman Correlation

			S2	S3	S6	S7	S8	S9	S10	S11
Spearman's rho	S2	Correlation Coefficient	1.000	0.459**	0.214**	0.315**	0.323**	0.104**	0.274**	0.321**
		Sig.(2-tailed)		0.001	0.000	0.000	0.001	0.003	0.007	0.000
		N	200	200	200	200	200	200	200	200
	S3	Correlation Coefficient		1.000	0.305**	0.327**	0.292**	0,252**	0.412*	0.359**
		Sig.(2-tailed)			0.000	0.001	0.000	0.000	0.011	0.007
		N		200	200	200	200	200	200	200
	S6	Correlation Coefficient			1.000	0.371**	0.237**	0.218**	0.388**	0.427**
		Sig.(2-tailed)				0.001	0.003	0.000	0.001	0.004
		N			200	200	200	200	200	200
	S7	Correlation Coefficient				1.000	0.371**	0.093**	0.360**	0.310**
		Sig.(2-tailed)					0.004	0.000	0.007	0.001
		N				200	200	200	200	200
	S8	Correlation Coefficient					1.000	0.304**	0.388**	0.454**
		Sig.(2-tailed)					200	0.002	0.001	0.023
		N						200	200	200
	S9	Correlation Coefficient						1.000	0.320**	0.342**
		Sig.(2-tailed)							0.002	0.001

	N	200	200	200
S10	Correlation Coefficient		1.000	0.454**
	Sig.(2-tailed)			0.000
	N		200	200
S11	Correlation Coefficient			1.000
	Sig.(2-tailed)			
	N			200

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed).

The results above indicate a positive correlation between the statements 'I have a higher grade in subjects where teaching was performed using the virtual classroom' and 'Learning through a virtual classroom is more effective' (rho=0.321 **, p-value=0.000). Furthermore, a significant positive correlation is evident between the understanding of the content presented through the virtual classroom and students' achievement (highest grade) (rho=0.359**, p-value=0.007). Additionally, significant positive correlations, as indicated in table 3, are observed between the increase in academic productivity resulting from learning through the virtual classroom and higher grades (rho=0.310**, p-value=0.001). Likewise, a notable positive correlation is established between the augmentation of critical thinking fostered by the method of presenting learning content through the virtual classroom and higher grades (rho=0.342**, p-value=0.001). Additionally, a noteworthy and statistically significant positive correlation exists between enhanced learning outcomes and higher grades (rho=0.454**, p-value=0.000). This correlation provides insight into the superior learning outcomes achieved through virtual classes, reflecting elevated levels of student achievement. Furthermore, the methodology of delivering learning content via virtual classrooms facilitates effective learning, leading to higher student achievement. Therefore, it is evident that learning through virtual classrooms contributes to improved academic outcomes. 3.3. Teaching through virtual classrooms increases student engagement in learning. In order to assess the correlation between teaching through the virtual classroom and commitment to

learning, we analysed the correlation between the following variables: 'I find learning contents presented by the teacher through a virtual classroom more interesting' and 'Interaction in the virtual classroom increases interest in learning'.

Table 5

Correlation Between Virtual Classroom Content Appeal and Interaction-Driven Engagement

			S1	S5
Spearman's rho	S1	Correlation Coefficient	1.000	0.212**
		Sig.(2-tailed)		0.001
		N	200	200
	S5	Correlation Coefficient		1.000
		Sig.(2-tailed)		
		N		200

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed).

To test the second hypothesis: the analysis was conducted between 'I find learning contents presented by the teacher through a virtual classroom more interesting' and 'Interaction in the virtual classroom increases interest in learning'. From this analysis, the result shown in Table 5 indicates a correlation coefficient of rho=.212** with a significance p-value of 0.001, indicating a positive and statistically significant correlation between the variables.

Results from interviews with teachers

As part of the research, interviews were also conducted with teachers who use virtual classrooms for their teaching. They were asked five questions with the intention of revealing teachers' perceptions regarding the effects of using virtual classrooms and their impact on students'

outcomes. This section highlights a collection of the most pertinent responses gathered from the interviews conducted with the group of teachers.

In response to the question, ***Do you think that teaching through virtual classrooms is more effective compared to teaching in in-person classrooms?,*** the following answers were obtained:

T3: '*Teaching through a virtual classroom is more effective and* offers *many advantages.* It enhances *students' interest in learning* by providing *opportunities for multimedia presentations of the learning material,* thereby accommodating students *with different learning styles*'.

All teachers expressed a similar positive perception in response to the aforementioned question. They unanimously recommended a substantial integration of virtual classes in teaching to enhance student participation during lessons and provide easier access to educational materials. As for the correlation between the displaying of information, the comprehension of the elaborated content, and the virtual classroom, in response to the question: **"*How does a virtual classroom affect the displaying of information and the comprehension of the content elaborated for students during the lesson?',*** teacher T1 provided the following answer: "*A virtual classroom is a multimedia learning environment; it provides interactive ways of demonstration, and such elements are very useful because they help to increase concentration in students, as well as stimulate critical thinking during the presentation and discussion of learning content'.* Teacher T4: *By integrating various applications within virtual classrooms, which can seamlessly become a regular part of the learning environment, we also have the opportunity to reinforce students' comprehension of abstract concepts. The learning materials that are elaborated on during the lectures are always available to the students, enabling them to browse the lesson as often as they need. This is something that cannot happen in in-person classrooms'.* Regarding the teachers' opinions on the ***influence that teaching and learning through virtual classrooms have on improving students' academic success***, teachers gave answers which indicated that the use of virtual classrooms positively affects students' academic success. This is because students are more focused during the learning process, and the presentation of learning materials is adapted to their learning styles, resulting in better understanding of the learning contents. As for the questions about whether they prefer teaching through virtual classrooms or in-person classrooms and whether they would recommend using virtual classrooms to other colleagues who do not use them, teachers answered. Teacher T2 responded, "*Choosing the physical classroom over the virtual classroom is like*

choosing to teach in a half-lit classroom instead of choosing a fully-lit classroom. In this context, this would be understood even by the biggest layman. While acknowledging the advantages of the in-person classroom, particularly in terms of socialisation, it is important to note that the benefits of the virtual classroom far outweigh those of traditional settings'. Teacher T1 *emphasized, "Virtual classrooms provide teachers with the opportunity to replace or supplement textbooks with a wide range of learning resources'.* Teacher T5 *highlighted, 'Enabling teaching materials to be accessible anytime and anywhere, and offering the ability to customize the virtual learning environment, virtual classrooms can contribute to heightened student engagement in the learning process'.* Regarding the endorsement of virtual classrooms to their colleagues, teachers believe that their colleagues who do not currently utilize virtual classrooms might not abstain from doing so due to ineffectiveness. Instead, they posit that various factors, potentially related to technical and infrastructural considerations, could be influencing this decision. One teacher stated:

"I strongly advocate for higher education institutions to prioritize the integration of virtual classrooms into their educational processes, or at the very least, consider a hybrid approach. Virtual classrooms offer a versatile platform that seamlessly incorporates various options, ultimately enhancing the appeal and intrigue of teaching and learning for students," remarked another teacher'. Subsequently, teachers were inquired about their perspective on potential drawbacks of virtual classrooms. In response to the question: "Do you believe that virtual classrooms have limitations, and if so, what are they?" nearly all teachers affirmed *'yes, virtual classrooms have their shortcomings*'. The technical and infrastructural aspect is regarded as major drawback in the application and effectiveness of virtual classes. The reliance on Internet connectivity and technological infrastructures contributes to the reduced efficiency of these classes. Teachers also identified the social context and the sense of self-isolation as significant drawbacks. Many of them observed these challenges during the pandemic period in 2020, when the entire learning process was conducted online. In this context, teachers emphasize the importance of developers of various computer applications considering the social aspect as well, to ensure that online education provides additional support for the social aspect of learning.

Discussion, Conclusion and Implications

High-quality education plays a crucial role in solving complex problems and global challenges in modern societies. Learning constitutes endeavour and encounters through which individuals

diligently acquire knowledge and skills, enabling them to proficiently apply techniques essential for resolving diverse real-world challenges. Teaching involves finding ways and practices that will influence the development of skills, namely the skills of acquiring knowledge and the practical application of that knowledge by students (Guerriero, 2017). The important role teaching and learning in society is difficult to overstate. The use of various computer applications for teaching and learning has progressively increased and has become an integral component of educational curricula, with the use of virtual classrooms in recent years, particularly during and after the COVID-19 pandemic. These applications have been recognized as components that enhance focus in learning and stimulate students' motivation to delve deeper into the covered topics and content (Richards &Dede, 2012). Yet, our findings reveal that students' motivation to engage in virtual classroom learning is helped by the different applications and interactive features provided by the virtual classroom environment. Learning environments that are well-equipped with appropriate teaching tools not only enhance the efficiency of teaching for educators but also offer students a conducive platform to engage in effective learning (Haleem et al., 2022). Each individual learns in different ways, posing challenges for teachers to cater to diverse comprehension styles. Virtual classrooms help personalized learning, aligning with academic outcomes (McClaskey & Bray 2014), which are interconnected. Hence, this research aimed to investigate the impact of virtual classrooms on teaching and learning, particularly their influence on student outcomes. To test the initial hypothesis, a correlation analysis was executed, examining whether 'Learning through virtual classrooms allows students to achieve better results'. Based on the correlation analysis results, it can be concluded that learning outcomes are indeed better in virtual classes and higher student achievement. This is further supported by the significant positive correlation between the statements 'I have a higher grade in subjects where teaching was performed using the virtual classroom' and 'Learning through a virtual classroom is more effective' (rho=0.321 **, p-value=0.000). The first hypothesis of the study is confirmed, indicating that learning through virtual classrooms leads to better academic outcomes. Insights from teacher interviews support this, highlighting the role of virtual classrooms in enhancing student engagement, concentration, and subject interest. To test the second hypothesis, 'The participants have perspective that teaching through virtual classrooms increases student engagement in learning', an analysis was conducted between 'I find learning contents presented by the teacher through a virtual classroom more interesting" and "Interaction in the virtual classroom increases interest in learning'. The analysis

yielded a correlation coefficient of rho=.212** with a significance level of p-value= 0.001, which is less than 0.01, as shown in Table 4. This significant result indicates a positive and dependable correlation between the two variables, thereby confirming the validity of the second hypothesis. Also, based on the feedback provided by the teachers, it is evident that virtual classrooms provide a platform to present learning content through diverse applications and interactive demonstrations. Teachers highlighted the significance of these elements in enhancing student concentration and fostering critical thinking during the delivery and discourse of educational material. The findings of this study align with prior research conducted by Uzoamaka (2017), Whitlock (2017), Yilmaz (2015), Hassan and Baraka (2021), all of whom underscore the positive correlation between the use of virtual classrooms and the improvement of students' academic achievements and engagement in the learning process. In our study, teachers' and students' perceptions were aligned regarding student engagement and their academic outcomes. Contrary to the studies mentioned above, the results of this study reveal a positive perception shared by both students and teachers towards the virtual classroom. Teachers and students alike view the virtual classroom as a favourable and engaging learning environment. Teachers particularly appreciate the benefits it offers to them and their students. The findings of this study underscore the positive relationship between learning through virtual classrooms and higher academic achievements among students. Virtual classrooms can be regarded as a stimulating learning environment that allows each student to tailor their learning according to experience aligned with their unique learning style. Utilizing the virtual classroom for teaching proves to be more captivating and alluring to students, thereby contributing to an augmentation in their dedication to the learning process. Teachers perceive the virtual classroom as a learning environment that grants them the opportunity to tailor their teaching methods to accommodate various learning styles, leading to heightened student engagement and active involvement during lectures.

Recommendation for future researchers and limitations of the study

Future researchers can conduct longitudinal studies to examine the long-term effects of virtual classrooms on both students' academic achievements and teachers' perspectives. Such research endeavours would offer a deeper and more comprehensive insight into the sustained influence and potential transformations that may evolve over an extended period. For a more nuanced comprehension, researchers could concentrate on particular subject areas or grade levels. This approach would allow for the identification of subject-specific obstacles, advantages, and

pedagogical approaches that pertain to distinct disciplines or educational stages. Furthermore, conducting comparative studies that juxtapose virtual classrooms with traditional face-to-face settings or alternative forms of remote learning can offer valuable insights into the relative strengths and limitations of various instructional methods. This study has the following limitations: Generalizability - Generalizability of the study's findings may be constrained by the particular context in which the research was undertaken. Variations in educational environments, cultural contexts, or technological resources could potentially lead to divergent outcomes. Self-Reported Data - Self-reported data from teachers constitutes a potential limitation, as it could be influenced by social desirability bias or individual interpretations. Enhancing future research, objective measures or observational data could be incorporated alongside self-report measures to strengthen the credibility and accuracy of the results.

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