

Exploring Technology in Transforming Education by Allowing Students to Learn at Their Own Pace and in Customized Ways

1. Mrs. Farah Shakee, 2. Dr. Ambreen Khanam, 3. Mrs. Nahid Awad Kheri, 4. Mrs. Shaik Shakira F R, 5. Dr Gomatam Mohana Charyulu

1. English Language Lecturer, Department of Foreign Languages, College of Arts and Humanities, Jazan University. Kingdom of Saudi Arabia Email : fshakeel@jazanu.edu.sa
2. Assistant Professor, Department of Foreign Languages. College of Arts and Humanities, Jazan University. Kingdom of Saudi Arabia Email : akabdulhameed@jazanu.edu.sa
3. English Language Lecturer , Department of Foreign Languages, College of Arts and Humanities, Jazan University. Kingdom of Saudi Arabia Email : nkheri@jazanu.edu.sa
4. PhD Scholar, Division of English, Dept of Science and Humanities, VFSTR Deemed to be University, Vadlamudi, AP India Email: shakira.rehamana@gmail.com
5. Professor, Department of English (DoEL), School of Applied Science and Humanities, VFSTR DEEMED TO BE UNIVERSITY, Vadlamudi AP India. gmcharyulu.g@gmail.com
Corresponding Author: fshakeel@jazanu.edu.sa
Corresponding Author: fshakeel@jazanu.edu.sa

Abstract- This study investigates the impact of technology on education, focusing on personalized learning strategies that facilitate student-centric pacing. Utilizing primary quantitative data analyzed through SPSS software, the research highlights the vast benefits and future opportunities of tech-based education. Key findings address challenges and provide mitigation strategies to enhance academic success rates. The study contributes to understanding technology's potential in education, informing effective strategies for improved student outcomes.

Keywords: technology-enhanced learning, personalized education, customized learning approaches, academic success

Introduction

Background of the study

The advent of technology has yielded substantial efficiency gains across diverse domains, with the educational sector being a notable beneficiary. Recent advancements have facilitated a paradigm shift towards flexible and personalized learning experiences (Baidoo-Anu & Ansah, 2023). Specifically, technology integration has enabled:

1. Tailored learning pathways aligned with individual needs and preferences
2. Streamlined resource acquisition processes
3. Self-directed learning at an optimal pace

This technological transformation has significantly enhanced the educational landscape, accommodating

varied learning styles and promoting improved academic outcomes.

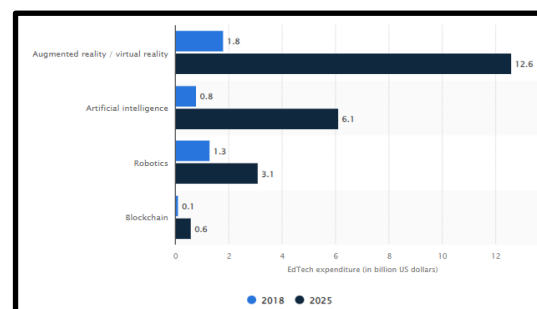


Figure 1: Forecast of investment in education technology globally in 2025

(Source: Statista, 2024)

The swift expansion of technology utilization in education has heightened the potential for investment in it to enhance the overall process, as illustrated in Figure 1. In 2025, global educational technology is anticipated to expand across several sectors, with investments in augmented and virtual reality projected to reach approximately 12.6 million dollars (Statista, 2024). This information elucidates the acceptance rate of technology among students, as it provides advantages such as personalized learning with an appropriate volume of educational resources, while preserving its own position and adaptability in the learning process. The emerging trends in this industry present a favorable opportunity to enhance the educational development of pupils via the proper integration of technology (Paudel, 2021).

Aim

This study aims to understand the way exploring technology is transforming education by allowing students to learn at their own pace in their own customised way.

Objectives

RO 1: To discover the benefit of technology in the educational system

RO 2: To analyse the way technology has changed the educational pattern and learning process of students

RO 3: To rectify the challenges faced by students while using technology in study

RO 4: To recommend ways of mitigating challenges that students face during the use of technology in study

Research Question

RQ 1: How technology has benefited the educational system?

RQ 2: How has technology changed the educational pattern and learning process of students?

RQ 3: What are the challenges students face while using technology in study?

RQ 4: How to mitigate the challenges that students face during the use of technology in study?

The integration of technology is positively transforming education; however, certain drawbacks are evident in this process. Blau et al. (2020) noted that excessive screen time can diminish the physical activity levels of students from an early age, which

adversely affects their health. The prevalence of eye conditions such as Myopia in children is correlated with the increased use of technology. Additionally, the use of technology for learning reduces opportunities for in-person interactions with peers, leading to potential social isolation. Enhancing awareness and implementing training programs for the effective and qualitative use of technology can support children in leading a healthy lifestyle while engaging in high-quality learning experiences.

Significance of the study

Grasping how technology influences the educational landscape for students is crucial for both scholarly and business objectives. Colleagues in the field can gather necessary information on the subject being examined, while skilled educational technology developers compile insights to create integrated learning platforms. Therefore, the advantages that technology provides to individual students and their success through it can be valuable for future studies and effective business development.

Literature Review

The benefit of technology in the education system and the development of learning ability of students

Through the use of technology, students have been able to more efficiently collect information, which has enabled them to find answers to their problems more quickly than ever before. In addition to this, the adaptability that is provided by technology-based learning enabled youngsters to create learning regimens that were tailored to their own personal preferences (Nadezhda, 2020). Children have been able to concentrate on areas that require more attention and improvement thanks to the customization choices that are available in digital learning systems. The internet and other online learning platforms, on the other hand, provide learning resources that are simple to access and preserve. Aside from that, the majority of learning tools include parental control, which can assist parents in understanding what their children are learning at what moment (Iatsyshyn et al. 2020). Through the use of learning platforms, students were able to improve their communication processes with their classmates, which in turn helped them collaborate

on projects and teamwork, which ultimately led to an increase in trust and positive bonding.

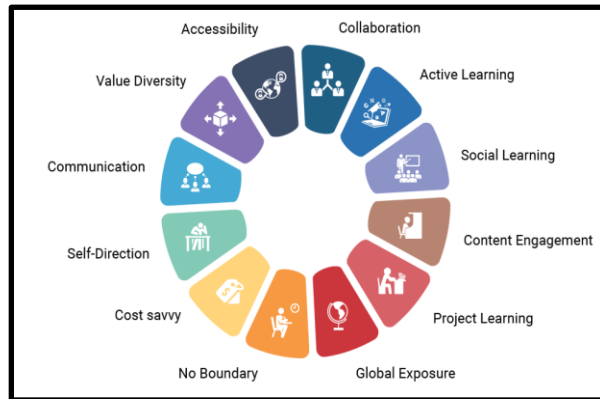


Figure 2: Benefit of technology education

(Source: Nadezhda, 2020)

Technology-based learning, despite the fact that it presents a great array of options, is fraught with several dangers that have the potential to disrupt the students' ability to study in an uninterrupted manner. Clark-Wilson et al. (2020) said that young learners are generally ignorant of the data sensitivity that occurs when they are operating devices for the goal of learning for this particular context. The risk of losing sensitive information and the chance of being bullied online might both be increased if one accepts any unwanted intrusion without being aware of it. In addition to this, students spend more time in front of screens, which tends to diminish the amount of time they spend moving around physically. A distraction can also be caused by the development of an addiction to technology, particularly the internet, which can occur throughout the process of learning (Guo et al. 2021). Students are able to access the internet in a secure manner when they are informed about the limitation method and more data privacy concerns are raised.

TAM theory

The technology acceptance model is a framework that assists in articulating the manner in which people embrace technology on the basis of its usefulness and simplicity of use. "The technology acceptance model" According to Vorm and Combs (2022), students are able to make use of technology to improve their academic performance since advancements in

technology have made it possible to create individualized learning systems for each student. Learning how to navigate through the many types of education can be simple, which is evidence of its user-friendliness. Having a constructive outlook on the process of learning through the use of technology can contribute to the enhancement of learning experiences that are more beneficial for everyone.

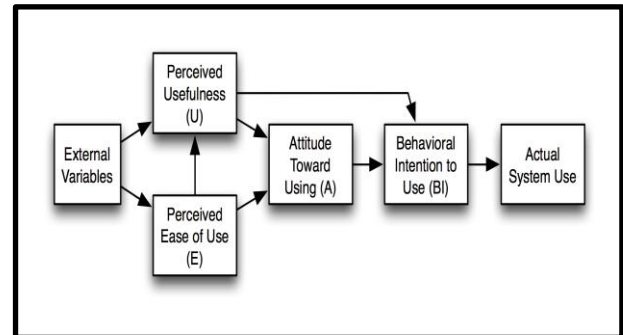


Figure 3: TAM theory

(Source: Vorm & Combs, 2022)

Methodology

The gathering of information is an integral aspect of the research process because it helps to preserve their authenticity and expand their expertise. The completion of this study needs the collection of pertinent information in order to gain an understanding of the function that technology plays in enhancing the capacity of children to learn at their own pace and according to their own preferences. As a result, the primary quantitative approach has been selected for this study, and sixty-five different parts have been picked to carry out the survey. According to Ali Shourideh and Kurdi (2023), the collecting of primary data is beneficial in terms of obtaining information in real time. A questionnaire needs to be produced in order to carry out the survey. Within the questionnaire, there should be a total of eight questions based on topics, as well as three questions pertaining to demographics. An analysis of the information that was gathered was performed with the assistance of the SPSS software. According to Won (2023), performing analysis using the primary analysis tool results in the generation of statistical information that is simple to interpret. When using the program for demographic analysis, it is necessary to conduct regression and

correlation tests in order to collect correct results that may be correlated with previously published literature.

Hypothesis

Alternative H 1: Sufficient Digital learning resources and learning aspect of students at their own pace have a strong positive correlation

Alternative H 2: There is a positive correlation between flexibility in learning and earning aspect of students at their own pace

Alternative H 3: The correlation seems to be formed between automated support in applications and the learning aspect of students at their own pace

Findings and analysis

Demographic analysis

Distribution of age

What is your age?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	26	40.0	40.0	40.0
	31-50	26	40.0	40.0	80.0
	50-65	13	20.0	20.0	100.0
	Total	65	100.0	100.0	

Table 1: Distribution of age

(Source: Primary data collected from SPSS)

Table 1 reflects the age of the participants of the survey and the people belonging to the age group of both 18-30 and 31-50 with 26 in each. In Table 1, it can be seen that minimum participation is from the age group of 50-65 which is 13.

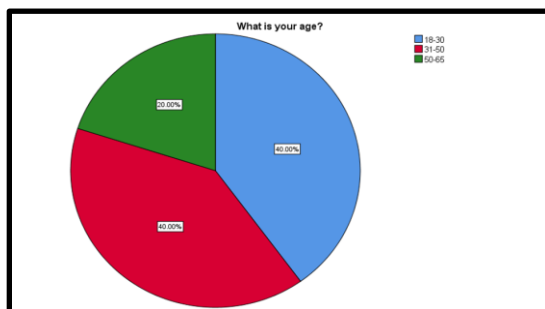


Figure 4: Distribution of age
(Source: Primary data collected from SPSS)

Figure 4 reflects the age of the participants of the survey and the people belonging to the age groups of both 18-30 and 31-50 with 40% in each. In Figure 4, it can be seen that minimum participation is from the age group of 50-65 which is 30%.

What is your gender?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	26	40.0	40.0	40.0
	Male	26	40.0	40.0	80.0
	Prefer not to say	13	20.0	20.0	100.0
Total		65	100.0	100.0	

Table 2: Distribution of Gender

(Source: Primary data collected from SPSS)

Table 2 highlights the age of participants in the survey in which both females participated equally that is 26. Only 13 people preferred not to disclose their gender identity.

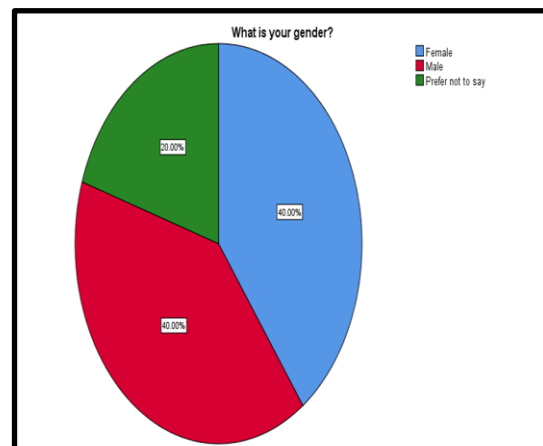


Figure 5: Distribution of Gender

(Source: Primary data collected from SPSS)

Figure 5 highlights the age of participants in the survey in which both females participated equally that is 26. Only 13 people preferred not to disclose their gender identity.

What is your income?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25000-45000	13	20.0	20.0	20.0
	45000-60000	26	40.0	40.0	60.0
	Above 60000	13	20.0	20.0	80.0
	Below 25000	13	20.0	20.0	100.0
	Total	65	100.0	100.0	

Table 3: Income range of the population(in INR)
(Source: Primary data collected from SPSS)

Table 3 reveals the income range of people participating in the survey for this research. The Maximum participation comes from the group with INR 45000-60000 income, that is 26. Rest categories have an equal number of participants with each having 13.

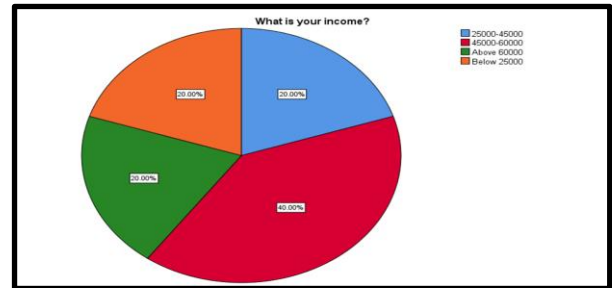


Figure 6: Income range of the population (in INR)
(Source: Primary data collected from SPSS)

Figure 6 reveals the income range of people participating in the survey for this research. The Maximum participation comes from the group with 45000-60000 income, that is 40%. Rest categories have equal number of participation with each having 20%.

Descriptive analysis

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Error
Students learn at their convenience (DV)	65	2	5	3.60	1.028	-.278	.297
flexibility in learning (IV 1)	65	1	5	3.60	1.508	-.748	.297
Collection and store resources are easier (IV 2)	65	2	5	3.60	1.028	-.278	.297
Automated support (IV 3)	65	1	5	3.60	1.508	-.748	.297
Valid N (listwise)	65						

Table 4: Descriptive analysis

(Source: Primary data collected from SPSS)

Table 4 performed descriptive analysis where the values of mean, median and mode were evaluated that ranged between mostly 4 to 5. This indicates most participants chose to agree or strongly agree. Both positive and negative skewness value indicates moderate shaped til of the dataset.

Regression analysis
Hypothesis 1

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.812 ^a	.660	.655	.604	2.581

a. Predictors: (Constant), flexibility in learning (IV 1)

b. Dependent Variable: Students learn at their convenience (DV)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.618	1	44.618	122.309	.000 ^b
	Residual	22.982	63	.365		
	Total	67.600	64			

a. Dependent Variable: Students learn at their convenience (DV)

b. Predictors: (Constant), flexibility in learning (IV 1)

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Correlations		
	B	Std. Error	Beta				Zero-order	Partial	Part
1 (Constant)	1.607	.195			8.235	.000			
flexibility in learning (IV 1)	.554	.050		.812	11.059	.000	.812	.812	.812

a. Dependent Variable: Students learn at their convenience (DV)

Table 5: Linear regression of hypothesis 1
(Source: Primary data collected from SPSS)

Table 5 helped in forming a link between IV 1 and DV in which the value of R, R-squared and adjusted square have been calculated. Value of R is 0.812, showing the correlation between variables. The Durbin-Watson value is 2.581 which indicates there is a negative autocorrelation between variables that have formed. The significant value is 0.000 which is lower than 0.005, indicating hypothesis 1 has been accepted in this study.

Hypothesis 2

<u>Model Summary^b</u>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.812 ^a	.660	.655	.604	2.581

a. Predictors: (Constant), Automated support (IV 3)

b. Dependent Variable: Students learn at their convenience (DV)

<u>ANOVA^a</u>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.618	1	44.618	122.309	.000 ^b
	Residual	22.982	63	.365		
	Total	67.600	64			

a. Dependent Variable: Students learn at their convenience (DV)

b. Predictors: (Constant), Automated support (IV 3)

<u>Coefficients^a</u>								
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
	B	Std. Error	Beta			Zero-order	Partial	Part
1 (Constant)	1.607	.195		8.235	.000			
Automated support (IV 3)	.554	.050	.812	11.059	.000	.812	.812	.812

a. Dependent Variable: Students learn at their convenience (DV)

Table 6: Linear regression of Hypothesis 2

(Source: Primary data collected from SPSS)

Table 6 helped in forming a link between IV 2 and DV in which the value of R, R-squared and adjusted square have been calculated. The value of R is 0.812, showing the correlation between variables. The Durbin-Watson value is 2.581 which indicates there is a negative autocorrelation between variables that have formed. The significant value is 0.000 which is lower than 0.005, indicating hypothesis 1 has been accepted in this study.

Hypothesis 3

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.812 ^a	.660	.655	.604	2.581

a. Predictors: (Constant), Automated support (IV 3)

b. Dependent Variable: Students learn at their convenience (DV)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.618	1	44.618	122.309	.000 ^b
	Residual	22.982	63	.365		
	Total	67.600	64			

a. Dependent Variable: Students learn at their convenience (DV)

b. Predictors: (Constant), Automated support (IV 3)

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Correlations		
	B	Std. Error	Beta				Zero-order	Partial	Part
1 (Constant)	1.607	.195			8.235	.000			
Automated support (IV 3)	.554	.050	.812		11.059	.000	.812	.812	.812

a. Dependent Variable: Students learn at their convenience (DV)

Table 7: Linear regression of hypothesis 3

(Source: Primary data collected from SPSS)

Table 7 helped in forming a link between IV 3 and DV in which the value of R, R-squared and adjusted square have been calculated. The value of R is 0.812, showing the correlation between variables. The Durbin-Watson value is 2.581 which indicates there is a negative autocorrelation between variables that have formed. The significant value is 0.000 which is lower than 0.005, indicating hypothesis 1 has been accepted in this study.

Correlation Test

		Correlations			
		Students learn at their convenience (DV)	flexibility in learning (IV 1)	Collection and store resources are easier (IV 2)	Automated support (IV 3)
Students learn at their convenience (DV)	Pearson Correlation	1	.812**	1.000**	.812**
	Sig. (2-tailed)		.000	.000	.000
	Sum of Squares and Cross-products	67.600	80.600	67.600	80.600
	Covariance	1.056	1.259	1.056	1.259
	N	65	65	65	65
flexibility in learning (IV 1)	Pearson Correlation	.812**	1	.812**	1.000**
	Sig. (2-tailed)	.000		.000	.000
	Sum of Squares and Cross-products	80.600	145.600	80.600	145.600
	Covariance	1.259	2.275	1.259	2.275
	N	65	65	65	65
Collection and store resources are easier (IV 2)	Pearson Correlation	1.000**	.812**	1	.812**
	Sig. (2-tailed)	.000	.000		.000
	Sum of Squares and Cross-products	67.600	80.600	67.600	80.600
	Covariance	1.056	1.259	1.056	1.259
	N	65	65	65	65
Automated support (IV 3)	Pearson Correlation	.812**	1.000**	.812**	1
	Sig. (2-tailed)	.000	.000	.000	
	Sum of Squares and Cross-products	80.600	145.600	80.600	145.600
	Covariance	1.259	2.275	1.259	2.275
	N	65	65	65	65

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

Table 8: Pearson correlation analysis
(Source: Primary data collected from SPSS)

Interconnected strength between variables can be seen though the correlation formed in Table 8. Pearson correlation tests have been conducted to understand the strength of correlation and thus, if the values are more than 0.8, a storing correlation can be seen to be formed.

Discussion

The information that is analyzed using a process known as regression analysis can be of assistance in comprehending the connection that exists between the variables that were generated in this study. The method in which technology is leading to a

transformation in education is demonstrated by the relationship between the flexibility of learning and the feature of learning in which students learn at their own pace. According to Carballo-Fazanes et al. 2020, the post-pandemic age has seen a continued widespread acceptance of technology-based learning procedures that were initially implemented in the context of pandemic events in the year 2020. The use of technology-based learning has made it simpler for students to communicate with their peers and mentors, and flexible learning has made it possible for students to gather information at their own pace and gather it whenever it is most convenient for them. Nevertheless,

the challenges can also be observed in the fact that a lack of understanding of technological issues might be a barrier to successful adoption (Wiederhold, 20200). It is possible for security threats to increase when there is a lack of understanding to handle sensitive information. To ensure that pupils are able to make effective use of it and achieve success in academic subjects, appropriate mitigation techniques can be of great assistance.

Conclusion

In this study, components about the transformation of the educational system through the use of technology that assisted students in learning at their own pace in a tailored learning process have been added. The information that pertains to the subject has been gathered through the primary quantitative approach, which assists in the collection of real-time information from sixty-five participants. In an efficient manner, the generation of valuable statistical information is facilitated by the analysis of the information. By providing students with learning resources that are simple to access and save, learning platforms and the internet have been able to assist students in achieving academic success.

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