A Multivariate Analysis of Technology and Education in the 21st Century: Antecedents and Determinants

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16 October 2022

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Abstract

Globally, educational systems are undergoing a restructuring in which emerging technologies and information sciences will play a significant role. Education will undergo the most significant changes in over a century as a result of new technology and mobile devices with cutting-edge capabilities. As emerging technologies continue to advance, mobile learning methods are becoming increasingly popular. Literature reviews conducted by the author indicate that as this field of study continues to develop, more and more researchers are investigating how technology impacts learning, how it influences teaching methods, and how teachers are evaluated. Further, this paper examines the educational benefits of using technology to facilitate independent learning. Technology is helping to facilitate a fundamental rethinking of what should be taught and how it should be taught rather than serving as an adjunct to learning and teaching. An undertaking of this magnitude represents both an exciting opportunity and a serious responsibility. In an effort to meet this challenge, this article examines several key antecedents and determinants associated with education and technology. A number of terms have been integrated into the educational field of vision in recent years, including portal connectivity, artificial intelligence, big data, machine learning, mobile technologies, and intelligent learning patterns. Consequently, society and education have undergone unprecedented changes. Consequently, the use of technology in education is likely to follow a hockey stick pattern, according to the author's research. In simple terms, in light of the rapid development of technology in the field of education, the way in which knowledge is delivered and the capability to learn new things will undergo a great deal of change.

Keywords: Technology, Information Technology, Integrated learning, Technology and Education, ICT- Enabled Education

Introduction

Technologies and products of today have an increasing degree of interdisciplinary, which makes it difficult, in many educational fields, to maintain all necessary skills in-house, including core activities. In order to remain competitive, many educational organizations are leveraging their in-house competencies with external resources in order to stay at the forefront of their key technologies. There appears to be an increase in the need to acquire external technologies as the number of component technologies increases (Granstrand and Sjolander, 1990; Granstrand et al., 1992). During extreme cases of complexity, networks of specialist developers may be formed to serve organizations that specialize in the integration of educational systems and the customization of learning materials. According to Tiwari (2022) the advancement of emerging technologies will increasingly have an impact on knowledge sharing in education, and it is imperative that educational organizations utilize their unique core competencies to deal with the technology explosion. An emerging technology can be thought of as a technology that can perform tasks and activities that are normally performed by humans but can be accomplished by computer systems. Educators are finding it increasingly easier to do their jobs as a result of the use of this technology in schools and classrooms. However, despite the positive aspects of these emerging technologies, there are still many educators who are concerned about the impact these technologies will have on the field of education in the future. In terms of how it will affect the attainment gap, democratizing education, or closing the achievement gap, what impact will it have?

Aldridge (1990) examined technology management and found fundamental issues for engineering education, as a result of the use of emerging technology, teachers, professors, and other educators are able to make sure that their teaching materials are accessible to a broad audience. This can be attributed to the fact that pupils are given a variety of opportunities through such progressive steps which allows them to learn without limitations. The benefit of universal access to study materials is that, for example, if a student is ill or stuck at home due to weather conditions, he or she can complete their studies regardless of whether they are in school or not. There is no denying that language barriers can make it difficult for students who speak multiple languages to understand teachers who speak a different language from their own. In order to make the material more accessible to students, technology can be used to translate it.

Consequently, instructors and students are able to collaborate and discuss more effectively as a result of this.

There is no doubt that technology plays an important and pervasive role in the lives of many of us in today's world as well as in how we live our daily lives in the modern world. Technology plays an important role in the development of a society that is perceived to be efficient and economically successful because of the use of technology. Throughout the recent development of technologies, a number of features have been introduced to education which have been assimilated into this field as a result of the recent development of technologies. Educators have used technology in a variety of contexts and applications, especially in a variety of different settings, in order to enhance learning and teaching. Tiwari (2008) published a study that noted how information and communication technologies are becoming increasingly integrated into everyday life in a wide range of fields and contexts across a wide range of industries and professions across a wide range of fields and contexts. The use of ICTs is widespread across a range of industries and professions across a wide range of contexts and applications. Nowadays, it is widely accepted that the development of technology has led to a change in teaching methodologies, a change in learning approaches, and a change in the accessibility to information that has led to a change in the way in which information is imparted. In addition to this, the author of this article also indicates that he strongly prefers the use of bridles to be placed on the horse. Watson (2001) has argued that in the 21st century, there are two needs: a need for knowledge as well as a need for answers. The key to the future of education lies in the knowledge that we have about it! The nature of learning and teaching must be taken into consideration by policies in order to be effective in achieving such knowledge. Thus, a more holistic view of how to improve education will emerge, as well as a clearer picture of the kinds of changes that will be needed in education, as well as the benchmarks that we will place on both education and technology to reach the goals we have set.

With the advent of technology, it has become increasingly important to enhance education, develop digital literacy and 21st century skills, such as critical thinking, problem solving, collaboration, communication, and information literacy, in order to prepare students for the future. In the education sector, technology can be used to impart these skills more effectively.

It is certainly possible to use pedagogical models within education institutions, but this must be done in a productive manner in order to be effective. In common with great leaders and entrepreneurs, great educational organizations share the ability to exchange knowledge and wisdom among faculty members, students, and the surrounding community. As a result of the variety of ways individuals and groups communicate a decision, technology-enhanced communication in the educational sector has never been more challenging or complex than it is today. In order to effectively disseminate knowledge in educational organizations, it is essential to consider both the prerequisites and the consequences of using technology.

During the past decade, the entire educational landscape has undergone a profound change as a result of the rapid advancement of digital technology and internet access. A whole new world of education will be created through the use of innovations such as artificial intelligence, which will be powered by technology. Furthermore, digital technology can also be utilized in order to enhance the quality of communication and collaboration between students. It is important to understand that instructors can engage learners in their classes, but students may also interact with each other during classes. It is important for students to work together in order to solve problems even when they are taking online lessons. When students are working together in a collaborative session, they may use digital devices to share their thoughts, ideas, and support with each other. As a result of the use of educational technology, students are able to interact with their teachers and instructors in a way that is comparable to interacting in person.

Combining emerging technologies with traditional teaching methods

In addition to the old legacy systems of teaching, the new technology-powered education world has had a significant impact on them. The sharing of knowledge can take a variety of forms, including between and within cultures, and within social organizations, where there are many ways in which knowledge can be shared. Every level of development and exchange of knowledge is possible, from the local to the global, from the poor to the wealthy. It is possible to develop and exchange knowledge anywhere in the world, no matter where one is located. We live in a society where knowledge, as well as the exchange of knowledge, is an integral part of the way we live, whether we're thinking about government, citizen engagement, or economic development. Society will develop and exchange knowledge unrestrainedly, unstoppably, and

unrelentingly throughout the coming years, resulting in a knowledge-based society capable of coping with changes in development. Development and exchange of knowledge are part of the reform process that is designed to ensure that marginalized and underprivileged groups are also included. Social media has emerged as one of the best methods of knowledge development and knowledge exchange due to the advent of emerging technologies. Technology has made it possible to develop knowledge thanks to its advent. Through the introduction of new technologies, new methods have been developed for disseminating and retrieving knowledge efficiently, as well as for creating and exchanging instantaneous knowledge, leading to a variety of new business opportunities spawned by knowledge management and new educational practices, and new ways to develop and exchange instant knowledge.

Methodology

To conduct this study, 250 individuals from a cross-section of the education and technology sectors were surveyed, and a wide range of questions were asked to them as part of the survey. Over the course of this project, the author conducted a series of surveys in order to be able to examine how academics make sense of their own explanations and motivations for changing their practices in relation to those changes. An effort was made by the author to determine how people interpret the changes to their practices that result from our findings, so a series of surveys was conducted in order to achieve this goal. Participants were asked to participate in a survey to assess their attitudes towards institutional policy, technology, and their perceived utility for themselves and their teaching, as well as their expectation of how technology will affect them before implementation and their understanding of its impact. The impact it has on technology and education. Following the implementation process, a survey was conducted to determine whether previous expectations had been met. Upon the formation of these opinions, a comparison was made between them and those that had developed after the implementation began.

Technology has had a significant impact on education, and it has played an important role in many different areas. Respondents were asked to rate the questionnaire on a five-point Likert scale, ranging from 5 points (strongly agree) to 1 point (strongly disagree), using a five-point Likert scale. According to the scale above, respondents were asked to indicate their level of

agreement with the statement. The validity of the measuring questions was determined by using Cronbach's Alpha as a tool to calculate the validity of the measuring questions. In accordance with the calculation performed by SPSS for the 'Reliability Statistics', the Cronbach's Alpha value of the 20 items in the 'Multivariate Analysis of Technology and Education in the 21st Century: Antecedents and Determinants' questionnaire is .932. Based on this result, it can be concluded that the data is reliable and suitable for further analysis. In this case, the value is significantly higher than a value of '.6', which is well above the minimum value.

Reliability Test:

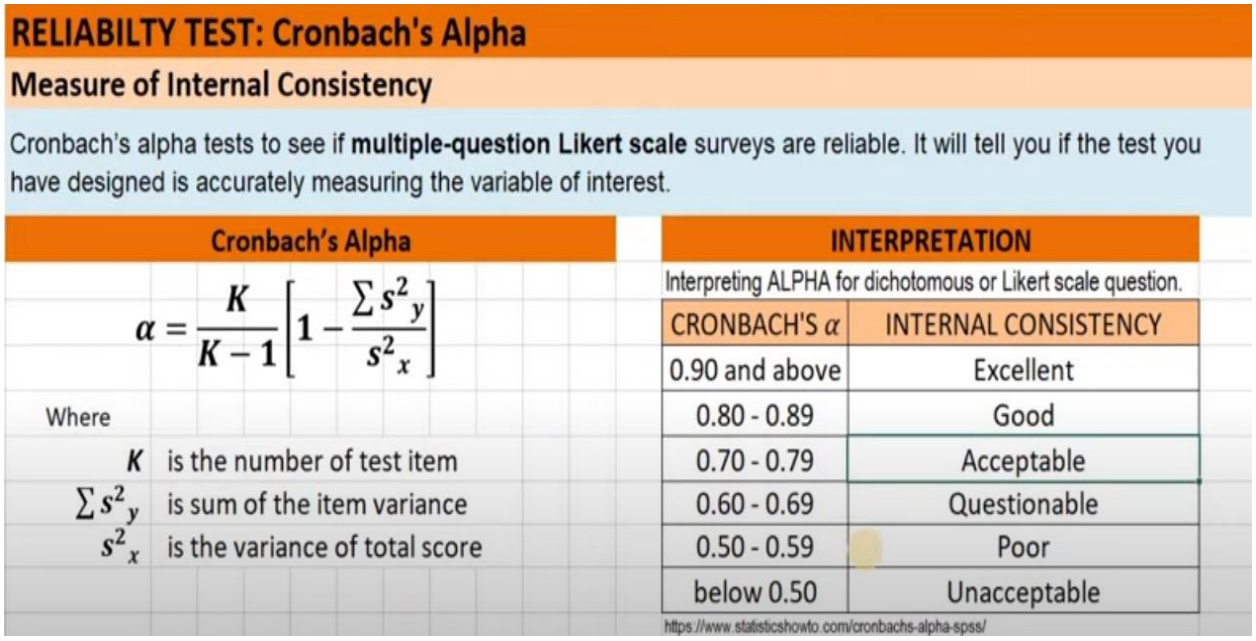

Table - Reliability Statistics

Cronbach's Alpha	N of Items
.932	20

Data Collection

1. **Primary data:** The following primary data was collected from the samples selected

through the use of a questionnaire consisting of 20 questions which was asked from the participants closely associated with the education and technology sectors.

2. Linear Regression: To further prove or disprove the relationship between technology and education, the former was considered an Independent Variable and the latter as a Dependent Variable, a simple linear method, a statistical method, was implemented to establish the relationship between the two variables . The data received from the questionnaire designed as well as the analysis on Excel has helped in showing a general flow of the points based on the X axis and the Y axis, where (y = mx+c) indicates a positive trend, and the points are close together, which is indicative of a strong and positive correlation between technology and education, as demonstrated by the regression line where the y intercept is 0.004 and the m intercept is 0.378. The Slope where a slope is the measure of the steepness of a straight line (Change in y / change in x, for any two points on the line) & Regression Square is .127.

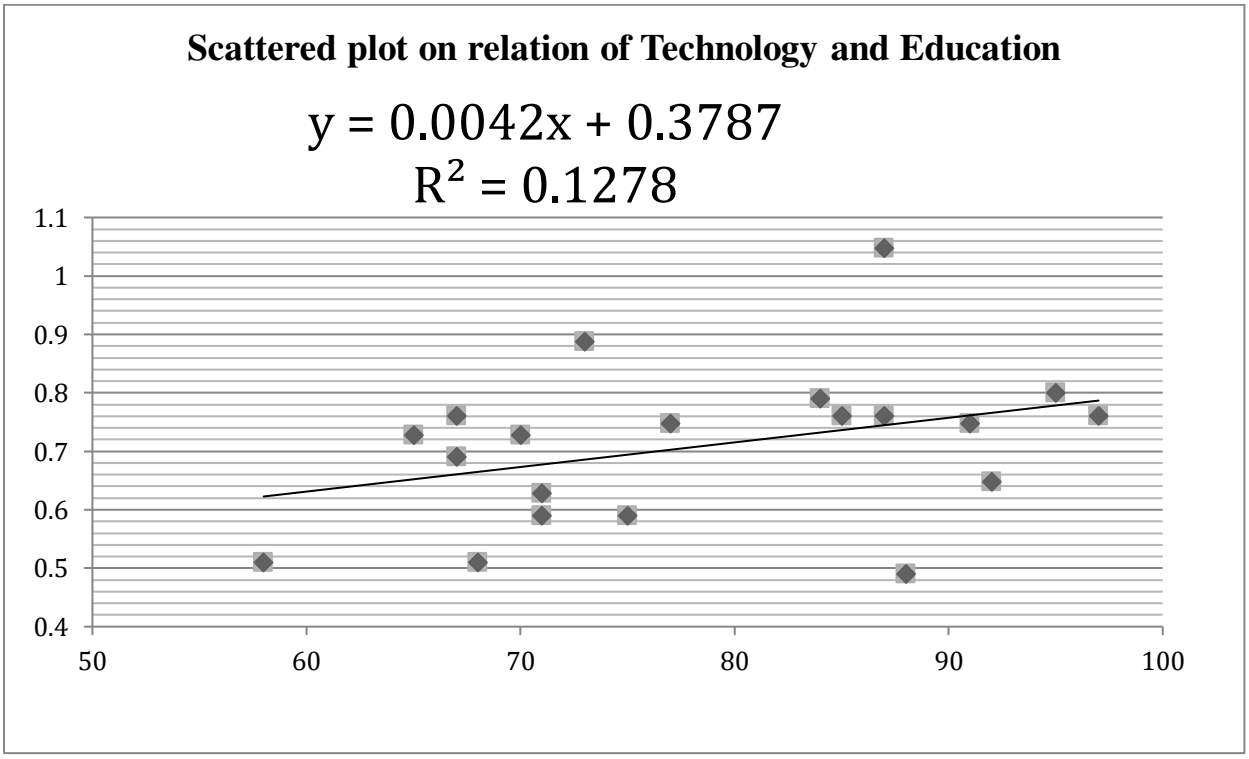

Fig – Linear Regression

Results and Discussion

1. As a result of the study's determination of the relationship between technology and education, it has been concluded that technology and education have been and must be incorporated together in order for the content of a lecture to be effectively communicated, which is inevitable given that the use of technology could easily be utilized to convey that content.
2. Historically, there have always been challenges in the education sector when it comes to instruction that was a part of the integration of education, but on the other hand, the incorporation of technology has enabled students to gain a deeper understanding with the help of technology.
3. Technology is being used in education to assist students in finding information quickly and accurately. Traditional textbooks are being partially replaced in the classroom by e-books and search engines. As opposed to hiring personal tutors, students are increasingly able to contact one-to-one tutors via educational videos - anytime and anywhere - and massive open online courses. By providing students with an understanding of how these continuous learning tools can be utilized in the future, they will be better prepared for academic success.
4. In addition to their use of technology in the classroom, students use it in a number of other aspects of their lives as well. Learning can be made more fun and exciting by using technology within the classroom. The advent of game-based learning (GBL) over the past few years has allowed instructors to deliver lessons using interactive games and leader-boards as a way of delivering lessons. The use of technology can be used to gather feedback and to critically assess the impact of these gamification efforts, ensuring that you can move beyond anecdotal evidence and can honestly assess how effective these new tools are. This is an excellent example of organizational agility at work when it comes to keeping track of these efforts.
5. To succeed in the 21st century workplace, students must possess more than just an understanding of certain technological tools if they are to become successful professionals. Some of these tools include cloud-based tools, mobile applications, video conferencing, electronic whiteboards, and others. Education institutions are incorporating these technologies into their regular educational curriculum and on-going activities to ensure that their students are better prepared for the modern workplace.

6. As a result of the advent of modern technology, a multitude of home-based learning strategies are now available in the education sector. These strategies can be compared to the lecture-based approach that is usually used in face-to-face settings in the classroom. Instead of using technology to mimic traditional instructional methods, the focus should be on harnessing its power to transform pedagogy. To accomplish this, new ways of teaching and learning can be developed that facilitate new kinds of interactions or learning outcomes not previously possible without the use of technology in the classroom. Education researchers are currently exploring the knowledge building approach as a transformative strategy, which can be viewed as an example.
7. An educationist in the author's survey highlighted the below example, which contributed significantly to the paper's results and discussion. Using technology to support the whole learning process in the educational sector means capturing students' ideas over time and making their collaborative knowledge construction process visible. Analytics are available on the backend of this platform for analyzing the learning data of students. Using a click of the button, it is possible to create word clouds that reflect the keywords they have used and their frequency of usage over time. Moreover, using the inbuilt analytics, the teacher is able to monitor the key concepts and ideas being explored and provide the necessary intervention or guidance as necessary.
8. When it comes to transforming education through technology, the human-computer partnership is one of the most noteworthy characteristics. Using technology in education is not what will duplicate the best human instructor, but instead facilitate collaboration among students to improve ideas and make their learning visible in order for students to understand their progress in learning along with the number of ideas they have developed. Through the use of technology, students are able to participate in active learning instead of passive learning. The main objective is not to learn about technology or to learn from technology, but rather how to use it effectively. Overall, it entails leveraging technology in the education sector in order to enhance our ability to learn and perform on a physical, cognitive, and a social level in an effort to enhance our learning and performing capacity.

Conclusion

As a whole, the educational community must recognize that these new technologies, as well as their instrumentalities, will have a significant impact on future generations. The impact of these new technologies on future generations has not been fully considered in our assessment of their impact on the user community. In fact, the broader educational community has not even considered this particular issue. Educators have not yet been able to conduct a comprehensive study of this phenomenon, according to the author of this article. Many educational institutions involved in new emerging technologies have attempted to reduce risks by restricting the types of machines that can be used to perform machine learning algorithms. Therefore, this method has proven to be very effective in reducing risks.

Through the use of technology, students are able to visualize events in a way that allows them to create learning that will last and widen the learning curve by making it easier for them to recall the lessons that have been taught and give them a chance to reinforce them. Through the introduction of technology in a learning environment, students will be able to cater to the different interests and expectations of each and every one of them. Thus, technologically based education will provide a variety of learning environments for students as a result. There is no doubt that this research will assist the teachers of the future in keeping up with the rapidly developing and changing world, and in guiding them in raising qualified individuals who are knowledgeable and aware. The fact that we fail to take advantage of the technological advancements in our times in the field of education is analogous to the fact that we stop our technological progress as a civilization in its tracks.

The author concludes by stating that based on the results of his research, it is forecasted that technology and education will be integrated in the most effective way possible in order to achieve maximum results.

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