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Facilitating Factors And Barriers Of Technological Innovations In Education Field Of Pakistan

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Abstract:

New innovations in the field of technology have a significant effect on education system at all level. Technologies like online classes, educational software, social networking tools and digital teaching aids are disrupting traditional classroom environment in Pakistan. Basic stakeholders of education field like learners and teachers are highly encouraged to search, explore, and use all new technological innovations to discover new ideas and find out new ways. In current study researcher explored that how much these technological innovations are supportive in process of learning and education and how can we utilize these innovations in improved way. Objectives of the study was to outline the technological innovations in education field of Pakistan and to highlight the barriers and facilitating factors towards technological innovations. Present research work adopts quantitative methodology and survey research method.

Constituted the population of study students of federal area universities. 3 universities (50,000 students) were taken as a population of the study. Study sample was 20% of total population. Sample was taken through simple random sampling, lay under probability sampling techniques. The data were collected through closed-ended survey questionnaires. I end up highlighting that technological innovations effect the process of learning positively as well as negatively. Findings of study also shows that through the use of technologies in educational institutions, the things can be changed. Research also highlighted that proper training is needed about the use of technology. Based on findings researcher recommend that trainings sessions should be arranged for students and teachers to trained them about the use of technology.

Key words: *Technology, Innovations, Education, Pakistan, Barriers, Facilitating Factors.*

1. Introduction

1.1 Technology in Pakistan

Now-a-days technology alternate our lifestyles, our culture, and traditions also. World become a global village due to technological innovations. We can see billions of people who are always connected by mobile devices with ultimate processing power,[1] massive storage capacity, and access to knowledge are really unlimited. We can surely say this change in technology is a

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'Fourth Revolution '(Bernaert, 2017). We can realize a technological change in every sphere of life but a change in information communication technology is rigorous. In short, technology and its impact on the social, economic, and individual growth is now very interesting for many researchers (Moomal & Masrom, 2015).

Developing countries due to their not so good economic and social situations will be uncomfortable to pick for such extreme change in technology. As per ITU (International Telecommunications Union, 2017), it is necessary to bridge a gap between developing and developed countries. Developing countries cannot grow immediate state of the art new technologies. Hereafter International Technology transfer (ITT) is critical for social infrastructure and economic growth of developing countries. The existing situation of ICT Sector in Pakistan which is also a developing country is that Pakistan Telecommunication Authority-PTA (Government of Pakistan agency whose responsibility is to establish, operate and maintain Telecommunications in Pakistan) announced that in December 2017 Broadband subscribers in the country are about 49 million which are more than 18 times since 2006 and 142 Million mobile phone subscriber. However, the total population of Pakistan is 211.819 Million.

Availability of modern technology in Pakistan is a serious issue. There are not only issues concerning to availability of up-to-date technology but also many barriers persist in the application of technology in Pakistani society. This is not an issue relating to Pakistan but more and less several developing countries are facing barriers in implementation of technological innovations. Barriers in technology integration are Intrinsic and Extrinsic, whereas intrinsic barriers are easy to overcome if extrinsic barriers have been controlled effectively. Developed countries successfully achieving the goals of providing quality education with the successful implementation of technological innovations in the education sector and learning process. He has further pointed out the some barriers in developing countries like poor governance, over-crowded classrooms, requirement of large capital investment, provisioning of expertise and resources relating to technology, the medium of instruction and courses in the education sector and improper or no action plan (Salam, Zeng, & Pathan, 2018). Innovative educational technologies are involved with resources, process, organizations, ideas, thoughts, devices, instruments, or machines which enable and facilitate the teaching learning process and make it more successful, effective, and memorable. According to Tomei (2002), "Educational technologies are the combination of those instructional, development, managerial and other technologies which are used particularly to find out the solution of educational problems".

2. Literature Review

2.1 Barriers of proper transfer of technology in Pakistan

It is necessary to identify the barriers in the proper implementation of technology in education sector of Pakistan. Such facilities cannot be created without identification of dominant hurdles in inter-organizational knowledge transfer (Aghdasi, Bazrafshan, & Ranjbarfard, 2015). Adaptation of new technologies is a very important factor for the organizations so to improve and maintain their competitive position in the market. There are some classifications of barriers identified by Mazurkiewicz and Poteralska (2017). The first one is technical natured barriers; second one is system-oriented barriers and the last one is organizational and legal natured barriers. Each issue in transfer of technology in R&D should be handled separately as they can be involving with infrastructure, human beings or institution related (Mazurkiewicz & Poteralska, 2017). Procurement options, cultural barriers and language barrier are some more barriers mentioned by Kang, Arefi, Goh and Song (2015).

A successful transformation of technology is questionable in Pakistan. There are some organizational barriers faced by ICT operators in Pakistan. The most important barrier is attitude problem like responsibility escaping, a delegation of responsibilities, resignation, and

conflicts in responsibility matrices of transferor and transferee. Another barrier is presence of individual and organizational cultural barriers as Technology has to be transferred from other countries. Existence of several types of organizations like private, public and semi government etc., severe communication gap effects transmission of knowledge activities. Technological organizations in Pakistan have seriously realized these situations and found some solutions to handle them like hiring of consultants and proper utilization of government funds.

2.2 Educational Technologies

Educational technologies are the combination of those instructional, development, managerial and other technologies which are used particularly to fine out the solutions of educational problems (Tomei, 2002). Educational technology is a complex process, it contains with various things like devices, people, institutional design, ideas, evaluation and managing solutions to those problems which involve in all aspects of human learning (AECT, 1977). According to sharma & sharma (2006) "it is a system in education which is the combination of diverse things like machines, materials, media, men and methods working together to attain specific educational objectives".

2.3 Barriers of technological innovations in education sector of Pakistan

There are many barriers of technological innovations in the education sector of Pakistan. We are going to describe some of them:

- **Deficiency of skills and training**

Teachers perform a vital and critical role in assimilating technology in teaching learning process so, it is very important for teachers to have practice about the use of technology and should have skills to take benefit from the technology successfully. Those teachers are very important who are competent and skillful in utilizing and managing educational technology. The learners and teachers both should be competent in using educational technological innovations. Some research studies highlighted that teachers who are formally trained for the appropriate use of technology for instructional purpose, they have succeeded to bring significant progresses in the student's achievement. It was also highlighted that upgrading in student's achievements was connected with the teacher's training in the proper use of technological innovations.

According to the above discussion, it is concluded that skills and training are important and central elements for the effective integration of the technological innovations in teaching and learning process. So, it is requirement of time to introduce technology in pre-service teacher's training programs. In this way, competent and trained teachers will be produced, and our educational standard will also be enhanced and raised.

- **Load shedding**

Load shedding is a major problem in Pakistan. This problem is proved as damaging element in almost all lifestyles which have affected a development of nation. Because of this barrier it is not possible to use technology in classroom presentation as well as it is also not possible to continue online classes fluently. Most of the teachers do not prefer to use technological innovations due to frequent load shedding and breakdown. Effective integration of technological innovations in education field needs proper training; electricity; technical and administrative support; availability of technologies and other things. The proper usage of technologies depends upon the satisfactory environment of classroom.

Electricity it is the main problem and barrier in the way of technologies integration in Pakistan. Thus, it is authoritative to manage alternative source of energy to ensure and maximize the utilization of existing technologies in teaching learning process in order to ensure effective and successful teaching learning process.

- **Non-availability of technology**

Non-availability of technology is an important factor in dropping the use of technology by teachers in their teaching process (Mumtaz, 2000). Effective integration of technology generally depends upon its accessibility. Some research studies conclude that non-availability of technologies is the main barrier in technology integration in classroom. Additionally, some more research findings suggest that technologies are widely under-used by teachers and learners because of inaccessibility and non-availability of resources in schools and other educational institutions (Veen, 1993; Byard, 1995, Wild, 1996).
In short, it is essential to ensure the availability of technological innovations.

- **Need of technical support**

Mostly educational institutions do not have proper technical support and they face technical maintenance issues. Due to technical maintenance issue, there is always a chance of technical breakdown. In present research mostly participants responded that improper technical maintenance is a major barrier of using technology in teaching learning process. Present study also shows that in some countries, schools have recognized the importance of technical support to help teachers.

- **Absence of rewards and incentives**

Those teachers would improve integration of technology in education field, who are recognized and rewarded (Hope, 1997). Hope further highlighted some ways to encourage teachers about the use of technology in classrooms:

- Teachers should be appreciated for using technology.
- The teachers should be provided several configurations of technology for their use.
- Teachers should be provided and paid stipend to discover educational computing and appropriate technologies.
- Set aside time during the workday for teachers to explore computers and related technology.
- Technology role models should be provided for teachers.

Lake of incentives for teachers who spend their time to integrate technology in their classes have seriously affect the readiness of teachers to use technology in classrooms during teaching learning process.

2.4 Facilitating factors of technological innovations in education field of Pakistan

In the comparison of traditional education system of Pakistan with modern education system (which involved with new technological innovations) we get to know that modern education system is much effective and helpful. In last era, latest technology has additionally started to evolve into educational system around the world. Technology is recognized as a productive tool that transforms education (Chigona, 2015). IT laptops, mobiles and other devices bringing a rapid change in education sector (Daniel, 1996). From WhatsApp groups to biometric fingerprint systems, innovative technology has facilitated with building and restoring schools and improving teacher maintenance in isolated regions. Here we are going to describe some of the facilitating factors of technology in education field:

- **Monitoring of schools through technology**

Now a day's technology can be used to support management and ensure accountability in the education system. In most areas, schools have apps keep track of teacher attendance, recording when teachers are within a certain geo-radius of the school; they work offline in more remote areas, uploading information when there is network access. Fingerprint-based biometric and photograph systems supported by GPS coordinates are also able to track teaching hours.

- **Innovative technologies support results**

Technology has changed the education landscape. Technological innovation creates opportunities for learners, teachers, and other educational stakeholders. Technological innovations play a gradually prominent part in the growth of education system in almost all over the country. These innovations help students to connect with teachers all the time as well as they can get new ideas and latest thoughts, this thing indirectly have positive impact on the results and learner's achievements.

- **Innovative tools to transform the class**

In classrooms with very diverse students, how can teachers consider each individual student's requirements and help all children develop to their full potential? In this situation innovative tools offer a great chance to adapt instruction to each student and free up teachers' time for individual support. Digital devices can enable adaptive teaching, as they are a helpful resource for tailoring instruction to individual learners.

- **Role of WhatsApp groups and other online apps**

The first step consists of creating WhatsApp groups which consists on students, teachers and maybe mothers or guardian. Supporting learners with a mobile app is sometimes of no account, an only message of Good Luck, right before the exams might increase student's strength. Through video calling face to face communication is build up after school hours.
Some of the digitalized tendencies in the education sector of Pakistan are as follow:

- **Video based learning**

Video based learning makes education exploring, entertaining, and engaging. So, it is gaining fame among scholars to understand tough topics and concepts by using videos interfaces. Many higher education institutions in Pakistan are offering facilities of online courses.

- **WI-FI accessibility**

Some of the private institutions are providing Wi-Fi facilities in all of their departments, this thing helps learners to collect information from the internet in order to do their assignments and group studies. Government and private sector have taken some worthy initiative to support digital learning in Pakistan.

- **Educational apps on devices**

Several educational apps are also presented in smart gadgets that help students to understand and get knowledge more effortlessly. Scribd, Google reads, Evernote, to-do-ist are few examples of such apps.

- **E-books**

Gaining information and knowledge by using e-books is very common now-a-days. Learners can access any kind of book or research paper by any author around instead of searching books in libraries.

- **Increasing trend of digital classrooms**

Now a day's almost all learners are encouraged to use facilities of internet and gain mandatory detailed knowledge of topics instead of learning bookish material only. In Pakistan, most of the private universities and schools are making their classrooms digital. The smart classrooms are helpful in improving the level of understanding on part of students.

2.5 Objectives of the Study

- To outline the technological innovations in education field of Pakistan.

- To highlight the barriers and facilitating factors towards technological innovations.

3. Methodology

The methodological techniques and ways of analyzing the observations play a significant role in social research. Social research is a systematic method of discovering new facts, or verifying old facts, their sequences, interrelationship, casual explanation, and the natural laws which govern them. Scientific methodology is a system of clear rules and procedures upon which research is based and against which the claims for knowledge and evaluated.

The main objective of this chapter is to describe tools and techniques involved with the collection, analysis, and interpretation of the data, concerning to present topic under study.

3.1 Research Design

Present research work adopts quantitative methodology and survey research method.

3.2 Population of the Study

3 universities of Islamabad (50,000 students) were taken as a population of the study.

Universities	**No of Students**
IIUI	28,000 to 30,000
NUML	18,000
NUST	16062
TOTAL	62,062 (We take approximately 50,000 0f total population)

3.3 Sample of the Study

Study sample was 20% of total population**.**

3.4 Sampling Technique

Sample was taken through simple random sampling, lay under probability sampling techniques.

3.5 Instrumentation

The data were collected through closed-ended Likert-scale survey questionnaires. A Likert scale questionnaire was categorized into 3 major section based on already developed themes, themes involve with educational innovations, facilitating factors and barriers of these educational innovations in education field of Pakistan.

3.6 Validity and Reliability of Instrument

For checking the validity of questionnaire content validity and face validity was determined based on experts' opinion. Instrument was discussed with some experts of research and according to their opinion required amendments were made.

3.7 Data Collection

Researcher personally visited to all sampled respondents for data collection. Researcher handed over questionnaires to all sample respondents and discuss the basic purpose of the study.

3.8 Data Analysis

Excel is used for analysis of data. Frequency distribution is calculated against each question.

4. Results and Discussion

- A massive majority (71%) took the education sector of Pakistan as developed and 29% of respondents did not take the education of Pakistan as developed one.
- 74% of the participants agreed that innovative technologies are very important for educational development of a country and rest of the participants (26%) said that technology is not much important for the educational development. So, most of the participants believed that technology is important for the improvement of education sector.
- 39% participants were said that Pakistan had satisfactory level of technology, while 61% respondents disagreed with this statement, they elaborate that Pakistan had not sufficient level of technology for education development.
- 55% of the respondents agreed that Pakistan had the use of technology in education sector and the rest of participants (45%) disagreed, they said that Pakistan had not enough use of technology in education sector.
- Majority of participants (78%) illustrate that less economical resources became barriers in the proper usage of innovative technologies in education field of Pakistan, while some of the participants (21%) were disagreed with this statement.
- 66% respondents agreed that technology facilitate the educational stakeholders and rest of the 36% described that technology is not much helpful in education sector.
- Almost 69% participants said that educational institutions of Pakistan are getting benefits from innovative technologies while 31% of the total population said that Pakistani educational institutions are not getting benefits from the innovative technologies.
- 75% participants agreed that development of education sector depends on proper usage of technology and only 25% participants of the total population disagreed, they said that educational development do not depends on innovative technologies.
- 54% respondents describe that adaptation of technology in necessary for the success of a nation, while 46% respondents said that adaptation of technology is not necessary for the success of a nation.
- 55% respondents use technologies like mobile phones, laptops, tablets, and other gadgets in the education and learning process while rest of the 45% participants do not use the technologies.
- 42% participants are research students and they use google scholar and google for the research purposes and the other 58% also use google scholar for the educational purpose.
- A majority (55 %) of the respondents are in favor that level of innovative technology should be advanced in the Pakistani educational institutions, some of the respondents (25%) said that level of innovative technology should be traditional while remaining 20% of the respondents said that innovative technology level in economic institutions should be simple.
- 79% participants agreed that innovative technology facilitate in online education, and remaining 21% do not agreed with this concept, they said that innovative technology is not an easy way for education.
- 74% of the total respondents said that technology is helpful in continuous learning process and rest of the 26% respondents were disagreed, they said that technology is not easily accessible for everyone.
- 70% of the participants believed that there is a relationship between innovative technology and educational sector to great extent and only 7% believed that there is no relationship between innovative technology and educational sector, rest of the 23% were remain natural.
- 62% respondents said that technology helps students to improve their knowledge while 38% respondents were disagreed with this concept, they said that technology is not helpful for students to improve their knowledge skills.
- Almost 60% respondents agreed that due to innovative technologies, students produce better results while remaining 40% do not agreed and said that student's results do not depends on innovative technologies.

Educational institutions can provide a creative environment for students to learn about innovative technology. Innovative technology holds great potential for transforming our thinking and learning. It allows learners to create and test knowledge, provide immediate access to information, extend the communications network, and expedite new forms of creative expressions.

It is decided that innovative technologies are very important now days almost in every field of life and it plays a key role in the education sector. Country will remain underdeveloped without proper usage of technology. Adaptation of innovative technology techniques are very necessary to promote education sector. There is a strong relationship between education sector and technology, especially it is very important for underdeveloped countries like Pakistan, that they use technology for their educational development. Innovative and communication technologies (ICTs) are powerful tools for empowerment and income generation in developing countries.

Results of the present study clearly shows that proper utilization of technological innovations is very important in the development of education sector, improvement of education sector depends on technological innovations. It is not sufficient to prepare learners with just the basics of education that is required in their field. The challenge is to provide the students with skills and knowledge that is required to leverage technology effectively in the workplace, to enable them to compete successfully in the today's global market and also to become independent.

5. Conclusion and Recommendations

5.1 Conclusion

The main finding of the present study that availability and usage of innovative technology is very important to develop the educational competence of students. Technology facilitate the education sector of Pakistan; it can be very helpful if it is used properly and effectively. Availability of innovative technology in education sector of Pakistan is supportive for the students to improve their learning skills. Modern technologies are accommodating students to prepare their projects and assignments. Results also shows that technological innovations can helpful to produce the creative knowledge of students relate to their studies. Students were agreed that technology provide vast knowledge to students through digital libraries and internet, so it can helpful to improve the education competence at local, regional, and national level. Findings of current study suggested that more the availability and practice of innovative technology in education sector will increase, then as a result more the competence of students will increase. After analyzing all the results, we conclude that innovative technologies bring a positive impact on Education sector of Pakistan. It is also concluded that there is need to improve the technology usage and train the students and teachers about the proper use of technology, it is also needed to provide technological resources, after that is can be very helpful in the development of education sector.

Pakistan is far behind in the integration process and a poor development regarding innovative technology is observed. There are several barriers in the effective integration of technology in the education field. The study was carried out to explore these barriers as well as the facilitating factors and positive aspects of innovative technologies. Present study also come up with possible solutions so that process of technology integration may be more benefited. Most of the respondents confirmed that appropriate utilization of technology is beneficial, result oriented and valuable for the overall progress and development of the education sector. Participants of the study mainly confirmed the existence of barriers at many levels of teaching and learning process.

5.2 Recommendations

Based on the findings and discussion, few recommendations are offered. Upcoming research is required to confirm the effectiveness of the following recommendations and to recognize other significant ones:

- Use of technology should be made compulsory at certain occasions.
- Awareness workshops maybe launched followed by frequent presentations and demonstrations with schools, students, and teachers.
- Teachers who integrated technology in their classrooms should be supported.
- Teachers should act as role models for students by using innovative technologies in their courses.
- Skilled persons maybe hired for the training sessions about the use of technology.
- Technical and monetary support should be provided to institutions.
- Educational institutions head should be trained on the basis of teaching with technology.
- Motivational sittings should be conducted for educational institutions heads, teachers, and students.
- Examination system may be made more interactive so that it can encourage usage of innovative technology.
- Financial support from Govt. is very necessary and can make the difference which should be provided to institutions.
- Better internet connections should be provided.
- Alternative energy or UPS in labs should be provided.
- At least one desktop computer with internet access should be provided in every classroom.
- More time maybe assigned for technology integrated classes.
- Steps should be taken by Govt. to reduce the barriers in technological innovations in education field of Pakistan.
- More cooperative learning environment maybe developed.
- E-based projects and assignments should be chosen instead of paper-based assignments.
- Course contents should be reformed to gain more benefits from innovative technologies.
- Websites and students' portals for sharing ideas and thoughts should be created.

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