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A Comparative Study of Public and Private University Faculty about the Utilization of Innovative Instructional Strategies with the Use of Technology in Teacher Education

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Abstract

The current research study aimed to compare the usage of technology in the classroom environment, of public and private sector university faculty regarding innovative instructional strategies concerning the technology used at the university level in teacher education programs. A quantitative study was conducted to investigate the perception of faculty regarding using technology in the classroom. The population of the study was all the public and private sector university faculty, especially in teacher education programs of the Punjab province, Pakistan. In addition, 10 public and 10 private universities, offering teacher education programs, were taken as samples randomly. The study sample comprised 202 faculty members, including 144(70.3 %) from public sector universities and 58(28.7 %) from private sector universities. These faculty members specifically teach the education department. A self-developed questionnaire Likert-type survey having five options, agree, disagree, undecided, strongly agree, and strongly disagree was used to collect quantitative data. The alpha reliability usability of technology was 0.78. To compare the difference between private and public sector teachers, the independent samples t-test was applied. The findings of the study revealed that the Private sector university faculty have a capable workforce in the utilization of technology as compared to the public sector. The study recommended that the provision of technological tools and technology-based training for faculty of teacher education programs is a must for making teacher training programs effective and successful.

Keywords: Innovative Teaching Strategies, Technology Usage, Use of Digital Devices

Introduction

The 21st century is the century of modern technology. Modern teaching and learning methods connected with technologies have replaced traditional teaching methods. As a result, a lot of learning and teaching methods in education have brought a revolution in the world. The education system has now moved towards innovation and creativity due to information and communication technology. Information and communication technology (ICT) has brought everyone worldwide access to knowledge. Modern technological tools have brought revolutionary steps in the recent century and future to make teachers enable they can satisfy age-old dreams. Presently, we can individualize guidance and instructions. By creating simulations with the help of technology, teachers, and students can construct new knowledge. Information and communication technologies (ICT) facilitate the learner to learn in a better way, efficiently, creatively, and innovatively. Technology provides to resolve complex problems, provide wider access, and give, new information (European Commission's Digital Agenda for Europe, 2015).

Innovative instructional strategies concerning technology are the process of designing, implementing, evaluating, and communicating according to the instructional objectives. It is the integration of human and non-human resources, which provides help for instructions. Education and technology are much more interdependent with each other in transferring educational materials from one source to another. In the last decade, technology has not only affected instructional strategies but also brought changes in the learning process and research activities. Due to advancements in technology, new effective tools have opened the pathways of generating new knowledge, new ways of information, instructional strategies, and approaches (Commission on Instructional Technology, PCIT, USA).

The integration of teaching-learning theories and innovation in instructional design with the use of technology has made the educational process more effective, innovative, and creative. Programmed instruction, computer-assisted technology, and technology-reinforced mastery learning methods are the new innovative instructional methods in the classroom environment. Teachers remain on the best in drill and practice software. Watching on screens while presenting knowledge, with positive feedback and internet connectivity gives a stimulus-response format to highlight and click with related connections (Tomei, 2002).

Hence, with the emerging trends of innovations and technology in teacher education and collaboration with the world, our faculty members should have the new knowledge, skills, and proficiency to adopt innovative instructional strategies with technology use. To compete with the global world our higher education institutions both public and private sectors should have an environment in which the faculty members should be provided with professional development and the skills to adopt technology in the teaching-learning process.

Objective of the study

To investigate the faculty's use of innovative instructional strategies concerning technology in teaching at both public and private sector universities.

Hypothesis

Ho. There is no significant difference among the faculty of public and private universities in utilizing technology in institutions.

Significance of the study

The research would help universities provide a skilled and proficient workforce for teaching, training, and learning purposes. It may also be helpful for university teachers to learn skills that are used to adopt technology for teaching. Scholars and researchers may use technology and digital tools for collaboration and sharing knowledge worldwide.

The main purpose of the study was to observe whether the faculty members of the universities have the knowledge and skills to utilize technology in the classroom environment. Hence higher education commission may take steps for the training of the faculty and professional development training with technology adoption.

The policymaker can benefit from this study in how they can make policies in the curriculum and teacher training programs that maximum material and training should be included in the curriculum with the adoption of technology, which will create innovation and creativity amongst the students so that they can compete with the global world. The teacher training agencies and the institutions that are providing funds to promote education like the World Bank, UNESCO, and the British Council may benefit from managing their teacher training programs so that technology integration may be utilized and the teachers may be trained to apply technology for teaching purposes. The National Accreditation Council for Teacher Education may benefit from this research in making a policy for higher education that they would use technology in their teacher education programs while training pre-service university teachers. The study may be helpful for curriculum developers and implementers at higher education levels. This research may be helpful for the universities that may add technology to the professional development training programs.

Literature Review

Definitions of Teaching

Teaching is defined by Merriam-Webster's Dictionary (2016) as "the act of transmitting or conveying knowledge or skills to another." As a result, a teacher's act, activity, or career. It includes procedural education, which leads students to the material they need and challenges them to think about concepts they create in their heads. All of these are required to teach children how to become fully functional persons with strong reasoning abilities.

Teacher's Competency

At the start of the 21st century, educational managers and other educational administration organizations prepared a plan that how to prepare the curriculum, keeping in mind, the needs of society and giving skills to the learner, so that they could be effective and productive citizens of our country. Planning would be done so that our educational institutions, would provide such an environment in which the learner explores the knowledge and excels in his mind so that, he would be a critical thinker and would be an active learner (Windschitl, 2002).

It was further suggested that the knowledge should be delivered, through an individual having mastery over skills and practical application rather than rote learning, so, that a learner can interact with other people around the globe. An individual should be given such kinds of skills and knowledge that are globally required (OECD, 2005).

For this new emerging trend which is based on constructivist theory, we need constructivist teachers with new knowledge and skills promoting in the students (Rutney & Broughton, 2011).

So, teachers' knowledge and training is important. For competitiveness of teachers, these should be training and professional development to enhance teaching skills (Carena, 2014). So, developing change in the structure of teacher education, there is the need for teacher assessment through a competitive process and making changes in recruiting agencies using different indicators and technical tools. We need to assess the teachers with different tools to check their skills of a teacher (Guerriero, 2017; Kaiser et al., 2017; Kunter et al., 2013; Seidl & Sturmer, 2014).

Innovative teaching methods

The 21st century is the initiative of emergent learning theories that how the learner gets knowledge in the best way. Advanced technologies like smart boards, computers, and web 2.0 tools have brought a revolution in educational environments. Web 2.0 technology has made the user collect and share the content with digital tools and technology (Caruso, & Kvavik, 2005; Lseeing, 2008). E-learning, as explained by (Lamb & Callison, 2005), is the process in which knowledge, instruction, and interaction are done through the internet and intranet with instructional tools and material like web-based resources, e-mail, blogs, chat, audio, etc. Downes (2005), Anderson (2007), and Walton et al. (2007) argued that with the help of web- technologies, the learner explores new spaces and styles of learning. This process provides collaborative knowledge building, sharing information, helps to problem-solve, and creates linkages between knowledge and communications, Collaborations, and computer-based learning provide work to stimulate the learning and inquiry process (Wasson et al., 2003; Laurillard, 2009). Opportunities to integrate technology to support learners' development and real-world problems provide difficult tasks. It allows resolving and adjusting learning with new and unfamiliar situations, which is based on constructivist theory. Technology helps accessibility to information and increases inquiry for students who naturally explore and get knowledge about the new environment through inquiry (Wang et al., 2009).

Wang et al. researched the use of technology in inquiry-based learning activities (2009) Early childhood schooling was the only option. Pre-recruited teachers and on the job. The course has been related to other research evaluating the use of technology to promote the use of inquiry-based teaching (Capobianco, 2007). Teachers who employ inquiry-based teaching strategies help students build 21st-century learning abilities and knowledge. Teachers must be able to lead inquiry-based

Learning in a technologically advanced setting (Bebell & Kay, 2010; Larson & Miller, 2009; Storz & Hoffman, 2013). Teachers generally do not use inquiry-based teaching approaches in the classroom since it is difficult to measure students' mastery of content knowledge vs using more traditional teacher-centered teaching methods (Boyles, 2012; Saavedra & Opfer, 2012). Duncan (2009) defines 21st-century learning abilities and knowledge as those that need a high level of setting.

A learning model that combines 21st-century learning skills in the educational setting was established by government and semi-government collaboration with innovative knowledge in 2002. Students must have a set of broad abilities and a thorough understanding of the material to succeed. state curriculum has made evaluation strategies with standardized tests depicting the needs and abilities of the 21st century (Partnership for 21st-century Skills, 2009).21st-century teaching skills are represented in the figure below.

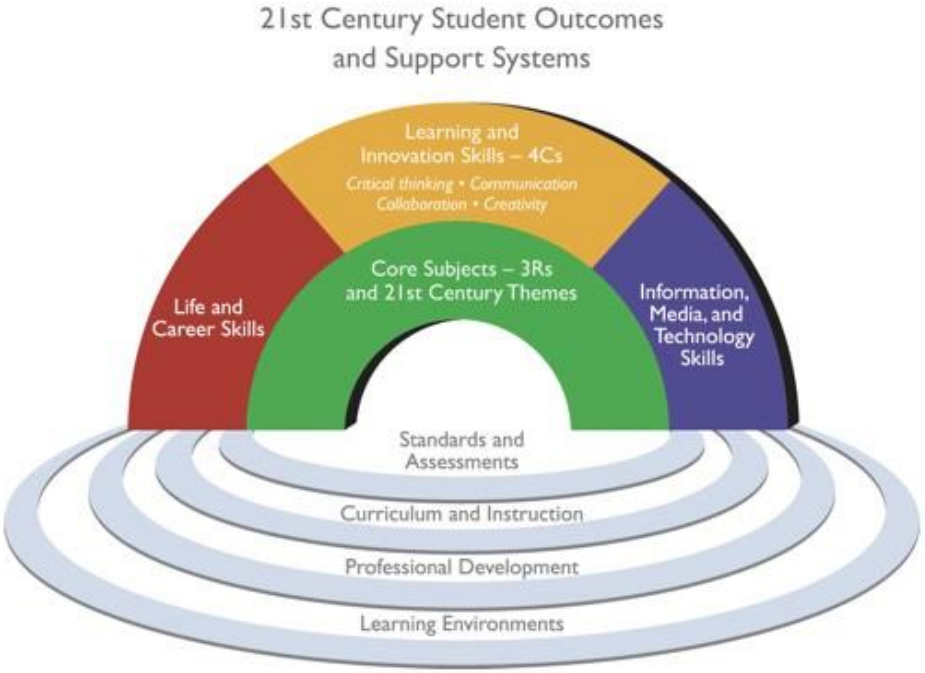

Figure 4. 21st Century Student Outcomes and Support Systems. (Annotated image from http://www.p21.org)

The constructivist method of education was presented by Cole (2009) and Yu et.al. (2005), indicating that the knowledge of the students increased when they use technology individually. Learner capacity, enhancing inquiry-based teaching grasp, resources, skills, and active participation in their learning. Inquiry-based learning allows students to actively participate in gathering knowledge, understanding materials, and creating their skills to find out the answers to the questions using their cognitive domains. Students can become self-regulated learners by using new understandings and deeper comprehensiveness about their surroundings through this approach (Sekeres et al., 2014).

Project-based teaching Enhanced 21st-Century Skills

PBL is a modern teaching technique through which learners are provided with an environment in which, they jointly work together to get the required goals of learning. According to Galvan and Coronado (2014). (p.40) PBL to an approach that emphasises individual exploring about a certain subject. According to Tseng, Chang, Lou-and Chen (2013, P.88), in the process, learner achieves their goals through questioning and as a result, they gain mastery over skills that are required in PBL (Markham, 2012). A lot of work and research related to PBL with Markham, investigation, which was reflected several times in his studies.

Tseng (2011) indicated in project-based learning research with 84 secondary school and vocational school studies, that combining STEM and PBL in an online environment was created for students to do a problem-solving experiment. The research concluded that students' behavior, accomplishments, attitude, and behavioral inputs have been increased and were provided with a base for learning deeply using the STEM and PBL behavioral model (Lou et al., 2011, p.181).

Collaborative Learning

The concept of getting knowledge in groups was presented in 1950-1960. The group learning method was used by the doctors to communicate with health students. The students who worked in groups had better results as compared. to those who worked alone or as individuals. To understand in a better way the concept of collaborative learning through the different concepts investigated by Swan et al. (2000, p.46)

Garrison and Cleveland-Innes (2005). On the other hand, Sessoms (2008) divided the technology-based learning process into three categories: interactive learning, active learning, and expository instruction. Mash (2012) suggested different kinds of interaction that take place during the educational process, including peer-to-peer faces in the classroom applying different tools of Web 2.0, live conference tools like Skype, etc.

In higher education in modern institutions, digital tools are being used widely. Studies showed that there is a gap between students' expectations and university technology using expertise. The findings of the studies showed that universities should develop policies and visions that enhance academically productive work. Newland and Byles (2014) Explained in their research how e-learning and other e-resources help academics to apply Web 2.0 technologies at the universities for instructional strategies.

Blended learning

Blended learning is defined as "together materials and valued combination of different sources" (Tshabalala, Nadya–Ndereya, & Merwe, 2014, p. 102). Staker and Horn (2012, p.3) defined as it the process in which different information is combined and designed to facilitate the learner through traditional and technological methods in the classroom environment. There are many blended learning system tools through which an individual can learn like, individualized regulated, need-based, and use of ICT hybrid learning systems as explained by Glick (2008, p.36) integrate technology along with one-to-one learning programs for the instructional purpose of offer a comprehensive learning environment, as well as Taraji, Trade, Radic and Pokrajac (2005, p.1), stated a system with the formal teaching along with technology-based teaching pedagogical method which has no limit of delivery. Further, hybrid teaching has beneficial interactions with the instructor-student having effective communication between the students and teachers with positive behavior fulfilling the needs of the learner and the responsibility of the teachers (El-Mowafy et al., 2013, p.133). At present blended learning has also been initiated at a low level of education due to its effectiveness (Eiter & Woll 2011). In addition, the addition of technology in the classroom environment gives more chances for faculty members to decide and design the course in such a way, that promotes critical thinking in individual learning as well as in the whole class.

Torrisi-S-Steel (2011) identified a blended environment as that, it is the process of teaching methods, combinations of different strategies, and distribution methods. It is the process in which learning abilities are centered instead on technology application in a teaching environment. Blended learning provides an opportunity to assess how the student learns, attract face-to-face, and provide diverse learning experiences using technology. So, in blended learning student needs attention from the teacher, teaching techniques, and tools.

(Tan, 2003; Teo & Wong, 2002) explained that there is a big need for universities to train their faculty in a useful and innovative way so that their outcome would increase, they should use technology in the teaching process effectively so that they can produce an effective and innovative product, which is in demand of our society.

Literature and research studies indicated that innovative teaching strategies have a positive impact on the student's critical thinking, and analytical thoughts, bringing creativity and innovation amongst them. As a result, the teachers are required to make changes in their teaching methods. Hence, teachers are required to be trained with modern technology and equipped with the latest digital tools. There is a demand for a skilled and competent workforce at universities who can apply technology and digital tools in the classroom environment effectively (Shaffer, 2006). Shaffer highlighted that if a teacher can read, it would not be possible for teachers that the passages written in the books useful or not useful. Similarly, if a faculty member has no skill and knowledge about technology application and utilizing the available resources and technology in the classroom environment, then it will be not possible for innovative teaching in higher education. So, there is a demand for faculty training and professional development with innovative teaching strategies used in university teaching. Research studies indicated technology is the source of facilitation to adopt technology for teaching. If the teachers are well-trained, then, they will use technology in the classroom environment. Teachers must be used and proficient in applying technology in the classroom environment (Shaffer, 2006).

To sum up the conversation Kwan (2000) has long ago explained that the best strategy for students` learning is to awaken their cognitive abilities and make them think critically and analytically. Hence, the transmission of knowledge with different innovative teaching methods is the only way forward for education, especially higher education.

Constructivist learning focuses on knowledge creation by an individual, mainly focused on learner-centered teaching strategies. Such kinds of strategies are group learning, collaborative learning, debates, project-based teaching, learning through digital tools, and inquiry-based learning.

The above-mentioned strategies help the students construct knowledge by adopting active participation in the learning process to achieve certain goals of learning (Driscoll, 2005; Windstchitl, 2002).

Methodology

The research deals with the recent situation. Hence, it is a descriptive study. Innovative instructional strategies concerning technology have been shown to have a positive impact on the teaching and learning process in the classroom (Baylor & Ritchie, 2002). However, the lack of use of technology in teacher education was found. The main purpose of the study was to survey the teacher education programs to determine what instructional strategies teachers use in their teaching and the problems teachers, faced like the utilization of technology.

In this regard, Creswell (2003) states that data is collected through a structured questionnaire for comparison and contrast. A survey-type questionnaire having Likert type five options, agree, strongly agree, disagree, strongly disagree, and uncertain was used to collect quantitative data from the university teachers. The questionnaires were distributed among 202 university faculty of both public and private sectors. Data was analyzed using a sample independent t-test to find out the difference between public and private faculty.

Population of the Study

Sekaran and Bougie (2016) state that a single number of the population is called a member. The population includes all the members that are considered for the study conclusion (Best & Kahn, 1999; Levin & Rubin, 2000). Punjab is the biggest province of Pakistan. It has a large population having a large number of reputed educational institutions. There is a big network of universities. Hence, it was chosen as the population of the research study. There were 80 universities both in the public and private sectors as a whole. All the public and private universities were taken as the population who were offering teacher education programs.

Population Table. 1

Sr. No.	Number of universities offering teacher education programs	Public	Private	Total
1.	Universities	49	31	80
2.	Faculty	350	150	500

Source: www.hec.edu.pk

Sample of the Study

Sekaran and Bougie (2016) state that a sample is the collection of all members of the population that are used to explain the population. It is the subset of the whole population. We take samples from a large population. This process is called sampling. A research sample is easier than investigating the population. So, it is less expensive and less time-consuming (Levin & Rubin, 2000).

Punjab has 36 Districts with a large population. 10 public and 10 private universities that were offering teacher education programs were randomly selected as a sample of the study.58 teachers from the private sector and 144 teachers from the public sector universities were taken as a sample of the study. A sample is a sub-representative of the whole population.

Sample Table.2

Sr. No.	Number of universities Offering teacher education programs	Public	Private	Total
1.	Universities	10	10	20
2.	Faculty	144	58	202

Data analysis

Table 3

Comparison of mean scores of responses of private and public sector teachers on usability

	Usability	Private		Public		Independent samples t-test	
Sr#	Statements	*Mean*	*SD*	*Mean*	*SD*	T	P
1	I use the project method of teaching in the classroom environment	3.55	0.86	3.63	0.97	-.502	.616
2	I provide online material to supplement my course content.	4.02	0.89	3.74	1.02	1.788	.075
3	I manage online courses	3.84	0.74	3.80	0.87	0.357	.722
4	I use digital materials like audio and video for	4.28	0.74	3.97	0.84	2.390	.018*

	teaching						
5	I use presentation technologies in the classroom environment	4.21	0.64	4.17	0.87	0.263	.793
6	I use online meetings/classes/seminars	4.31	0.71	4.00	0.93	2.286	.023*
7	I adopt technology-equipped classrooms for my teaching	4.12	0.92	3.95	0.98	1.126	.261
8	I use a virtual classroom model	3.95	0.87	3.76	0.93	1.345	.180
9	I use technological (for example flickers) tools for student assessment	3.98	0.89	3.81	1.08	1.108	.269
10	I use instructional simulations/games for teaching	3.91	1.05	3.76	1.15	0.900	.369
11	I assess students' learning in multiple ways by using different digital tools.	3.90	0.91	3.79	1.04	0.669	.504
12	I use an inquiry-based teaching approach in a classroom	3.88	1.14	3.83	1.12	0.262	.793
13	I use an effective teaching approach to guide student learning in the project method	3.78	1.17	3.88	1.04	-0.590	.556
14	I select technologies that enhance students' learning for a lesson.	3.76	1.03	3.90	1.00	-0.873	.383
15	I use a learning management system (such as Moodle, etc.) to teach and organize instructional content.	3.79	1.12	3.58	1.19	1.189	.236
16	I use videos to teach and organize instructional content.	3.86	1.15	3.39	1.15	2.653	.009*
17	I use mobile devices (including smartphones, tablets, laptops, etc.) to teach and organize instructional content.	4.00	1.03	3.58	1.09	2.545	.012*
18	I use cooperative teaching along with the use of technology with different digital tools like smartboards in the classroom environment.	3.67	0.98	3.31	1.12	2.184	.030*

Table 3 shows the comparison of mean scores of responses of private and public sector teachers on usability. Private and public sector teachers were compared on eighteen statements related to usability. In most of the statements, there is no statistically significant difference ($p>.05$) in teachers' use of technology for innovative instructional strategies of private and public sector universities. Both, teachers of private and public universities agreed on the usability of technology for innovative instructional strategies. They agreed on using the project method of teaching in the classroom environment, providing online material to supplement my course content, managing online courses, using presentation technologies in the classroom environment, and adopting technology-equipped classrooms for my teaching. Further using a virtual classroom model, technological (for example Flickers) tools for student assessment, instructional simulations/games for teaching, assessing students' learning in multiple ways by using different digital tools, using an inquiry-based teaching approach in a classroom, using effective teaching approach to guide student learning in project method, in selecting technologies that enhance students' learning for a lesson, using a learning management system (such as Moodle, etc.) to teach and organize instructional content.

There is a statistically significant difference ($t=2.286$, $p<.05$) in teacher's use of technology for innovative instructional strategies of private and public sector universities. The mean score (*Mean*=4.28, *SD*=0.74) of private sector university teachers who use digital material like audio and video for teaching was greater than the mean score (*Mean*=3.97, *SD*=0.84) of public sector university teachers.

There is a statistically significant difference ($t=2.286$, $p<.05$) in teacher's use of technology for innovative instructional strategies of private and public sector universities. The mean score (*Mean*=4.28, *SD*=0.74) of private sector university teachers use I use online meetings / classes / seminars was greater than the mean score (*Mean*=3.97, *SD*=0.84) of public sector university teachers

There is a statistically significant difference ($t=2.653$, $p<.05$) in teacher's use of technology for innovative instructional strategies of private and public sector universities. The mean score (*Mean*=3.86, *SD*=1.15) of private-sector university teachers who use videos to teach and organize instructional content was greater than the mean score (*Mean*=3.39, *SD*=1.15) of public-sector university teachers.

There is a statistically significant difference (t=2.545, p<.05) in teacher's use of technology for innovative instructional strategies of private and public sector universities. The mean score (*Mean*=4.00, *SD*=1.03) of private sector university teachers use mobile devices (including smartphones, tablets, laptops, etc.) to teach and organize instructional content was greater than the mean score (*Mean*=3.58, *SD*=1.09) of public sector universities teachers.

There is a statistically significant difference (t=2.184, p<.05) in teacher's use of technology for innovative instructional strategies of private and public sector universities. The mean score (*Mean*=3.67, *SD*=0.98) of private sector university teachers using cooperative teaching along with use of technology with different digital tools like smartboards in the classroom environment was greater than the mean score (*Mean*=3.31, *SD*=1.12) of public sector university teachers.

Discussion

Null Hypothesis Ho. There is no significant difference between public and private university faculty in utilizing technology in teaching.

There is a statistically significant difference (t=2.796, p=.006) in the use of technology in private and public universities. The mean score (*Mean*=3.93, *SD*=0.35) of usability of technology of private sector university teachers is greater than the mean score (*Mean*=3.77, *SD*=0.40) of public sector university teachers. Hence the null hypothesis, that there is no significant difference between public and private university faculty in utilizing technology in teaching is rejected. It shows that private-sector university faculty used innovative instructional strategies concerning technology in an effective way for teaching purposes as compared to public-sector university teachers (Table 3).

Torres (2001) and King (2011) elaborated in detail about the in-service and pre-service faculty training which have been already elaborated in a conference on education for all. The data was analyzed about the training of faculty at higher education levels like university level training. At university-level teaching, teachers apply digital tools and technology required to be highly skilled and integrate technology with innovative teaching methods. In our country's scenario, there is a huge gap between acquired knowledge, skills, and competencies for applying technology in the classroom environment. A large number of students and faculty at universities lack communication skills as well as technological skills to apply to our societal demands. The research studies highlighted that there is a lack of skills knowledge and practical knowledge application in real situations amongst the university students and faculty as well (critical thinking, critical analyzing, and problem-solving skills).

(Tan, 2003; Teo & Wong, 2002) explained that there is a big need for universities to train their faculty in useful and innovative ways so that their outcome would increase, they should use technology in the teaching process effectively so that they can produce an effective and innovative product, which is in demand of our society.

Conclusion

The present study's purpose was to investigate the faculty's use of innovative instructional strategies concerning technology in teaching at both public and private sector universities, especially in teacher education programs. Literature and research studies indicated that innovative teaching strategies with the use of technology have a positive impact on the student's critical thinking, and analytical thoughts and, as a result, bring creativity and innovation amongst them. So, the teachers are required to make changes in their teaching methods. The findings of the study revealed that private-sector faculty have a strong utilization of technology as compared to the public sector.

Recommendations

The study concluded and recommended the provision of resources and faculty training on technology-based both in the public and private sectors. Hence, teachers are required to be trained with modern technology and equipped with the latest digital tools.

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