Original Research Article

Effect of Technology-Enabled Learning Environment on Performance of Mainstream Secondary School Students

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Abstract

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Educationist has been showing a keen interest in teaching-learning styles from the 18th century. After the introduction of the Child-center approach in education, a drastic change was seen in educational policies all over the world. The child-centered approach in the 21st century demands the application technology in classrooms. This randomized posttest-only control group design Experimental Research explored the cause-and-effect relationships among variables. A pilot experimental research with sixty (60) participants from Grade IX was conducted at secondary school in Karachi. Thirty students participated in the experimental group and thirty students in the controlled group. Data was collected through the achievement performance of participants after 20 days of experiment in the form of a post-test. A six days workshop was conducted by the IT experts for teachers to give awareness for using technology as a teaching tool at the secondary school level. Findings of t-test analysis using SPSS- 22 (t_{58} = 17.4, $p <$ 0.001) showed that differences in mean of controlled group and experiment group (M= 50.77, 68.17) that performance of students who are Studying in an interactive technology-enabled environment that includes using cell phone, smartphone, internet, SMS, software application and social media was significantly higher than scores of students who were instructed using conventional lecture-based teaching. The research study supports the effectiveness of teaching using technology-enabled learning at the secondary school level. The study concludes that more technology-assisted learning is promoted in the public sector secondary schools across the country.

Keywords: 21st century teacher, Child-centered, Learner, Teacher- centered

INTRODUCTION

The use of technology in teaching is now a global phenomenon with various aspects currently under consideration to make it even better. Scholastic activities such as teaching, learning, and testing are incomplete without the vibrant use of technology and its related advancements. Classrooms are now becoming a hub of pedagogic experiences with the growing use of technology and related instructional design in Pakistani educational context in the last ten years as discussed by (Khokhar et al.,2017). It has been reported that 75 % trained secondary school teachers were not ready for using technology as a teaching tool in their classroom,

only 21% of trained secondary school teachers find themselves prepared to teach technology-based lessons (Khokhar et al., 2017). The teaching style of public sector schools' teachers has a big challenge in the technological environment. Information communication technology has brought with itself a humongous expansion in classroom pedagogical instructions. Researcher found that the usage of web-based facilities offered by Allamalqbal Open University, the researcher concluded that performance expectation, outcome probability and social inspiration of 388 master level students were significant predictors of learners' social intention (Arif et al; 2018). Recently reported that it is essential to integrate ITC in teaching-learning for a definite reason (Rashid and Asghar, 2016). They also found that use of technology correlates with learners' involvement in teaching-learning process and self-directed learning (Rashid and Asghar; 2016). With the rapid change of technological environment in the world, it was a basic need to prepare students to match with the technological environment; keeping this in view a reform was decided to bring by the Government of Pakistan in the curriculum which matches this technological environment. Researcher argued that Curriculum reforms have been proceeding since 2001 in Pakistan after a long period of abandonment and inertia (Jamil et al; 2009). Research plays a vigorous role in the evolving teaching style in mainstream public secondary school students' educational settings. The use of Technological-based teaching methodology in secondary school is also gripping the attention of many researchers and philosophers globally. This growing tendency to make technological-based teaching a part of routine classroom teaching is now taking routes in a tradition in Pakistani classrooms. It has been mentioned that Information and communication technologies and teaching in the technological environment are a similar as it offers modes of technological environment, technology in the form of ICT is chiefly emphases on communication technologies that comprise internet, network, cell phones, and others communication standard (Christenson et al; 2010). In last three decades precisely, integrated technologies have been providing a massive range of new-fangled communication proficiencies. i.e. WhatsApp, IMO, YouTube, Watt pad, Tango, bottom, ask.fm, line, kick, snap chat, twitter, Facebook, Viber. It has elaborated that at present, individuals can communicate with the help of communication technology, in their factual period with each other from all over the world (Roberts et al, 2000). Now a day's offices and factories are running under IP, video conferencing and other networking sites that consent manipulators entirely over the world to endure in the trace, connection, and link at any time. Now technology made this world a universal community where people interconnect with each other across wise the world as they are living in the neighbor. Technology in daily life would make it a part of education.

Review of Related Literature

Many research studies identified the positive significant effect of using technology as teaching tool on performance scores of students (Laurillard; 2013), (Tidd and Bessant; 2018), (Healey, 2018), (Tondeur et al., 2016), (Genlott and Grönlund; 2016), (Hwang et al; 2015), (Casey et al; 2017), (Blanchard et al; 2016) and (Uluyol and Şahin; 2016) have provided documentation proves of effective and inspiring use of integrated technology as teaching tool in schools and classrooms. It has been suggested that learning of learners can be significant and expressive if teachers prioritized direct instruction, technology-enabled instruction, and problem-based learning and teaching when teaching Algebra 1 (Hass; 2002). On the other hand, another study reported that there is a significant correlation between learning and use of technology as a teaching tool (Salavata; 2016). This study further explained that learners come to schools from different backgrounds, socio-economic status or having varying in learning styles and interest, be that as it may, it is a major task for teacher perimeter when instructing in the class to satisfy student's fulfillment particularly for utilization of right technological innovation. In particular, the literature emphasizes the necessity for an educator to modification their tutorship for the potential of technology to be realized. The paradigm of technology in the education system creates a drastic situation in the education system in Pakistan, especially in the public sector schooling system. The major aim of shifting of technological paradigm is for the enhancement of quality education in public sector schools with prepares learners to adjust in this global village. Another study conducted quantitative research with N=109 learners and found that there is a disparity effect of teaching styles on learners' performance scores when teaching with three teaching styles (Ganyaupfu; 2013). The teacher-student interactive method followed by learners–centered was found to be the most effective one in comparison with the teacher-centered. Previous researches statistically proved and conclude that 21st century needs change in teaching style that match with 21st-century learner's learning style (Hakkinen et al; 2017), (Blaschke and Hase; 2016), Stronge; 2018) and (Cronjé; 2018). Another researcher explored that students of undergraduate and graduate from the University of Punjab used the technology of the internet at the University Library's Digital Lab Unit and home. The use of technology improves their performance but students learned using internet technology by themselves and relying on a friend's assistance without attending any formal training program (Bashir et al; 2016). It has been recommended that educational institutions must have IT-based courses for students of internet use (Bashir et al; 2016). Additionally, argued that for 21st-century learners, a comprehensive need to be required to bring educational institutions up to mark as 21st-century demand (Ahmood et al; 2018). Another

study explored a positive attitude after using technology tools in the public school classroom (Young; 2008). They further elaborated that schools must have to play a dynamic role to prepare learners as the 21st-century technology-dependent world. Young highlighted the importance of teachers' training to implement ICT tools in their teaching pedagogy practices (Young; 2008).

This research study based on Technology Acceptance Model (TAM), In education, it was used rapidly in all over the world, Teo, (2009) researched with N=475 pre-service teachers in Singapore and concluded that Perceived usefulness appeared to the strongest determinant of behavioral intention. Another study examined the pre-service teachers' attitudes (N= 239) in Singapore, participants belonged to an Education Institute towards using technology with the TAM framework (Teo et al; 2008). Findings indicated that perception on the usage of technology that technology does not only make our work easy but also play a great role in increasing user's efficiency (Teo et al; 2008). It has been suggested that TAM is a strong and perfect model to understand the role of individual factors and it reports the issue of the willingness of usage and practice technology (Azawei et al; 2017). They stated that the TAM model referred to information system theory based on concept that how user accepts and habitual with the technology (Ahuja and Thatcher; 2005) and (Teng; 2015) and further suggested that behavior determined the intention to use a system, and intention to use a technology determined by the attitude of a person towards using the system (Teng; 2015). Another study described that TAM has attracted significant attention in e-learning as mentioned in their researches (Liaw; 2008) (Shin and Kang; 2015).TAM model predicts human behavior, whether to accept or reject the use of technology. The researcher adopted TAM as a foundation because it has been extensively used to investigate technology adoption as mentioned (Bagozzi, 2017), (Shin and Kang, 2015). It has been concluded that the core factors of the model can predict learner satisfaction as well (Azawei et al. 2017). However, there is concern regarding the appropriateness of the model across culture. Another study explored that mobile-learning (M-learning), a new kind of learning has promoted to the advent of a new kind of learning after the launching of 3G and 4G mobile technologies.(Ali and Arshad; 2016). Additionally, they stated that children in Egypt at the age of eight to eighteen years old are acquainted with mobile devices; the researcher suggested that it is a need to use integrated teaching using technology for 21st-century students in Egypt only to support conventional teaching(Ali and Arshad; 2016). The chief objective of any pedagogic instruction in pragmatics is to increase learners, realistic consciousness and to give them adoptions about their interaction in the goal assignments or subjects. The educational institution offers an inclusive healthy environment for learners to learn and experience. Learners in their learning places can do their given tasks in new procedures and designs. They will enjoy a greater level of social acceptance to a great extent. Public sector Secondary school teacher's main task would be to select tasks to his learners' and to facilitate them to find out solutions or finding of any assigned task. In this connection, the best choice would be to introduce technology-enabled instructions at secondary schools. These two group post-test controlled group experimental research explored the effect of teaching on the performance of secondary school students in a technology-enabled environment in mainstream public school, Karachi, Pakistan.

Different scholars use diverse classifications to state teachers 'teaching styles. Researcher concluded that the natural, habitual, temperament ways of the style of a teacher are referred to as teaching style and this style is used in the classroom to transmit the information to learners(Peacock; 2001). Another definition of teaching style designated by Felder's (1996) teaching style is based on their principles, tone of their voice, gesture, brashness, practices techniques, personal behavior and their nature of self-control. Study discussed a few basic or fundamental teaching styles that are mostly used by educators(Gill; 2013). The Authority or Lecture style is purely a Teacher-Centered teaching style and considered a one-way process of communication, learners are supposed to be written down or absorbed information delivered by the educator. In the context of mainstream public sector secondary school students in Pakistan, direct instructions are used in their teaching-learning process; this style is also known as traditional teaching style. In our province, Sindh eighty percent of teachers were appointed from 1980 to 1992 and mostly did their B.Ed before 1990 and they applied this style in their teaching practice periods. Unfortunately, they don't have a chance to attend training, workshops, and seminars to improve their teaching skills, that's why in Pakistan this style is still using in classroom teaching. Child-centered teaching approach, in this approach child role, is active and educators would give them a pleasurable and good time when they are learning. The educator role is just to facilitate the learners; this approach demands expertise in child psychology too. This approach gives learners to the natural setting, child centeredness, maximum freedom, happiness, and healthy mood, senses, and instincts. A study summarized this approach in this way that this approach gives birth to progressive education(Khalid; 1974). It has made teaching more enjoyable, useful, effective and real. Now, this approach is considered to be the most outstanding approach to education.

Many studies showed that the performance of learners and satisfaction significantly increased when used technology tools in the teaching-learning process, a study presented a research model based on TAM to explore

the students' satisfaction on enhancement in performance for using technology in teaching-learning process proposes(Tennyson; 2010). Findings of Survey-based quantitative research on N-212 participants indicated that the technology-enabled learning environment had a significant effect on the performance of learners. Conducted survey questionnaire research that investigated the perception of learners with seven dimensions including the use of technology, he concludes that learners are largely satisfied when using technology in their learning process(Wilkins; 2012). Another study developed a theoretical model of elements of e-learning satisfaction in teaching among secondary school teachers(cheok; 2015). His findings were based on integrative literature reviews on the use of technology and satisfaction. He yields a theoretical framework for e-learning satisfaction among secondary school teachers. Another study explored factors that use of technology with hearing impairment learners, play a vital role when used in inclusive schools and concluded that participants (N-153, hearing impairment learners) using hearing devices show satisfaction to increase performance because, in inclusive class, students reported more unheeded by the teacher(Rekkedal; 2012). Findings showed that the social network played a key role in students' satisfaction with the online courses(Aishereef; 2013). He also suggested that educational institutions should be assessing social network technology, use, and understanding in the classroom(Aishereef; 2013). Recently, study conducted to measure the students' satisfaction in the learning application based on Kano's quality model(Vezzetti; 2019). The results of the study suggested that the visual and collaborating features rooted in the application have the potential to encourage the positive satisfaction of users.

There has been an inconsistency between the widely accepted promise of technology to transform teaching and learning and actual results and experiences in the field. It has been stated that the use of technology in education unlocks a new epoch of information and supports as a catalyst tool to enhance teaching styles(Gilakjani; 2017). Other researchers solidly agreed that technology assists teachers to enhance their teaching styles(Gilakjani, 2017, Frigaad; 2002), Timvcin; 2006). Rodriguez, Peterson, and Ajjan (2015) elaborates that Some of the social media websites namely, Facebook, Twitter, LinkedIn YouTube and Flickr, a creation like blogs, educational websites would be used in the teaching-learning process to enhance performance. The above-mentioned websites are useful not only for students but also for teachers and other people who are working within any organization. Greenhow and Lewin (2016) state that using social media promotes a student-centered learning approach among secondary school students, the tools which are used to use this approach let learners interrelate and coope-rate with each other. Three of the social networking sites

which will be discussed are Blogs, Facebook, Twitter, and YouTube. Secondary schools in Pakistan are in particular need to realize that the world today is evolving and more on a social side and students need to be taught how to interact with people and work collaboratively. These secondary schools need to motivate students to use the internet not only for the sake of knowing about other people's social lives, but also relate social media with secondary school syllabus in their education process for two crucial years of students' life to prepare for the competitive examinations conducted by various school boards.

It has been proposed that YouTube is yet another content sharing website through which mainstream secondary school students can upload, share and watch different videos(Laird; 2014). It permits users to create playlists and share video clips with a huge number of spectators. It's very interesting to realize that some of the mainstream secondary schools are now open to embrace this technology-enabled learning environment too. With the concept of flipped classrooms coming up, YouTube can be used in these mainstream public secondary classes as a teaching resource for a greater activity-based teaching session informal classes. Through this website, teachers of the mainstream public secondary schools can share lecture videos and share links of additional information and popular educational related videos with all the secondary students' informal learning situations. Similarly, a public-sector mainstream secondary teacher can make and upload a video based on student projects and upload it on the class channel where different stakeholders such as students, teachers, siblings and parents from anywhere in the world can have access to it.

Conceptual Framework

There are several conceptual frameworks used to examine the effect of teaching styles of teachers using the technology-enabled learning on the performance of students with the reference to acceptance and adoption of usage of technology. In this research, the proposed model is based on Technology Acceptance Model, TAM as a conceptual framework. Davis (1989) presented his influential work, worldwide known as TAM- technology acceptance model. TAM and it's all improved and advanced versions have been used in many statistical studies as a theoretical framework all over the world. The educational researcher used this model for predicting students' performance with the use of technology. The TAM is considered as technology accept or not to accept predictors from the user of the technology side. It has been explained that the TAM model creates a positive attitude towards perceiving a system accept for easy use and for increasing efficiency, which in turn increases user's intention to use it (Akman and Turhan; 2017),
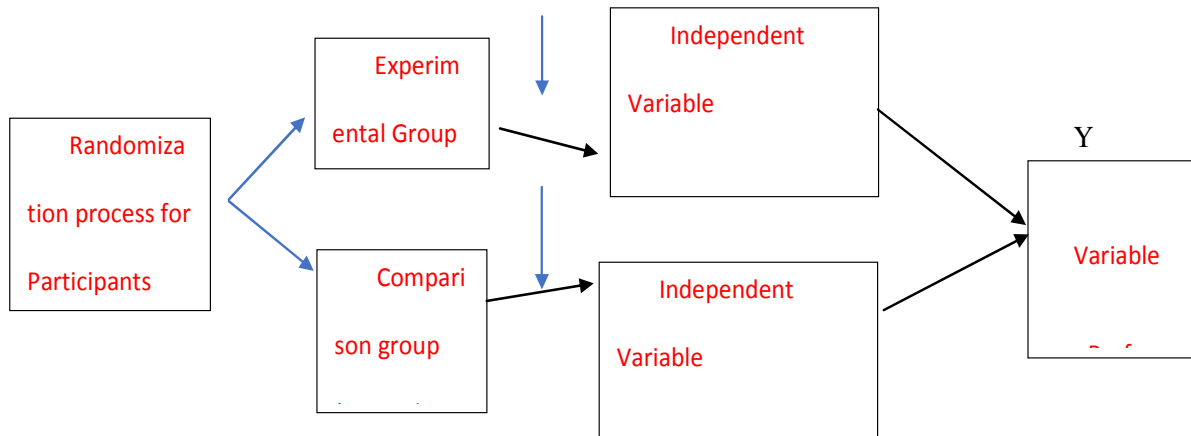
Figure 1. Proposed Research Framework
Interventions (20 days) X

(Marangunic and Granic; 2015). The hypothesis of the current research was based on the TAM model, in which the independent variables were teaching, using technology-enabled learning and teaching using conventional teaching and the dependent variable was the performance of students after 25 days of intervention if teaching on both experiment and controlled group. TAM indicates that users develop a positive attitude towards technology use when they perceive technology to be useful and easy to use. It has been stated that there was a significant positive correlation between the intention of use and influence of usage of technology(Cheung and Vogel; 2013), Choi and Chung; 2013 and Lee and Paris; 2013). According to the context of an institution, the advantageous use of technology would be beneficial to enhance individual performance which would be increased efficiency of an institute and benefits goes to directly or indirectly to the institute(Ali et al. 2017), (Teo; 2016) and (Venkatesh and Davis; 2000), this fact was also endorsed (Marangunic; 2015), (Phuong and Vinh; 2017) and (Teo; 2016), they all agreed that TAM would be beneficial for a person to evaluate the intention to use or not to use technology. On the basis of the TAM model and review of related researcher-developed research questions and hypotheses guided the analysis of data. RQ.1: To what extent were there significant differences in performance means of two groups, who are taught using conventional teaching style in the controlled group, and taught using technology, enable learning in the treatment group. RQ.2: To what extent was there comparison in the variances of the controlled group and treatment group after twenty days of intervention?

Ho1 = μ1 – μ2 = 0
Ho2 = μ1   μ2

Where, μ1=population scores mean for posttest of controlled group, μ2=population scores mean for posttest of treatment group.

$H0\ 3 = \sigma^2 1 - \sigma^2 2 = 0$
$H0\ 4 = \sigma^2 1 = \sigma^2 2$

Where $\sigma^2\ 1$ is variance of post-test score of controlled group, $\sigma^2\ 2$ is variance of post-test score of treatment group. Figure 1 illustrates the conceptual framework of the study

METHODOLOGY

The current research was guided by the randomized posttest-only control group design; experimental group and controlled group or comparison group were measured after their exposure to treatment. Explained that experimental research is conducted with two sets of variables: one of them is kept constant and the other is manipulated to establish cause-and-effect relationships among variables (Denscombe, 2014). This study employed two groups of participants: one that received a technology-enabled learning environment and the other comparison group would continue to be taught by their teacher's usual method. Study discussed that designing an intervening variable that is known as an independent variable or dominant variable in experimental research plays a vital role in connecting the link between the independent variable and the dependent variable and also explains the effect of the independent variable on the dependent variable(Mackinnon; 2015).

The researcher used this experimental research design to manipulate the independent variable after intervening a treatment for a prescribed period, in this regard deductive research approach was used. It has been defined that the deductive approach establishes emerging of a hypothesis (Wilson; 2010) and (Zalaghi and Khazaei, 2016). Based on the current theories and creating a research plan to test the hypothesis. To make the study effective, the researcher made the efforts to the best possible extent that the two groups in the study

remained as homogenous as possible. The researcher emphasized in this study that the respondent's real and true potential is not manipulated beyond the level of study objectives. in this instance, a pilot study was constructed in which two randomized homogeneous groups were exposed to treatment and the dependent variable is subsequently observed or measured to assess the effect of the intervention, Target population of the current research was high school students from public sector enrolled in Grade IX, District West, Karahi, Pakistan. District west consists of 569 schools in which 71 schools belong to secondary schools and 05 schools belong to Higher Secondary. 5257 students have enrolled in Grade IX.

Sixty (60) students from grade IX, science group participated in this pilot research study, all participants were female and belong to mainstream High school, situated in District West, researcher recommended that the result has more convincing if a Randomized Posttest-Only Control Group Design or the Randomized Pretest-Posttest-Control Group Design had been used (Fraenkel et al. 2012. District west consists of 569 schools in which 71 schools belong to secondary schools and 05 schools belong to Higher Secondary. 5257 students have enrolled in Grade IX.

The instructional model of teaching Biology using technology-enabled learning referred to an independent variable and criterion, outcome or performance of learners, refers as the dependent variable. The outcomes were statistically analyzed. An instrument for the performance of students comprised the set of Standardized assessment papers prepared as a prescribed pattern of Board of Secondary Education Karachi. Other demographic age and gender of students, the user of technology, past scores in examinations. Were collected in the form of a questionnaire just to observe that they all are a habitual user of technology? The results obtained through the test administration on the experimental group were compared with that of the control group after the treatment using the Independent samples t-test model. The control group was taught through the conventional method with a three-hour post-test examination having similar test items as the treatment group, duration of time for subject and period as same as treatment group has. stated that to analyses the research hypotheses, an independent sampled t-test statistical tool was used to determine the pattern of relationship between the dependent and independent variables(Anesthesiol; 2015). HYPERLINK "https://www.ncbi.nlm.nih.gov/pubmed/?term=Skaik%20Y%5BAuthor%5D&cauthor=true&cauthor_uid=26870136"Skaik (2015) explained that SPSS often produces thought-provoking figures that can illustrate researchers the degree of intersection among groups and how diverse their average members are from one another, their figures can help researchers comprehend the different functions and how the groups fluctuate from one another.

Further, Sedgwick (2012) stated that independent samples t-test is used when researchers are interested to compare means of the two dependent groups in a study to find the effect of the independent variable.

This study was designed to investigate the effect of the teaching style of teachers using the technology-enabled learning on the performance of students, to compare the means of both groups after the intervention of 20 days treatment. A pilot study was designed to assess reliability, viability, time, cost, contrary events and improve upon the study design before the performance of a full-scale research study. Current Pilot study as consisting of three-phase, first phase consists of teachers training, enhancing teaching integrating technology in their classrooms for treatment group, second phase integration of technology in classroom for 20 working days, (from 8th April 2016 to 3rd May 2016), third phase assessment of experimental group who had been taught with technology-enabled learning and control group who had been taught conventionally. For teachers training, Apricot Education System was involved and conducted Digital Learning Fundamental Course for 08 Biology teachers. 6 days of digital learning IT training was scheduled for teachers from 21st March to 26th March 2016. The scheduled plan for Pilot study was 8thth April 2016 to 4rd May 2016 (20 working days). Before starting a pilot study, a parent meeting was called from administrator to discuss research objectives and procedure and requested to allow smart cell phones or laptops to their kids at school only fulfilled research procedure. The researcher would like to mention here that cell phones are prohibited in schools. Only 8 students allowed to bring smart cell phones and two students were agreed to bring lab tops in the treatment class. The school administrator was agreed to arrange an internet device. After teachers' training and randomized grouping, a pilot study was started from 08th April 2016 till 04th May 2016, 10 periods per week, two consecutive 4th and 5th periods of duration of 35 minutes each. Chapter 2, Structural organization of life from Biology Grade IX, Sindh Text Book Board, Jamshoro, was taught in both groups but using different teaching style, whole lesson was distributed in weekly sessions including, detail of lesson plans with topic, day, diagnostic activity, guided task, assessment, outcomes, and challenges were provided and applied in both classes. After 20 days of the intervention of treatment, a post-test was conducted and performance scores of students were analyzed using a t-test on SPSS V-22.

Data Analysis

The gathered data were analyzed using a t-test on SPSS-22, Before applying the t-test, calculating Cohen'd is essential as it is an appropriate tool for calculating and

Table 1. Descriptive of Cohen's d test

			Statistic	Std. Error
Scores	**Mean**		59.47	1.418
	95% Confidence Interval for Mean	Lower Bound	56.63	
		Upper Bound	62.30	
	5% Trimmed Mean		59.56	
	Median		60.00	
	Variance		120.626	
	Std. Deviation		10.983	
	Minimum		35	
	Maximum		82	
	Range		47	
	Interquartile Range		17	
	Skewness		-.094	.309
	Kurtosis		-.502	.608

Table 2. Group Statistics for Pilot study

	Group	N	Mean	Std. Deviation	Std. Error Mean
Scores	0	30	50.57	6.991	1.276
	1	30	68.17	6.320	1.154

inferential testing of standardizing mean effect size. Table 1

For the current pilot study, Cohen's d value is 0.9043345605623 and its effect size is 0.412006244476970. The normality test is essential before calculating the t-test, in this regard a symmetrical bell-shaped curve is considered as normally distributed data. Using SPSS V-22 and calculating value of skewness divided by standard deviation and value of Kurtosis divided by standard deviation should be inside the range value of -1.96 to +1.96. calculated skewness and kurtosis values for the pilot study were -.094, .309 and -.502 and .608, differences divided by std. error, showed results -0.12391255 and 0.0732270, these obtained values lies between the range of -1.96 to +1.96 confirmed that data was normally distributed and fit for t-test calculations. Another enlightened that before applying the t-test; the data were analyzed using descriptive statistics to get the initial insights for further data analysis procedure(Winship and Zhuo; 2018). Table 2 shows the preliminary figures used to establish the need for the t-test.

The 'descriptive statistics' table 2 described the scores control and treatment group student in Biology subject.

As per the results portrayed in the table, that overall means score of students of the comparison group was 50.57 and the mean scores of the treatment group were 68.17. This implies that the performance of the students has been improved in Biology subject due to the intervention. Group Statistics showed the value of Std. Deviation for the Controlled group was 6.991 and for treatment, the group was 6.320.

Hypothesis testing

After the initial data analysis, data were tabulated and further analyzed to test the hypothesis using the statistical package for social sciences (SPSS) 22nd version. Another study explained that on the basis of the analysis obtained through descriptive statistic that the data meet the 'Homogeneity of Variance' assumption researcher used the Levene's test and set the alpha at 0.05 (Gravetter and Wallnau; 2016). The alpha obtained in this study was 0.425 which is greater (›) than 0.05 and calculated that the variance is equal. Hence the researcher has not violated the 'Homogeneity of Variance' assumption. Further analysis of the scores for the two groups, controlled and the experiment was done by means of a t-test.

Hypothesis 1

Independent Samplet-test was run to identify whether or not means of post-test scores of controlled group and treatment group were equal. Table 3

When the null hypothesis stated that there was no real difference between the means (Ho 1: μ 1=μ2). Any observed difference just occurred by chance. The p-value as shown in table 3 sig (2 tailed) column is smaller than the chosen alpha concluded that the observed difference between the samples is statistically significant. Mean Difference is the difference between the means (labeled 'Mean Difference'): i-e. 68.17- 50.77= 17.4. The t - value obtained from the analysis of the overall scores of the post-test scores of the controlled group and experiment

Table 3. Independent Samples t-Test, pilot study

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
scores	Equal variances assumed	.646	.425	-10.113	58	.000	-17.400	1.721	-20.844	-13.956
	Equal variances not assumed			-10.113	57.418	.000	-17.400	1.721	-20.845	-13.955

group is 10.113. The mean difference is -17.400 with a standard deviation of 1.721. The detail also reveals that the p-value or value of significance is 0.000, at the level of 0.05. the analysis shows that there was a significant difference between the overall mean scores of the controlled group and experiment group at 5% level of significance rejected the null hypothesis: There is no significant difference in the mean scores of controlled group and experiment group or

Ho1 = μ 1- μ 2　 = 0 (Rejected) which translates into 50.77 = 68.17,
H1:　μ 1 - μ 2　≠　0 (Accepted) which translates into 50.77 ≠ 68.17.

The rejection of the null hypothesis means that the difference between the two means has statistical significance. If the researcher does not reject the null hypothesis, it means that the difference between the two means is NOT statistically significant and the difference is due to chance. The significance at 5% level also suggests that the difference in the mean scores of the controlled group and experiment group is due to the effect of the treatment, not due to chance. T-test for Equality of Means provides the results for the actual Independent Samples *t-Test*. From left to right, it was concluded that Since $p < .001$ is less than our chosen significance level $\alpha = 0.05$, we can reject the null hypothesis, and conclude that the mean performance score of controlled group and performance scores of the experimental group are significantly different. Based on the results, the researcher can state that there was a significant difference in means between scores of controlled and treatment groups. (*t* 58 = 10.113, p < .001). This independent-samples t-test was conducted to compare the scores of the controlled group and treatment group. There was a significant difference (see table 3) in the scores for controlled group (*M*=50.77, *SD*=6.991) and treatment group (*M*=68.17, *SD*= 6.320) conditions; t (58) =10.113, *p* = 0.000. These results suggest that teaching Biology using technology at grade IX level does affect the performance of students. Specifically, our results

suggest that when students have a chance of a technology-enabled learning environment, their performance increases.

Hypothesis 2

The SPSS V-22 output displayed the results of the t-test (Table 3) to test whether or not the variance between the two-sample means is significantly different from zero. Levene's Test for Equality of Variances, from left to right: *F* is the test statistic of Levene's test; *Sig.* is the p-value corresponding to this test statistic. The *p*-value of Levene's test is printed as ".000" (but should be read as $p < 0.001$ -- i.e., p very small), so we reject the null of Levene's test and conclude that the variance in the treatment group is significantly different than that of control compared group.
H0 2 = $\sigma^2 1 - \sigma^2 2$ = 0 (Rejected)
H 2 = $\sigma^2 1 = \sigma 22 \neq 0$　(Accepted)

RESULT

The results of the analysis suggested that strong validity existed among the independent variable and dependent variables. It also shows that there is a significant relationship between teaching styles in classroom practices with the performance of learners. Such a significant relationship has also been found in various other research studies. They concluded that there was a statistically significant difference between the experiment group and controlled group at a significance level of 0.05 when using computer and multimedia technology in treatment class while another controlled class was treated with traditional dialog techniques (Aloraina, 2012). Researcher analyzed the empirical research and they found that there is a positive effect on achievement scores while teaching-learning takes place in a technology-enabled environment (Sung et al, 2015).
　The research null- hypotheses, means of both groups were the same, testing was conducted with the help of

independent samples t-test and Cohen's d assists analysis to identify the effect of teaching styles on the achievement of students in a technology-enabled environment. Which resulted in a rejection of the research null hypothesis? The finding of data analysis showed a significant difference in the means of two groups, and it was concluded that teaching using technology-enabled learning was an effective teaching strategy when compare with teaching using conventional in control group. The preliminary data analysis revealed that teaching biology using technology as a teaching tool at the secondary school level had a significant effect on the performance of students. the mean scores of both groups were 50.43 (mean score of controlled group) and 69.17 (mean score of experiment group) and differences of means was 18.74, is compels that if teacher use technology as teaching tool in teaching biology at secondary school level, performance of students enhance, finding of results verified with other researchers: it has been stated that reform in teaching pedagogy which match with learners' learning style at secondary school level, is significantly effective at increasing learning(Kremer et al; 2013), further explained that technology would potentially improve pedagogy and learning(Glennerster al.et. 2013). it was inferred that using technology as a teaching tool at secondary school level not only enhances students' performance but encouraged students to move towards the 21st-century globalized world. This finding provides a path for teachers as well as for learners to developed 21st-century teaching and learning skills in them. Recent findings of the literature review showed that teaching Biology with innovative integrating with technology-enabled learning at secondary school level had a positive significance on the performance of learners. Study has presented a comprehensive overview of the framework and significance of changes in arrogances and level of engagement (N=100) in Biology class using technology-blended learning method and suggested that this method would be used as a feasible substitute to more traditional methods(Moore; 2013). Besides, the finding showed that overall students suggested that the blended learning method would be used in other subjects' classes. The researcher also stated that for implementation of blended learning method, training and coaching is necessary for faculty and learners to achieve maximum effectiveness of this method.

CONCLUSION

This study has contributed both theoretical as well as the practical implication for academic practice. The researcher recommended that at the secondary school level, Department of Education, Government of Sindh, provide not only comprehensive technology-based training for all level of teachers but on the other hand allocate handsome budget for the improvement of the technology-enabled learning environment in all public sectors schools to ensure that each student is getting a quality education. The researcher described in detail the research procedure with detail lesson plans (annex A) and relevant links will help all Biology teachers not only in Pakistan but the main idea of Biology topics are the same internationally, so it would be beneficial for international teachers as well as learners. Digital learning fundamental course provided support to integrate ICT in teaching Biology. The whole module is described in the methodology (annex B). This research suggested that Digital learning fundamental course would develop ICT skills among teachers and students both nationally and internationally. The government should recommend this course to all secondary teachers from the public sector secondary level. This research presented lesson plans with web links to understand the different concepts of Biology; in this regard, distance learning would be benefited for irregular and e-learners. The present research is proposed as a starting point for filling the gap in the local context and paves the way for future comprehensive research in all subject taught at secondary and primary level, so that a better understanding of the 21st-century learner, teacher classroom could be expected for teaching different subjects for different Grades.

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