

## **A Framework for Integrating Digital Technology in Management Education: A Way Forward for the New Normal**

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### **Abstract**

*The pandemic-19 has engulfed the whole world and education industry has been the worst hit. Educational institutes are trying their best to impart education through digital technology in current situation. The study aims at establishing integration of digital technology as an alternative in the current situation while imparting education. The study was conducted through structured questionnaire administered to 374 management teachers from colleges and universities across the country. The study concludes with establishing integration of digital technology as a very important ingredient in imparting effective learning.*

**Key-words:** Digital Technology, Technological Knowledge Content Knowledge, Pedagogical Knowledge and Effective Learning Outcome.

### **1. Introduction**

The current pandemic scenario has grappled the whole world. The COVID-19 pandemic relates to spread of disease through novel coronavirus which affects the respiratory system and in severe circumstances leading to death of the infected. The disease becomes much more dreadful as there is no vaccine available for the disease till date. The virus is so contagious that it easily spreads through the droplets present in the air and also can be transmitted through touching the surface of material having the virus (Kraemer et al.,2020; Bai et al., 2020). In most of the cases it has been found that the coronavirus is fatal for people with older age group, young children's and individuals who are already suffering from some disease or having very low immunity. Never the less in some cases it has been found that nobody is immune to the dreadful virus and almost everybody across all age groups can be infected with the virus and in worst circumstances can lead to the death of the

patient (Bender, 2020; Meng, Hua, & Bian, 2020). The current prevailing situation has created a lot of lot panic and fear among the people related to their health (Remuzzi & Remuzzi, 2020; Anderson et al., 2020). The pandemic has pressed the panic button around the world considering the vulnerability of the disease (Paules et al., 2020). Nobody around the world is immune to the infectious virus and the situation becomes more worrisome as till date no vaccine is available to cure the disease.

The pandemic has created a lot of panic around the world among people regarding the risk related to their health from coronavirus (Wu et al., 2020). According to Guerrieri et al, (2020) the evolution and spread of the pandemic has been so fast that within no time the disease has infected people around most countries of the world. Considering the spread of disease at an alarming rate and no vaccine available, the government of India has imposed a complete lockdown in the country from mid of March 2020. The lockdown imposed by government pertains to stopping of all economic and social activities except the activities dealing with essential services. During the lockdown the government has imposed complete restriction on movement of individuals except for those who are dealing with essential services. The lockdown restriction were also applicable on education sector, which means all educational institution were closed from 23<sup>rd</sup> March 2020 leading the education sector to stop all their activities. The restriction has made all students and teachers to stay at home in order to protect themselves from the deadly virus. The restriction has forced many students pursuing higher education to return to their native places. The steps have been taken by government as preventive measures in order to protect students, scholars and teachers from the fatal virus (Perienen & Al Sultan, 2020).

Education sector is considered as the backbone of every nation and contributes towards growth and development of that nation (Okendu, 2012; Wheeler, 2010; Thomas, 2007). India is an educationally rich country. The education sector in general and management institutes in particular of India are rated very high and considered among the best around the world. The management schools in India have seen an exponential growth from the past few decades. This is the main reason that many students from different countries have taken admission in management educational institutes of India to seek management education (Jagadeesh, 2000). Subbarayudu & Mouli, (2012) have argued that management institutes play a greater role in not only imparting theoretical knowledge but also developing problem solving skill sets pertaining to the global market scenario. The management institutes are considered as the lifeline of any country as they produce skilled managers who contribute in economic development of the country. Considering the restriction, the education sector in general and management institutes in particular are the one which are badly hit. Education sector is

worst affected after the lockdown as all education related activities have been stopped due to which students been the most severely affected. Many students were in their last semesters waiting for their semester to end and join their respective jobs. The current pandemic situation has created an environment of fear in which most severely affected ones are the students. The pandemic has brought the students under lot of stress which has gripped them with fear of their uncertain future. The vulnerability of the disease with no vaccine available has further left future of many students in gloom.

The use of digital mode of *modus operandi* followed by teaching institutions has not only made teaching possible in these difficult times but also has relieved a majority of students from the stress regarding fear related to completion of studies and their future (Sintema, 2020). The rise of digital tools in learning has made many to believe that education is going to take a new turn in the coming decades. With every passing day the situation is becoming worse and the spread of virus is increasing at a very alarming rate. The government and policy makers with help of teachers have urged students to adopt and learn digital tools for learning (Xia, 2020). Further all students have been informed that teaching as well as research would be conducted by online mode. This was done in order to ensure that students stay safe at home and in the meantime also do not miss out on their studies and learn while staying at home. The use of digital tools in learning have been used and proposed from many decades to enhance effective teaching learning interface (Usak et al., 2020). The current pandemic situation has superimposed the thought and made the present generation to believe and consider it as an alternative to continue teaching learning process in the present pandemic situation. Today in the current situation when whole world is fighting with coronavirus and trying to survive the pandemic, education is the one which holds key in defeating the deadly virus and gives a ray of hope to all (Bao, 2019). Digital platform in education is playing a key role and turning out to be the one which helps in creating an atmosphere of positive learning, and innovativeness. Learning through digital platform has made teaching learning process to be more effective in the current pandemic situation which is helping the nation stay on track and keep on moving ahead on the path of development.

### **1.1 Theoretical Framework**

Digital learning has been into practice from the past so many decades. The use of digital technology in education has been very useful for imparting knowledge. Many studies have firmly supported the view regarding use of technology to make teaching- learning process more effective

(Gueudet et al., 2012; Ruthven et al., 2009). The 21<sup>st</sup> century is considered as the age of technology and no sector can grow without the use of new innovative tools in its field. Education sector is the one which is among the first few sectors to recognize the importance of technological tools and started implementing them while imparting learning. The references of digital learning in education can be noticed from increase in usage of online learning in educational sector (Pierce&Ball, 2009).

The use of digital learning in management is on a rise around the globe and every single management institute is practically implementing these tools to make the learning process more effective. Many educationalists have stresses upon the importance of online mechanism of teaching and suggested to inculcate these tools in their daily teaching mechanism (Trouche, 2004; Reed et al., 2010). The Business schools of India which includes IIMs are ranked among the top business schools of the world. UGC and AICTE have recommended use of digital tools in management learning to enhance effectiveness and management institutes have been following this practice. The Indian management institutes have been using digital tools to impart education from a very long time. The main objective of management education is to impart business knowledge and inculcated leadership skills to meet the needs of current market in global scenario. To keep a pace with growth taking place around the globe technology holds the key. This has made all management institutes to have integration of digital tools while imparting teaching (Arthur et al., 2012). According to Gill & Lashine (2003) management institutes are known for using innovative digital tools in their teaching – learning process to enhance effectiveness in delivery.

Integration of digital tools in leaning pose opportunity for the teacher in which the teacher needs to exploit the opportunity of digital learning mechanism and make teaching more effective and interactive. Many researchers (Borba & Llinares, 2012; Doorman et al., 2012) have argued that the skilled teachers who are adopting digital tools in their daily learning mechanism feel much more satisfied with usage of tools. The teachers also feel that the digital tools had made teaching learning process much easier and effective and they are also of the view that by usage of digital technology the students have also generated interest in the teaching learning process. According to Reed et al (2010) the use of digital technology have made the teaching learning process much more interactive and students also pay keen attention while imbibing knowledge through use of new innovative technological tools.

Many previous studies have suggested that effective learning can be enhanced by using technological knowledge, pedagogical knowledge and content knowledge in an integrated manner (Adler, 2000; Cox & Graham, 2009). In a study by Mishra & Koehler (2006) it has been studied that the components of TPACK model help in enhancing the effectiveness of learning when used in an

integrated manner. The components of TPACK model include technological knowledge, pedagogical knowledge and content knowledge. According to Voogt et al., (2013) the deep knowledge of the subject along with its practical implication superimposed with technical know-how related to the topic enhances the effectiveness of delivery of topic and is better understood by the students. Researchers have further supported the view of usage of digital technology to make the learning process more effective and satisfying (Ruthven et al., 2009). In the 21<sup>st</sup> century the usage of digital tools are considered most essential and important while imparting effective learning outcome. The digital learning platforms are the current need of the new generation in order to stay with the pace of the growth around the globe. The growth in education sector is also linked with the innovative use of digital technology in teaching- learning interface.

Considering the current pandemic situation and also safeguarding the interest of the students the education sector has come up with new innovative tools in which the educationalists have resorted to online mode of imparting education (Lee & Tsai, 2010). The use of digital resources in teaching has been the new high which is the need of the current pandemic situation (Iwai, 2020). The digital resources were in usage by teachers and students from quite a long time but the current situation has enhanced its importance and also encouraged to use them more often and in more innovative way. Innovative teaching through digital resources has been found to be more effective in the present scenario.

In the prevailing current pandemic situation in order to prevent the spread of coronavirus all education related activities have been closed and advised to operate the mechanism of work from home (Baker et al., 2020; Gossling et al., 2020). The usage of digital tools like online classrooms, online mode for delivering lectures and interactions, digital mode of assessment and grading of students etc.. becomes much more important in the current pandemic context. The digital mode of learning or online learning has becomes the only hope in imparting education in the prevailing situation. The government of India has also advised to close all educational institutes and issued SOP's regarding imparting education through online mode. The current pandemic situation enhances the role of digital tools in learning and makes it much more important to gain knowledge of these tools so that process of learning does not stop. The use of digital tools during the current pandemic-19 situation has revolutionised the education sector and the reforms had made the policy makers to understand that collaborative usage of technological tools can enhance the effectiveness in teaching. The digital learning mode has become the lifeline in these difficult times in imparting education to each and every student. The current research study tries to develop a relationship among

technological knowledge, content knowledge and pedagogical knowledge and how these variables through integration of digital technology enhance effectiveness in learning.

## **1.2 Proposed Model and Hypotheses**

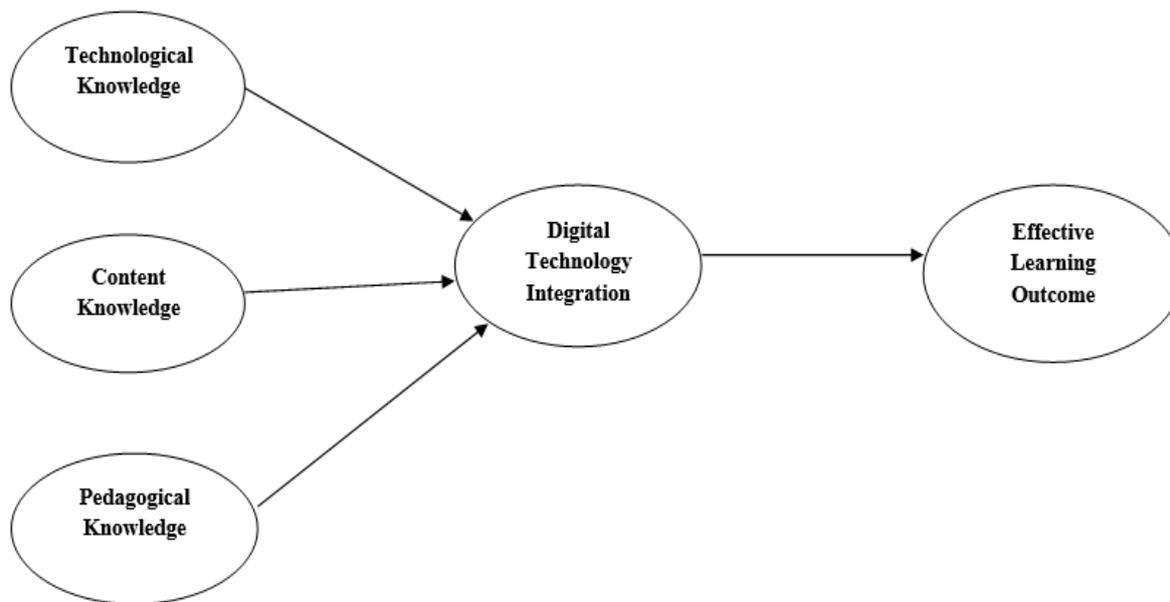
The study tries to nullify the research gaps of earlier researches and formulate a relationship between variables in enhancing effective learning outcome through integration of digital technology. According to Shulman (1986) it has been predicted that content knowledge along with pedagogical knowledge enhances the effectiveness of teaching. He further stated that content knowledge with practical implication of the subject makes teaching more effective. In many studies (Even & Ball, 2009; Sahin, 2011; Koh et al., 2010), the authors have stressed upon the need of use of technological skills to enhance teaching-learning relationship. The TPACK model further defines that effective learning can be delivered through amalgamation of technological knowledge, pedagogical knowledge and content knowledge (Celik et al., 2014). Voogt et al. (2013) have further stated that use of innovative tools of learning engages the students in more efficient manner and students are more satisfied after the teaching-learning process. Pierce & Ball (2009) have also stated that teachers own skill and knowledge through digital platform makes students much more contented and satisfied. In another study by Gueudet & Trouche (2009) it has been stated that use of technological tools enhances the interaction among students, reduces the time constrain and makes the learning much simpler, easier and appropriate. Cox & Graham (2009) in their study have stressed on use of software's and other technological tools related to the subject to enhance the attractiveness towards the subject. They have further stated that use of technological tools further enhance acceptance of teacher among students and students are also more interactive and confident while using these tools. The study taking a leap from the previous researches tries to establish a relationship among technological knowledge, content knowledge, pedagogical knowledge through integration of digital technology. The study after establishing relationship between all the variables states that effectiveness in learning outcome can be enhanced if all the variables are used in integration through digital mode of interface. The study further states in current COVID-19 pandemic digital interface become much more important and essential while delivering effective learning. Based on research objectives following hypotheses have been formulated.

**H<sub>1</sub>:** Technological Knowledge, Content Knowledge and Pedagogical Knowledge Significantly effects Digital Technology Integration.

**H<sub>2</sub>:** Digital Technology Integration has positive effect on Effective Learning Outcome.

The study finally proposes a model to enhance effective learning outcome based on linkage between the constructs (Figure 1).

Figure 1 - Proposed Framework of Digital Technology Integration



## 2. Methodology

The data for the study has been collected through circulation of web based questionnaire among management teachers of colleges and universities from different regions of India. In the current pandemic situation convenient sampling technique has been found most appropriate and used for collecting the data for the study. 374 questionnaires from the respondents have been found valid as no physical interaction was possible with respondents in the current prevailing conditions. The study comprised of using a structured questionnaire developed to study the framework of digital technology integration in imparting effective learning outcome.

The questionnaire was divided into two sections: section A comprised of demographic profile of respondents in which it was found that 69.79% population belonged to male category and 30.21% to female category. Further it was studied that out of the total respondents 72.46% were post graduates and rest 27.54 % were PhD's. Section B of the questionnaire dealt with study of constructs which are Technological knowledge, Content Knowledge, Pedagogical Knowledge, Digital Technology Integration and Effective Learning Outcome. The scales used for the study were adapted from Archambault et al., (2010), Koehler & Mishra (2008), Graham et al., (2012), Schmidt et al.,

(2009), Lin et al., (2013), Angeli & Valanides (2009), Xu et al., (2013), Graham et al., (2009), Hong & Stonier (2015), Koehler et al., (2007) and Chai et al., (2010) with certain changes that suited the current research. All the items were studied using five- point likert scale as the measurement tool. The tool used for administering data was SPSS software.

### 3. Data Analysis and Results

The data collected through structured questionnaire for the study was first administered to cronbach alpha test to see reliability of scales used in the research. The results from cronbach alpha test calculated were .739 for Technological Knowledge, .704 for Content Knowledge, .697 for Pedagogical Knowledge, .793 for Digital Technology Integration and .807 for Effective Learning Outcome. The results calculated predict the data used in the research to be reliable and valid.

#### 3.1. Factor Analysis

The study was further administered to EFA to reduce the data into different factors. On applying EFA to data the KMO value comes out is .821. The high KMO value shows that the data is appropriate for applying factor analysis. The results of EFA show that the data can be categorized into five factors which are Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Digital Technology Integration and Effective Learning Outcome. The results of EFA also show that the factors extracted from EFA leads to explaining 72.37% of variance. After applying EFA the next step is to confirm the factors obtained which is done by applying CFA. The results show that all the factors obtained have been found valid for formulation of the model as shown in table 1.

Table 1 - Confirmatory Factor Analysis & Construct Measures

Constructs	Retained Items	FL/SRW	Sig.
Technological Knowledge	TK1: The technologies I use enhance teaching learning process.	.793	***
	TK2: I use technology in teaching and enriching student's technical knowledge.	.802	***
	TK3: I use updated technology while teaching.	.678	***
Content Knowledge	CK1: I am concerned that student should get deep understanding of the topic.	.759	***
	CK 2: I try to gather as much as information regarding the topic before delivering it.	.821	***
	CK3: I also use digital sources to gather content knowledge regarding the subject to be taught.	.701	***
Pedagogical Knowledge	PK1: I prefer involvement of students to make them understand the implication of the subject.	.788	***
	PK2: I utilize my skills to make teaching more interactive and interesting.	.743	***
Digital Technology Integration	DTI1: Digital tools enhance effectiveness of learning.	.699	***
	DTI 2: I mostly use digital tools while teaching students.	.778	***
	DTI3: Digital tools have made teaching learning process much easier and simpler.	.781	***
Effective Learning Outcome	EL1: Digital tools are only mode of teaching in current and future prospects.	.748	***
	EL2: Digital mode of teaching has made learning process and grading of students much easier and efficient.	.814	***
	EL3: New innovations in digital learning have made learning more students friendly and effective in current pandemic scenario.	.832	***

*FL= Factor Loading; SRW= Standardized Regression Weight*

*\*\*\* mean significance < .05*

### 3.2. Correlation Matrix

The correlation between different constructs of the study has been studied through correlation matrix. The correlations between variables have been found to have a significant and positive correlation between factors extracted as shown in Table 2.

Table 2 - Correlation Matrix

Constructs	Technological Knowledge	Content Knowledge	Pedagogical Knowledge	Digital Technology Integration	Effective Learning Outcome
Technological Knowledge	1				
Content Knowledge	.575	1			
Pedagogical Knowledge	.482	.407	1		
Digital Technology Integration	.681	.611	.558	1	
Effective Learning Outcome	.593	.413	.497	.718	1

### 3.3. Impact Assessment Analysis

To study the impact assessment between the variables the factors were administered through regression analysis. Firstly the cause and effect relationship was analysed between Technological knowledge, Content Knowledge, Pedagogical Knowledge and Digital Technology Integration. To analyse the impact the factors were studied through regression analysis and it was found that Technological knowledge, Content Knowledge and Pedagogical Knowledge possess a positive and significant relationship while predicting Digital Technology Integration. The results calculated from regression analysis show that adjusted  $R^2$  value comes out to be .719 which shows that 71.9% Digital Technology Integration can be predicted through Technological knowledge, Content Knowledge and Pedagogical Knowledge.

Based on the analysis following regression equation has been formulated to see the effect of Technological knowledge, Content Knowledge and Pedagogical Knowledge on Digital Technology Integration.

$$DTI = 2.141 + .508 (TK) + .467 (CK) + .409 (PK)$$

Where: DTI = Digital Technology Integration

TK = Technological Knowledge

CK = Content Knowledge

PK = Pedagogical knowledge

Furthermore the study was also administered to study the impact assessment analysis between Digital Technology Integration and Effective Learning Outcome. On applying regression analysis it was found that Digital Technology Integration positively influence in predicting Effective Learning Outcome. The results calculated show that adjusted  $R^2$  value comes out to be .647 which shows that 64.7% Effective Learning Outcome can be predicted through Digital Technology Integration.

Based on regression analysis following equation has been formed to study the effect of Digital Technology Integration on Effective Learning Outcome:

$$ELO = 1.518 + .737 (DTI)$$

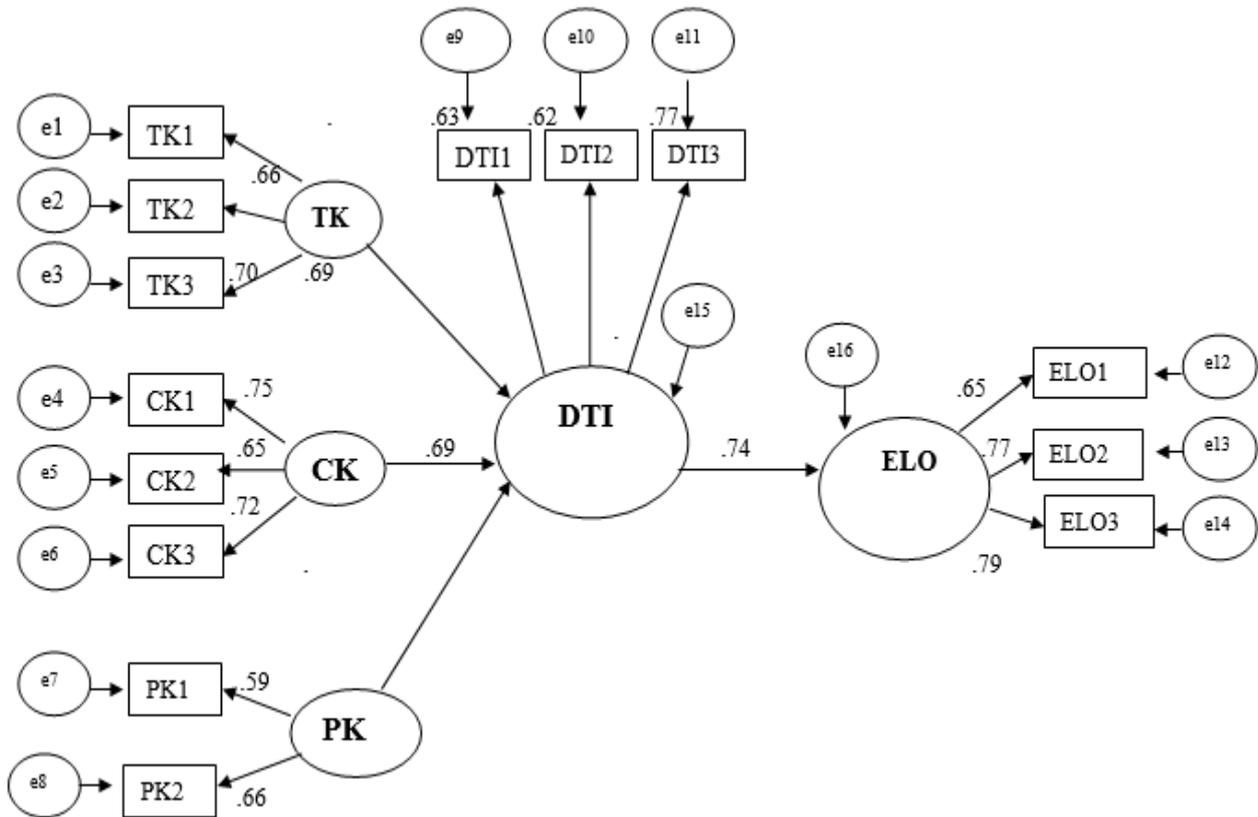
Where: ELO= Effective Learning Outcome

DTI = Digital Technology integration

### 3.4 Structural Equation Model

The final fit of the proposed model has been developed through SEM AMOS to formulate the framework for Digital Technology Integration as shown in Fig.2. The analysis of the model formulated has been found appropriate and fit with CMIN/DF= 2.137, GFI= .908, AGFI= .926, CFI= .909 and RMSEA= .038. All the parameters of goodness of fit (GFI, AGFI & CFI) are found to have higher value than .9 indicating model to be appropriate also RMSEA is below than .05 which further supports the model to be fit. Thus it can be concluded from the results formulated that the proposed model can be used to enhance effective learning outcome in teaching.

Figure 2 - Framework of Digital Technology Integration



*TK = Technological Knowledge, CK = Content Knowledge, PK = Pedagogical Knowledge, DTI = Digital Technology Integration and ELO= Effective Learning Outcome.*

#### 4. Results and Implication

The results of factor analysis have summarised and reduced the data into five factors which are Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Digital Technology Integration and Effective Learning Outcome. The results further depict that the factors extracted from EFA leads to explaining 72.37% of variance. The study was further administered to regression analysis to study the impact assessment analysis between the variables. The results of regression analysis show that 71.9% Digital Technology integration can be predicted through Technological knowledge, Content Knowledge and Pedagogical Knowledge. Furthermore the results of regression predict that 64.7% of Effective Learning Outcome can be enhanced through Digital Technology Integration. The study also formulates a framework of Digital Technology integration which predicts that digital mode of teaching enhances effective learning in current pandemic as well as future scenario.

The study pose a challenge as well as opportunity for the teachers in imparting learning orchestrated with digital technology in current pandemic situation. The study also predicts that innovative use of digital technology make teaching-learning process more interactive and much more effective. Results also suggest that teachers firmly believe that teaching through digital platform makes learning process more interactive and effective as compared to the traditional ones. The use of digital technology has also made grading of students easy and convenient for teachers while staying at home. In current scenario when all education institutes are closed, virtual mode of learning has came as a blessing and ensured that student continue their studies while staying safe at home. The policy makers also believe and suggest that use of innovative digital technology is much needed for growth of education sector. The study also suggest that virtual mode of teaching would revolutionise education sector, increase mass coverage and make it more student friendly. Technology innovation is considered as key to success for growth and development of nation. The current pandemic-19 has further made all educationalists to think and consider on more usage of digital technology to enhance effectiveness in teaching-learning process.

## **5. Conclusion**

The paper tries to answer the most difficult question of current scenario, which is how to impart education to students in current pandemic situation when every activity including education sector is closed to protect individuals form threat of coronavirus. Digital mode of learning has been predicted as the probable answer for imparting education in current pandemic situation. The study firmly believes that use of digital technology in imparting education not only makes teaching – learning process possible in present situation but also reduces the stress of students regarding their future from closure of education institutes. The digital technologies have converted the classes into virtual classroom which is appreciated by the student’s fraternity. The use of digital technology has made the teaching learning process more interactive and enhanced the level of satisfaction among students. The findings of the study suggest that adoption of digital tools in current pandemic scenario is best possible way of imparting education. As no vaccine to the virus is available and nobody knows how long the situation would prevail, so digital mode of learning in imparting education becomes more important. The outcome of the study suggests that digital technology should be used on regular basis even if the pandemic is over to enhance effectiveness in teaching. The outcome of the study comes with a scope for future researchers to consider virtual mode of learning as important part of their learning module to enhance effectiveness.

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