A BRIEF STUDY ON THE EFFECT OF AN ICT ENABLED INSTRUCTIONAL PROGRAMME ON TPACK AND SELF CONFIDENCE AMONG PRE- SERVICE TEACHERS

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Abstract

Incorporating ICT (Information and Communication Technologies) into classrooms in a meaningful way has become a problem for educators and academics alike. Many research involving the use of ICT in education have therefore used the TPACK framework. A thorough comprehension of this change and, in particular, of how pre-service teachers' views on the use of technology changed after completing their formal education in education seems to be lacking from the papers available thus far. For this reason, a total of fifty pre-service teachers' responses were gathered in a single survey; then, "using t-tests and analysis of variance (ANOVA), a predictive model was developed showing that pre-service teachers' TPACK contextual knowledge and technological knowledge contain the best information to predict their attitudes towards the integration of ICT in the teaching environment".

Paper Identification

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1. INTRODUCTION

Information and communication technology (ICT) is an umbrella word encompassing a variety of technologies that are being used to collect, store, manipulate, and disseminate information in a variety of formats. With the use of the internet, tablets, and replication, ICT is used to facilitate the exchange of ideas between students and teachers, resulting in a wide range of realistic educational settings. ICT's strength is in the reliable data it can keep for its users. More knowledge means more access to resources, which in turn benefits a large population that otherwise lacks easy access to either. It may effectively link together a huge group of people who are geographically separated into a single unit. Therefore, it may play a very useful role in bringing education to the marginalised. Numerous actions have been done up to this point, and they have impacted the lives of tens of thousands of people.

Role of ICT in Teacher Education

Training and practise are crucial to the development of every country. During the Vedic period, India developed the highly regarded Gurukul System of Education. From the Vedic era to the post-independent era, training in India has gone through a number of transitional periods. There has always been a concern for obtaining high-quality education with an eye on practical implications at every stage of development. Due to the undeniable prevalence of the internet in today's society, it stands to reason that education in the twenty-first century will seem quite different from what it did in the past. In most cases, teaching and learning took place face-to-face, and when separate instruction was used, it was accomplished mostly via the mailing of printed goods, and communication was slow and cumbersome. It has been found that when technology is incorporated into the teaching-learning exchange, the roles of both the teacher and the student shift from those of passive recipients of content to those of active members and partners in the learning process (the "Sage on the stage" to the "Guide as an afterthought").

When it comes to enhancing students' education, ICTs provide amazing opportunities and points of interest. Based on research by Lopez (2003), "To begin, ICTs provide for a constructivist approach to education by facilitating the creation of thoughtful learning opportunities. Second, the increased access to a variety of technological breakthroughs (Video, Computer, Telecommunication, etc.) made possible by ICTs makes for more effective learning, which in turn aids in the globalisation and understanding of previously incomprehensible concepts and methods. This opens up possibilities for establishing links between theory and practise. Finally,

the use of ICTs allows students to acquire relevant computer skills that can be put to use in the modern job market ". Information and communication technologies also provide students with a trove of learning materials.

TECHNOLOGICAL, PEDAGOGICAL & CONTENT KNOWLEDGE (TPACK)

The exponential growth of our modern world has fundamentally altered our working and leisure patterns. Technology is constantly developing in all areas, from smartphones to websites. Innovation will succeed in the end, which is a really positive development. It's hardly surprising that there's been an uptick in discussions about how important innovation is in education. For educators and administrations, the fast pace at which technology is evolving might represent a sea shift, since innovations can quickly become dated. This is despite the fact that countless man-hours and billions of dollars have been invested on machinery, preparation, and planning. Educators' capacity for learning has been identified as one of the most significant limitations to efficient innovation coordination in a recent audit of the examination and grant on innovation incorporation. Educators need to be well-versed in more than just the technical aspects of new technologies; they must also be aware of the affordances and requirements that these tools provide when it comes to discussing subject matter and identifying appropriate methods of instruction.

Everyone involved in the school system today is addicted to the internet. Education on the importance of human participation in driving creative progress is increasingly in the spotlight. Educators nowadays are expected to novel technologies in training as learning environments are being improved via innovation and change in course material. There is a growing interest in providing teachers with a structure that facilitates the coordination of innovation across subject areas. Besides digital technology, the specialist competence and specialised expertise are also necessary. Furthermore, there is a need for expertise in how to make the most of technological tools for providing targeted instruction and learning (Kereluik, Mishra and Koehler, 2010).

Another question about cutting-edge technology and classroom instruction that was unanswered in 1995 seems to have been resolved recently. The question is whether or not the current trend of "one-shot" workshops is an effective way to educate teachers and help them better incorporate new ideas into their lessons. Absolutely not is the correct answer. Typical once-off workshops only affect the classroom environment. These are the questions that need answering on how classroom teachers might best use creative strategies into their students' educational experiences

(Meltzer, 2010). A lack of an effective framework to actively lead educators' to coordinate ICT in teaching and learning was cited as a possible explanation for this dissatisfaction.

Assumptions of TPACK Model

Assumption 1:

The act of teaching is not one that is well-planned. Foundational work for TPACK came from Rand Spiro's Cognitive Flexibility Theory (Spiro and Jehng, 1990). Spiro's theory simply confirms that certain domains of knowledge are poorly structured and complicated, and that teaching to that sort of learning calls for unconventional teaching approaches in contrast to those that are appropriate for well organised education. Thus, education is analogous to a disorganised train in that it necessitates the application of intricate knowledge structures in a wide range of contexts. Teachers hone their craft in classes that are always shifting and challenging, requiring them to adapt and grow in their understanding. Effective educators need ready access to a wealth of information on learning and teaching, content, and, increasingly, technological developments (Koehler and Mishra, 2009). This is a profoundly significant realisation, since it shifts the emphasis away from seeing instruction as a mechanical, objective profession. Instead, education is seen as a profession, suggesting that teachers use their creativity in the classroom in addition to following set procedures.

Assumption 2: Digital Advancements Have Unique Attributes.

Collectively, we understand that our era's technical know-how and tools, such as the printing press, are subjectively different from those of other eras. As a second premise, this one draws on perspectives from the study of communication and related subjects. Some authors have even argued that the introduction of new forms of technology into the classroom fundamentally alters not just the ways in which knowledge is disseminated and communicated, but also the nature of the student and the subject matter covered. The advent of digital technology in the 20th century led to a technological singularity (a fundamental shift from which there is no turning back) (Prensky, 2001). Koehler and Mishra (2009) emphasised that traditional technological developments in the classroom serve certain functions, tend to be stable over time, and are simple or clear. They did so to emphasise that computerised innovations (the ones at the centre of most efforts to enhance teaching) lack these characteristics. Koehler and Mishra's (2009) description of how flexible, malleable, and nebulous modern advancements like PCs, mobile

devices, and programming apps by differentiating is spot-on (the internal workings are escaped from clients).

Assumption 3: Technologies are not neutral.

Researchers in psychological science and the learning sciences, in addition to constructivists, have all contributed to the idea that instruction is poorly structured. Theoretical contributions from the field of communication are recognised as supporting the hypothesis that cutting-edge pedagogical innovations possess noteworthy attributes. The third assumption incorporates the views of foundational researchers on learning innovations into the formation of TPACK. Understanding that technological advancements are neither impartial nor fair is another way in which education and innovation are intertwined. Or maybe different innovations are better suited to different tasks based on their own preferences, possibilities, affordances, and constraints.

Components of TPACK Model

1. Technological Knowledge

The term "Technological Knowledge" (TK) refers to information about new technologies and how they might be put to practical use . Technology is used to aid instructors when they present material to students, facilitate discussions between instructors and students, and orient students' enquiries into a topic. To wit: (Hammond & Manfra, 2009). When compared to CK and PK, TK is more ephemeral. The difficulty of defining it is what this is about. In this way, teachers who are short on time may benefit from what we know about future technological developments. It's also possible to argue that technical know-how risks becoming utterly out of date unless it becomes notably user-friendly. Koehler and Mishra (2005).

2. Pedagogical Knowledge

The term "pedagogical knowledge" (PK) refers to a teacher's extensive understanding of the theories, methods, and practises involved in education (Shulman, 1987). It's the ability to use or implement strategies for educating others. This information pertains to teaching and learning in general, and familiarity with various learning styles.

3. Content Knowledge

The term "Content Knowledge" (CK) refers to any and all knowledge that is specific to a certain subject. Ideas, hypotheses, concepts, authoritative systems, strategies for validation and verification, and moreover constructed theories and approaches towards expanding such knowledge are all part of what is meant by "content," as observed by Shulman (1986). Art history, popular canvas sizes and shapes, the influence of the artists' documented and social environments, and knowledge of aesthetic and cognitive speculations for lunderstanding and evaluating artwork are all examples of what this kind of knowledge might entai in the context of art appreciation, to give just one example. If teachers don't know their stuff, their students could form false beliefs about the subject matter and their own abilities to understand it.

4. Pedagogical Content Knowledge

The ability to facilitate the acquisition of any topic, no matter how complex or elementary, is a key component of pedagogical content knowledge (PCK). It's a compendium of strategies for instructing a wide range of topics . It's a way of organising, expressing, and embracing a wide range of student interests and talents, based on an awareness of how to deal with the challenges facing education today (Shulman, 1987).

5. Technological, Pedagogical & Content Knowledge

Teaching effectively, according to Shulman (1986), necessitates that instructors adapt their understanding of the subject matter to new pedagogical forms. What has been overlooked is the fundamental role that development or technology may play. For instance, “Shulman writes that in order to develop PCK, teachers must identify the most effective ways of depicting [the subject area's] ideas; that is, the most capable comparisons, delineations, cases, explanations, and demonstrates; in a nutshell, the means of representing and preparing the subject which thus make it excusable to others. Fascinatingly, the affordances and constraints of modern techniques and non-computerized technologies utilised to specify and display the educational programmes' content are obligated, developed, and defined in foundational courses”.

2. LITERATURE REVIEW

Anuar, Zakaria, Noor, and Othman (2022) survey of UITM's Fine arts Education major to determine their level of interest in online art education (VAE). Twenty-seven senior Creative Education majors agreed to participate in the survey. Educators' pedagogical, material, and technical chops were all put to the test in this survey (TPK). The research on TK as a whole has

shown how students are able to effectively use technology for educational purposes and have the requisite expertise to appropriately implement into their VAE curricula. The majority of educators believe they have enough CK and are interested in learning how to better integrate technology into their classrooms to boost students' VAE literacy. This study's findings establish TPACK as a reliable method for measuring instructors' receptivity to using technology in the classroom for the purpose of teaching VAE.

Baran, Bilici and Uygun (2022) emphasis placed on using equip teachers to effectively coordinate the use of such innovations or technologies. In Turkey, a TPACK-based professional development programme was designed and implemented to meet this need. The study also found that educators' TPACK grew and was sustained over the course of a year as a direct result of attending the PD. We discuss findings from studies and their practical implications for developing programmes to train future science teachers.

Jang and Tsai (2021) brought attention to the relationship between self-control and success in school. This article sought to investigate how Content Specific Technologies may aid in enhancing future teachers' Technological Proficiency, Pedagogical Content Knowledge (CST). Empirical research revealed significant differences in self-assessed levels at two different junctures. The results of the content analysis showed that by semester's end, teachers had improved their understanding and implementation of ICT-TPACK through the use of psychological performance reporting, and that they had developed the ability to demonstrate this knowledge through the apps of intelligent practises.

Alqallaf and Williams (2021) realised the value of new methods of doing things to help in knowledge sharing. This study was inspired by a desire to examine teachers' beliefs in their own abilities to implement technologically-advanced white board innovations in basic classrooms in publicly-funded schools (TPACK).

Agyei and Voogt (2020) The impact of linked approaches introduced in a scientific teaching innovation course on the development of innovation or technology mix skills, with a focus on the use of spreadsheets, was studied. For this reason, 104 future math teachers from a Ghanaian teacher-training programme choose to enrol in a semester-long science-based course on instructional innovation. Findings show that the time and effort put into the training by the future instructors improved their ability to reconcile innovations.

Chien (2020) dissected the TPCK of 30 Taiwanese students majoring in dialect educator training at a college in the country's north-west via the lens of the English guidebook. Details on assignments, discussions, and presentations were provided. These findings come from the enquiry. As a result of the instructor's display and demonstration as well as the students' own hands-on experiences and command, the group members developed a pronounced awareness of the many types of media devices. Their TPCK was generated and developed by and auditory tools, instructional plans, group discussions, classroom discussions, and personal reflections. Course design suggestions for fostering TPCK development are provided.

Juniu, Scrabis-Fletcher, Zullo, and Russo (2019) examined the beliefs of future PE teachers and their innovation in the classroom to determine the most effective means of teaching students about these topics. Data analyses revealed a strong connection between the perceived level of TPACK possessed by pre-service teachers and the actual level of creativity shown by physical PETE personnel, which included a variety of tactics for actual implementation.

Yelken, Cocuk, Konokman and Pan (2019) suggestion for a research approach built from current components. Pre- and post-tests were used to gather qualitative and quantitative data, respectively, with the use of the specialised knowledge and free-form metaphorical enquiry made possible by technological advancements in the realm of education. Quantitative and qualitative data analysis both required the use of T-tests on sacrifice samples and inductive substance analysis. As a consequence of using the computers to practise telling stories, the future teachers' self-assurance grew in the area of content knowledge acquisition (TPCK). The results of the research showed that pre-service teachers' TPCK improved when they used computerised narrative preparation.

Blackburn (2018) integrated research approach to online education investigates how well-versed online educators are in paedagogy, technology, and content (TPACK). Following this arbitrary plan, nine instructors who had been selected as having very strong TPACK components met individually with the researcher. The investigation's empirical investigations reveal that the xi faculty's level-showing personnel has a great deal of understanding about innovation, content, teaching methods, and technology content. The study's anecdotal findings suggest that teachers in the K-12 teaching sector are engaged in high-impact pedagogical practices.

Chang, Tsai and Jang (2017) applied their TPACK and use of ICT in scientific instruction. There were 806 teachers in Taiwan who were interested in the study, and 164 teachers in

Shaanxi. The results demonstrated that science teachers' TPACK was significantly relevant forms of ICT in Taiwan, but exhibited little variation in Shaanxi. Teachers of science in Taiwan who report using multimedia tools the most have been shown to have significant TPACK differences according to sexual orientation and prior teaching experience. Teachers of science in Shaanxi, where PowerPoint is the most popular ICT, did not show significant sex differences in TPACK overall, but did show significant TPACK differences when it came to imparting information.

Chai, Sang, Koh, and Tsai (2017) explored the beliefs, attitudes, and design inclinations of 394 preservice and 394 active teacher educators with regard to the seven elements of technology pedagogical subject knowledge (DD). In order to find telltale signs of TPACK, this study digs further by using supplementary condition models to examine the ties that exist between TPACK's many parts, as well as CB and DD. The results show that DD is a strong predictor of TPACK and they provide insight into the importance of perspective on planning for TPACK development. Even if the pre-benefit TPACK of teachers could be predicted, CB does not. Furthermore, CB is a very unfavourable predictor of TPACK among in-benefit teachers.

3. OBJECTIVES OF THE STUDY

1. To analyze the impact of Gender of the respondent on “Technological Pedagogical Content Knowledge (TPACK)”.

2. To analyze the impact of Gender of the respondent on self confidence.

3. To analyze the impact of ICT knowledge of the respondent on self confidence.

4. To analyze the impact of ICT knowledge of the respondent on “Technological Pedagogical Content Knowledge (TPACK)”.

5. To analyze the impact of Age of the respondent on self confidence.

6. To analyze the impact of Age of the respondent on “Technological Pedagogical Content Knowledge (TPACK)”.

4. HYPOTHESIS OF THE SUDY

1. Gender of the respondent does not have an impact on "Technological Pedagogical Content Knowledge (TPACK)"

2. Gender of the respondent does not have an impact on self confidence

3. ICT knowledge of the respondent does not have an impact on self confidence

4. ICT knowledge of the respondent does not have an impact on "Technological Pedagogical Content Knowledge (TPACK)"

5. Age of the respondent does not have an impact on self confidence

6. Age of the respondent does not have an impact on "Technological Pedagogical Content Knowledge (TPACK)"

CONCLUSION

HYPOTHESIS I

$H_0$1:- Gender of the respondent does not have an impact on "Technological Pedagogical Content Knowledge (TPACK)"

AS PER: DESCRIPTIVE STATUS OF "TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK)" **TYPE OF GENDER OF TEACHERS**

Descriptive status of "Technological Pedagogical Content Knowledge (TPACK)" of male and female has been analyzed and it is found that mean score and standard deviation of women with reference to "Technological Pedagogical Content Knowledge (TPACK)" are better than the mean score and standard deviation of male with reference to "Technological Pedagogical Content Knowledge (TPACK)".

It can be concluded from this descriptive statistical analysis that both genders has greater integrated "Technological Pedagogical Content Knowledge (TPACK)" but there is no significance difference between male and female with reference to "Technological Pedagogical Content Knowledge (TPACK)".

As per: STATISTICAL TOOLS USED:- INDEPENDENT SAMPLES TEST

it is analyzed that there is no significance difference between male and female with reference to "Technological Pedagogical Content Knowledge (TPACK)". Basic Significance value of data analysis is 0.05 but in this data analysis, null hypothesis is accepted because its significance

value is 0.001. So it is concluded that gender of a respondent has no significance impact on "Technological Pedagogical Content Knowledge (TPACK)".

HYPOTHESIS II

$H_0$2:- Gender of the respondent does not have an impact on self confidence

AS PER: DESCRIPTIVE STATUS OF SELF CONFIDENCE TYPE OF GENDER OF TEACHERS

Descriptive status of self confidence type of male and female has been analyzed and it is found that mean score and standard deviation of women with reference to self confidence type are better than the mean score and standard deviation of male with reference to self confidence.

It can be concluded from this descriptive statistical analysis that both genders has greater integrated self confidence type but there is no significance difference between male and female with reference to self confidence.

As per: STATISTICAL TOOLS USED:- INDEPENDENT SAMPLES TEST

It is analyzed that there is no significance difference between male and female with reference to self confidence. Basic Significance value of data analysis is 0.05 but in this data analysis, null hypothesis is accepted because its significance value is 0.003. So it is concluded that gender of a respondent has no significance impact on self confidence.

HYPOTHESIS III

$H_1$3:- ICT knowledge of the respondent have an impact on self confidence

AS PER: DESCRIPTIVE STATUS OF SELF CONFIDENCE TYPE OF ICT KNOWLEDGE OF TEACHERS

Descriptive status of ICT knowledge of the respondent has been analyzed and it is found that mean score and standard deviation of respondents reply in yes is better than the mean score and standard deviation of reply of respondents in No reference to ICT knowledge of the respondent on self confidence.

It can be concluded from this descriptive statistical analysis that ICT knowledge of the respondent has less integrated self confidence but there is significance difference ICT knowledge of the respondent with reference to self confidence.

As per: STATISTICAL TOOLS USED:- INDEPENDENT SAMPLES TEST

It is analyzed that there is significance difference on ICT knowledge of the respondent with reference to self confidence. Basic Significance value of data analysis is 0.05 but in this data analysis, null hypothesis is rejected because its significance value is 0.052. So it is concluded that ICT knowledge of the respondent has significance impact on self confidence.

HYPOTHESIS IV

$H_0$4:- ICT knowledge of the respondent does not have an impact on "Technological Pedagogical Content Knowledge (TPACK)"

AS PER: DESCRIPTIVE STATUS OF "TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK)" TYPE OF ICT KNOWLEDGE OF TEACHERS

Descriptive status of ICT knowledge of the respondent has been analyzed and it is found that mean score and standard deviation of respondents reply in yes is better than the mean score and standard deviation of reply of respondents in No reference to ICT knowledge of the respondent on "Technological Pedagogical Content Knowledge (TPACK)".

It can be concluded from this descriptive statistical analysis that ICT knowledge of the respondent has great integrated "Technological Pedagogical Content Knowledge (TPACK)" which shows there is no significance difference ICT knowledge of the respondent with reference to "Technological Pedagogical Content Knowledge (TPACK)".

As per: STATISTICAL TOOLS USED:- INDEPENDENT SAMPLES TEST

It is analyzed that there is no significance difference in ICT knowledge of the respondent with reference to "Technological Pedagogical Content Knowledge (TPACK)". Basic Significance value of data analysis is 0.05 but in this data analysis, null hypothesis is accepted because its significance value is 0.002. So it is concluded that ICT knowledge of the respondent has significance no impact on "Technological Pedagogical Content Knowledge (TPACK)".

HYPOTHESIS V

$H_0$5:- Age of the respondent does not have an impact on self confidence

AS PER: DESCRIPTIVE STATUS OF SELF EONFIDENCE TYPE ON AGE OF TEACHERS

Descriptive status of self confidence type of different age groups has been analyzed and it is found that mean score of age group among 40-50 is better than others while standard deviation of

age group among 30-40 years with reference to self confidence type are better than the mean score and standard deviation of other age groups with reference to self confidence type which means all age groups almost at same level as per their standard deviations and mean scores.

It can be concluded from this descriptive statistical analysis that all age groups has greater integrated self confidence type which means there is no significance difference among different age groups with reference to self confidence.

As per: STATISTICAL TOOLS USED:- INDEPENDENT SAMPLES TEST

It is analyzed that there is no significance difference among different age groups with reference to self confidence. Basic Significance value of data analysis is 0.05 but in this data analysis, null hypothesis is accepted because its significance value is 0.001. So it is concluded that age of a respondent has no significance impact on self confidence.

HYPOTHESIS VI

$H_0$6:- Age of the respondent does not have an impact on "Technological Pedagogical Content Knowledge (TPACK)"

AS PER: DESCRIPTIVE STATUS OF "TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK)" TYPE ON AGE OF TEACHERS

Descriptive status of "Technological Pedagogical Content Knowledge (TPACK)" type of different age groups has been analyzed and it is found that mean score of age group among 40-50 is better than others while standard deviation of age group among 30-40 years with reference to "Technological Pedagogical Content Knowledge (TPACK)" are better than the mean score and standard deviation of other age groups with reference to "Technological Pedagogical Content Knowledge (TPACK)" which means all age groups almost at same level as per their standard deviations and mean scores.

It can be concluded from this descriptive statistical analysis that all age groups has greater integrated "Technological Pedagogical Content Knowledge (TPACK)" type which means there is no significance difference among different age groups with reference to "Technological Pedagogical Content Knowledge (TPACK)".

As per: STATISTICAL TOOLS USED:- ANNOVA

It is analyzed that there is no significance difference among different age groups with reference to "Technological Pedagogical Content Knowledge (TPACK)". Basic Significance value of data analysis is 0.05 but in this data analysis, null hypothesis is accepted because its significance value is 0.001. So it is concluded that age of a respondent has no significance impact on "Technological Pedagogical Content Knowledge (TPACK)".

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