

NETS-T Educational Technology Practices of English Medium Secondary School Teachers in Kolhapur City

Queen Hlakanyane^{1*} , Pratibha S. Patankar² and Vidyanand S. Khandagale³

^{1,2,3}Department of Education, Shivaji University, Kolhapur

*hlakanyanequeen@gmail.com (Corresponding Author)

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ABSTRACT

Background: NETS-T Standards for teachers define the knowledge and skills that teachers or educators need to have in order to successfully and effectively integrate technology in teaching and learning.

Purpose: It is essential for every community to know the status of their teachers' NETS-T educational technology practices.

Methods: A questionnaire consisting of 6 educational technology factors, with a number of items or performance indicators, under each factor was administered to 76 Grade 10 English medium Secondary School teachers. The sample included 14 male teachers, and 62 female teachers from 11 schools that were conveniently selected.

Results: Findings were that most teachers strongly agree to the items mentioned under the TOC factor and PPP factor, while most of them agreed to the items mentioned under PDL, AAE, SEL, and TLC factors. A significant statistical difference in the distribution of the average scores of items for pairwise comparisons of some schools was found under TOC, PDL, AAE and PPP items.

Conclusions: There was no significant statistical difference in the distribution of average scores of items for pairwise comparisons of schools under SEL and TLC factors.



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1. Introduction

The full form for NETS-T is National Educational Technology Standards for Teachers. These standards were primarily developed as a framework that guides teachers to effectively integrate educational technology in teaching and learning. The standards were developed by an organisation which is based in the United States of America. The general goal of NETS-T Standards is to promote successful integration of educational technology in teaching and learning. Another goal is to equip teachers with knowledge and skills essential for developing the Z generation's critical and problem solving skills. The NETS-T Standards are also mandated at standardising technology use in education, in order to promote equality in access of educational technology by all students globally. They have been renamed ISTE Standards for Teachers. NETS-T Standards are composed of six performance indicators addressing each factor or standard. Global expectations are identified by each standard. They have

been designed to internationally fit any educational institution, district, or country. The NETS-T performance indicators and standards are also useful for developing tools for assessing teachers' ICT practices in teaching and learning. These assessment tools can be used to measure the teachers' competence of integrating technology in teaching and learning. They can also be used as guidelines for evaluating technology integration by teachers in their teaching and learning.

The first NETS-T Standard is; Technology Operations and Concepts (TOC). The first performance indicator under this standard requires teachers to exhibit basic introductory knowledge, understanding of concepts and skills related to ICT, as described by the ISTE (NETS-T). The second performance indicator under Technology and Concepts indicate that teachers need demonstration on ongoing development in ICT skills and knowledge in order to stay updated with the emerging and current technologies.

The second NETS-T Standard is Planning and Designing Learning Environments, and Experiences (PDL). The first performance indicator under this NETS-T Standard is that teachers need to design evolutionarily learning opportunities that are appropriate. These learning opportunities need to apply enhanced instructional strategies that assist in the diverse needs of students. The second performance indicator is that teachers need to apply current research in learning and teaching with ICT when they are planning for learning and teaching experiences and environments. The third performance indicator is to determine, discover, and evaluate technology resources for sustainability and accuracy. The next performance indicator demands teachers to plan for operation or management of ICT within the framework of instructional activities. The last performance indicator under NETS-T Standard of Planning and Designing Learning Environments, and Experiences challenges teachers to plan strategies that will manage or direct students' learning in an ICT enhanced atmosphere.

The third NETS-T Standard is Teaching, Learning, and Curriculum (TLC). The first performance indicator under the third NETS-T Standard is that teachers need to promote ICT enhanced experiences that deal with students' ICT standards and content standards. The other performance indicator calls for teachers to utilise technology in order to enhance learner centred strategies that cater for the diverse needs of learners. The third performance indicator requires teachers to apply technology in order to enhance learners' high order learning creativity and skills. The last performance indicator demands teachers to supervise or manage students' learning activities in a technology advanced setup or environment.

The fourth NETS-T Standard is Assessment and Evaluation (AAE). The first performance indicator under Assessment and Evaluation NETS-T Standard is that teachers need to use technology to assess learners' content using different assessment techniques. The second performance indicator requires teachers to utilize technology resources for data collection, interpretation of results, and report findings in order to enhance instructional practices and advance students' learning. The last performance indicator challenges teachers to utilize several evaluation methods in order to determine learners' appropriate utilization of technology resources for communication, learning, and productivity.

The fifth NETS-T Standard is Productivity and Professional Practice (PPP). The first performance indicator demands teachers to utilise technology resources to foster a continuous life learning and professional development. The second performance indicator needs teachers to persistently assess and reflect on professional conduct in order to make well informed decisions in relation to the use of technology in support of learners' learning. The third performance indicator requires teachers to use technology in order to enhance productivity. The last performance indicator is that teachers need to utilize technology to collaborate and communicate with parents, peers, and the community in order to enhance students' learning.

The sixth NETS-T Standard is Social, Ethical, Legal, and Human Issues (SEL). The first indicator under the last NETS-T Standard needs teachers to demonstrate, and teach ethical and legal practices relevant to the use of technology. The second indicator requires teachers to utilize technology resources in order to support students with diverse abilities, backgrounds, and characteristics. The third indicator mandates teachers to determine and utilize technology resources that support diversity. The fourth indicator compels teachers to promote healthy and safe utilisation of technology resources. The last one is that teachers should promote equitable access to ICT resources for all learners.

2. Literature review

2.1. The Role Played by ICT in Teaching and Learning

Saravanakumar (2018) argues that ICT breaks boundaries and makes information accessible regardless of students' geographical areas. In this regard, students can easily have access to various projects that are available across the world. This has changed the role of teachers to being that of coaches, mentors, and facilitators. Das (2019) highlighted many benefits of using ICT in teaching and learning, which include; making learning easy, since students' curiosity to learn will motivate them to learn. The continual use and advancement of ICT in education will have a significant influence on what is acquired, how it is acquired, where and when acquisition occurs, who is educating, and who is acquiring knowledge (Oliver, 2002).

ICT improves the quality of education through different interactive platforms among teachers, students, and the society. Given all the benefits of using ICT in education, the major privileges of using ICT is that educational institutions will produce students that are well equipped to work in some workplaces where computers and other technologies are widely used (Das, 2019).

Henderson (2020) posits that although there are obviously some remarkable benefits of using ICT in education, there are some challenges that are evident when integrating ICT in teaching and learning. These challenges include; lack of ICT software and facilities, teachers' lack of ICT skills needed for integrating ICT in teaching and learning, teachers' attitudes towards the use of some ICT tools in teaching and learning, and lack of teachers' knowledge in integrating ICT into instructional techniques. Similarly, a study conducted by Salehi and Salehi (2012) found that barriers to successful integration of ICT in teaching and learning included, lack of technical support in schools, limited access to internet, and limited class time.

2.2. Some Studies Related to Teachers' NETS-T ICT Practices

The study conducted by Crompton (2023) was to establish empirical evidence that indicates that teachers' practices impact positively on the learning of the student. The study used a scoping review methodology, and a transparent protocol was utilized for exploring, determining, and choosing articles that align with ISTE Standards. The study found that all the ISTE Standards practices of the educator have a positive impact on learning. Therefore, the study was considered significant for funders and policy makers.

Elmas (2013) examined the utilization of IT by faculty members in Bologna process in relation to NETS-T standards. The study found that faculty members were experienced in using computers and internet, and can utilise IT to support their learners' practices. They also found that faculty members' use does not exhibit any significant difference according to age, category, gender, experience with internet, and experience with the use of internet.

Sutton (2011) designed a qualitative study aimed at identifying and exploring pre-service technology training experiences of new educators, and determine how effective their teacher preparation program

prepared them with skills and knowledge needed to satisfy the NETS-T Standards. Data was collected by following an instrumental case study. The study used documents, field notes, and structured interviews to collect data. Findings were categorised into three themes, which indicated that there is a gap between technology training of teachers and other dimensions of teacher training, inadequate relevance related to content, and last theme revealed that there is also lack of transfer and retention.

Lewis (2015) determined the relationship between ISTE-T Standards and the role played by technology in the curriculum of preparation program of pre-service teachers. Using a mixed method to collect data, the finding indicated that, at literacy level, pre-service teachers possess minimal ISTE-T awareness. The conclusion of the study was that; when encouraged, pre-service teachers can utilise technology skills to discover technology at individual level.

Study by Çoklar and Odabaşı (2010) investigated the use of educational technology related to NETS-T Standards by education faculty members in Turkey. The study found that faculty members perceived themselves to be having high level of self-efficacy regarding all the NETS-T Standards. They found that faculty members affirmed highest level of self-efficacy for the NETS-T Standard of Productivity and Professional Ethics, and reported the lowest level of self-efficacy for the standard of Social, Ethical, Legal, and Human Issues. There was a difference in gender in particular factors.

3. Research questions

- a) What is the current status of teachers' educational technology practices as per NETS-T Standards according to perceptions of English medium secondary school teachers in Kolhapur City?
- b) Is there a significant statistical difference among schools in educational technology practices as per NETS-T Standards according to perceptions of English medium secondary school teachers in Kolhapur City?

4. Objectives of the Study

- a) To find out the status of teachers' educational technology practices as per NETS-T Standards according to perceptions of English medium secondary school teachers in Kolhapur City.
- b) To find out if there is a significant statistical difference among schools in educational technology practices as per

NETS-T Standards according to perceptions of English medium secondary school teachers in Kolhapur City.

5. Significance of the Study

The United States has succeeded in integrating educational technology in teaching and learning, of which utilising NETS-T Standards was one of strategies that have aided in achieving this milestone. For this reason, it is crucial to find out the status of teachers’ educational technology practices as per NETS-T Standards as a foundational or landmark study for further studies. This may assist the education system of the study area to assess the extent to which they are successfully integrating educational technology in teaching and learning.

6. Limitations and Delimitations of the Study

The area and population of the study was only confined to Kolhapur City, where only grade 10 English medium, SSC and CBSE Secondary school teachers participated. Due to time constraints and other limitations like language barrier and many others, teachers from Marathi medium did not participate. The study is considered a holistic research. The focus was on the overall trends and general patterns, of teachers, rather than subgroups or individuals. This is because studies related to NETS-T Standards are scarce in India, therefore beginning with the study of collective whole may lay a good foundation for further studies.

7. Research Design

The questionnaire consisted of a 5 Likert scale of six NETS-T Standards with total number of 42 items under each standard or factor. The number of items under each factor varied. In establishing validity and reliability, after expert validity, factor analysis was conducted and some items that scored less than 0,5 were removed under the 6 factors. A total of 38 items were retained, which were used to run exploratory analysis. Cronbach’s Alpha was administered for reliability. The Cronbach’s Alpha coefficient value was .890 for the all the items combined together. The next step involved the running of normality test of the data using Shapiro-Wilk normality test. The data was not found to be normal, for this reason, a non-parametric test was found suitable to analyze the data. In this case, Kruskal-Wallis Test was used. The average score

for items under each factor were calculated for each participant in order to determine the overall attitude of the participant for that particular factor. This was followed by determining the mode of the averages of the construct since the data is ordinal.

8. Data Analysis and Interpretation

Table 1: Performance indicator items under Technology Operations and Concepts (TOC)

FN	[1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree] Factor: Technology Operations and Concepts (TOC)
TOC 1	I know how to operate technological devices such as computer, laptop, smart board, smart pen, Overhead Projector etc. for effective teaching process.
TOC 2	I know how to use technological devices such as computers, laptop, tablet for preparing attendance records, exam papers, exam result, reports required for educational department etc.
TOC 3	I know the functions and application of the technological devices such as computer, laptop, smart board, smart pen, Overhead Projector etc. which are available in my school.
TOC 4	I know the basic operations such as MS Word, MS excel, MS PowerPoint, Notepad related to computer/ laptop technologies.
TOC 5	I know how to use technological devices in such a way that reduces the time of the assigned task as well as increase the quality of the assigned task.
TOC 6	I know how to use technological devices effectively to increase productivity and efficiency.

There were 6 items under the first NETS-T factor, which is Technology Operations and Concepts (TOC) that were regarded as performance indicators under the same factor.

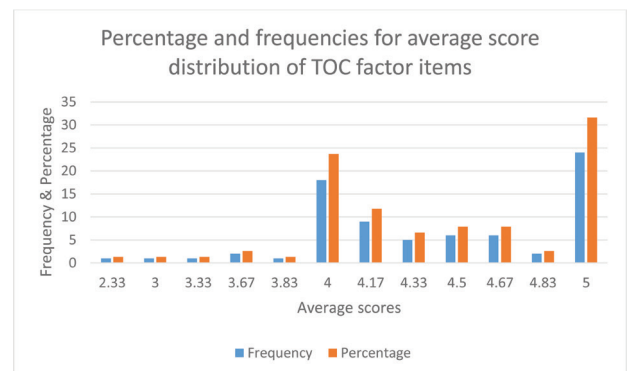


Figure 1: Percentage and frequencies for average score distribution of TOC factor items

There was an indication that most teachers (31.6%) which is approximately 32% strongly agreed to the performance indicators under the TOC factor.

Table 2: Performance indicator items under Planning and Designing Learning Environments and Experiences (PDL)

FN	[1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree] Factor: Planning and Designing Learning Environments and Experiences (PDL)
PDL1	I know how to choose appropriate technological app such as MS Word, MS excel, MS PowerPoint, Notepad to fulfil my subject and topic objectives.
PDL2	I know various websites, and online apps that are most suitable for planning learning activities for my subject and topics.
PDL3	I always discuss with students the benefits of using various technological devices such as computers, laptops, tablets, smart phone to enhance the teaching-learning process.
PDL4	I always search various authentic academic informative sources such as National Programme on Technology Enhanced Learning (NPTEL), Swayam etc. on the Internet to prepare my subject lessons.
PDL5	I always update myself about the use of technological devices such as computer, laptop, smart board, smart pen, Overhead Projector etc. for preparing my subject lesson in my classroom/lab.
PDL6	I always verify the authenticity and suitability of technological online sources such as NPTEL, Swayam, Wikipedia, YouTube channels/ video for student use.
PDL7	I know how technological online sources such as NPTEL, Swayam, Wikipedia, YouTube channels/ video should be used for teaching process to enhance the quality of education.

There were 7 performance indicator items under the second NETS-T factor; Planning and Designing Learning Environments and Experiences (PDL)

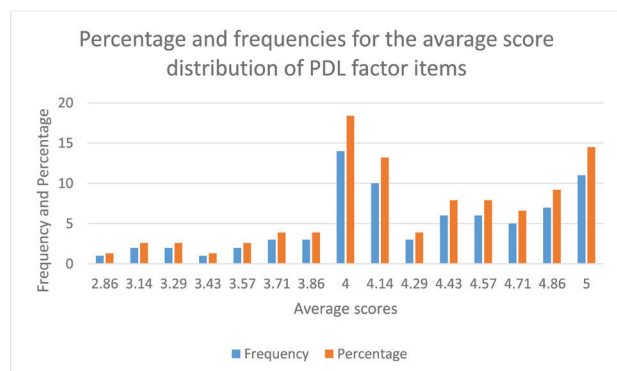


Figure 2: Percentage and frequencies for the average score distribution of PDL factor items

Most teachers; 18.4% (approximately 18%), from the 11 schools, indicated that they agreed to most of the performance indicator items under the PDL factor.

Table 3: Performance indicator items under Assessment and Evaluation (AAE)

FN	[1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree] Factor: Assessment and Evaluation (AAE)
AAE 1	I always use technological sources such as NPTEL, Swayam, Wikipedia, and YouTube channels/videos for a better understanding of the subject concept/ idea by the students.
AAE 2	I always use technological sources such as NPTEL, Swayam, Wikipedia, and YouTube channels/videos to enhance creativity skills among the students.
AAE 3	I always use technology-based measurement and evaluation tools such as various measurement models (personality test, personality type, intelligence and emotional mapping to evaluate student performance.
AAE 4	I always prepare attendance records, exam papers, exam result, cultural and sport activity report with the help of MS office/ online free software's and send it via email, LAN (Local Area Network), or virtual reporting software to my supervisor.
AAE 5	I suggest that students find or design their performance measurements via technological tools such as Rubrics, Scripts, Paired-Marking etc.

There were 5 performance indicator items that were analysed under the AAE third factor of the NETS-T Standards.

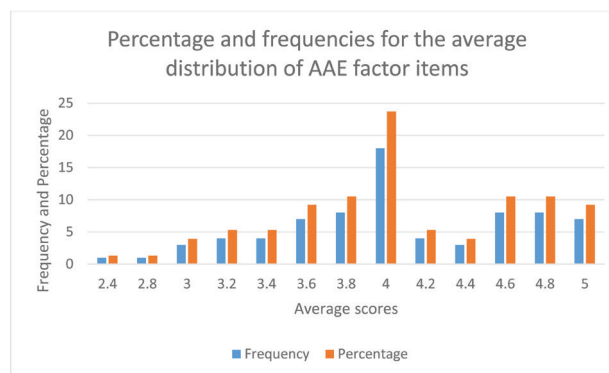


Figure 3: Percentage and frequencies for the average distribution of AAE factor items

Most teachers; 23.7% (approximately 24%) agreed with the performance indicator items representing the AAE factor.

Table 4: Performance indicator items under Factor: Productivity and Professional Practice (PPP)

FN	[1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree] Factor: Productivity and Professional Practice (PPP)
PPP1	I always search on internet to become a more effective teacher in terms of communication, delivering the concept, etc., of my subject, as well as to become a good mentor for my students.
PPP2	I have always wanted to register myself for an online FDP (Faculty Development Program) to develop my teaching skills.
PPP3	There is always an interlink between using technology device (computer, laptop, smart board, MS Office, apps, software) and becoming a more effective teacher in terms of teaching learning process.
PPP4	There is always an interlink between using technology devices (computer, laptop, smart board, MS Office, apps, software) and becoming a more effective academician in terms of preparing attendance reports, exam papers, exam result.
PPP5	I believe that I can keep lifelong learning with the help of educational technology platforms such as NPTEL, Swayam, Udemy etc.
PPP6	I use technological communication platforms such as WhatsApp, School apps, email, and online discussion forums to interconnect between teachers, students, and their parents.
PPP7	I always use new technological tools such as smart boards with electronic pen and online platforms such as NPTEL, Swayam, to become a more effective teacher of my subject.
PPP8	I use technology for increasing the comprehension ability of thinking as well as creating interest of the students in its subject, I always take help from online services such as NPTEL, Swayam etc.
PPP9	I observed how my colleague’s use technology in their teaching process (designing lesson plans, preparing lesson, and delivering lesson) and then I have been adopting and modifying the same technology in my teaching process.
PPP10	I know technology devices, online platforms such as YouTube, educational channels, social media and their impact on educational activities and social life.
PPP11	I can explain to parents how technological devices such as laptops, tablets, smartphones etc., and technological sources such as NPTEL, Swayam etc. are key in enhancing student learning activities.
PPP12	I always use technological apps such as WhatsApp, school app, email to inform students and their parents about various school activities such as sport and cultural events, parent meeting etc. and send the results.

There were seven performance indicator items under PPP factor which were analysed.

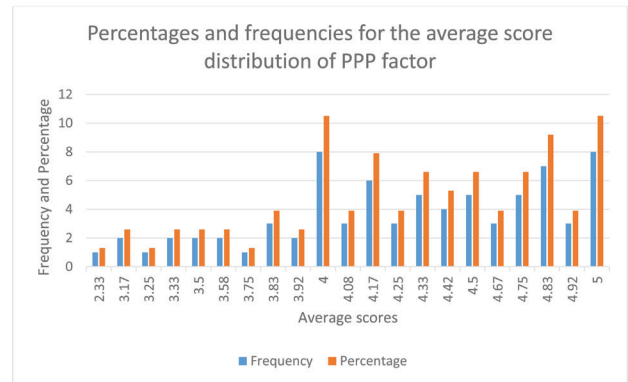


Figure 4: Percentages and frequencies for the average score distribution of PPP factor

Most teachers; 10.5% (approximately 11%), respectively, strongly agreed and agreed to the items representing the PPP factor.

Table 5: Performance indicator items under the Social, Ethical, Legal, and Human Issues (SEL)

FN	[1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree] Factor: Social, Ethical, Legal, and Human Issues (SEL)
SEL1	I must go thoroughly through the rules and regulations for use of technology amended by Indian law.
SEL2	I have detailed knowledge about copyright of software in my school.
SEL3	I must have knowledge of how to protect students from pornography websites during technology use.
SEL4	I have detailed knowledge of the negative impact of internet and social media on the student’s physical and mental health.
SEL5	I know the safety precautions to be taken for safer use of technology for teenagers in schools.

There were 5 performance indicator items representing the factor; Social, Ethical, Legal, and Human Issues (SEL).

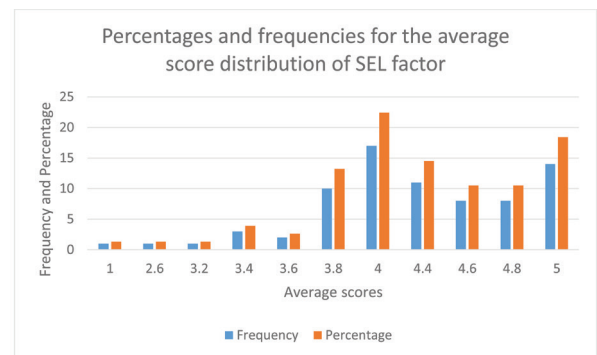


Figure 5. Percentages and frequencies for the average score distribution of SEL factor

Most teachers; 22.4% (approximately 22%) agreed to the items representing the SEL factor.

Table 6: Performance indicator items under the Teaching Learning and Curriculum (TLC)

FN	[1=Strongly Disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree] Factor: Teaching Learning and Curriculum (TLC)
TLC 1	As an educator, I focus on designing a unique lesson plan that fulfils the expectations of all students with different IQ levels.
TLC 2	As an educator who believes in the power of technology, I can create customized teaching activities that meet the unique needs of each student.
TLC 3	As an educator, with the help of technology, I am creating inclusive learning environments for students who may struggle to understand difficult educational objectives.

3 performance indicator items representing the Teaching, Learning, and the Curriculum (TLC) factor were analyzed.

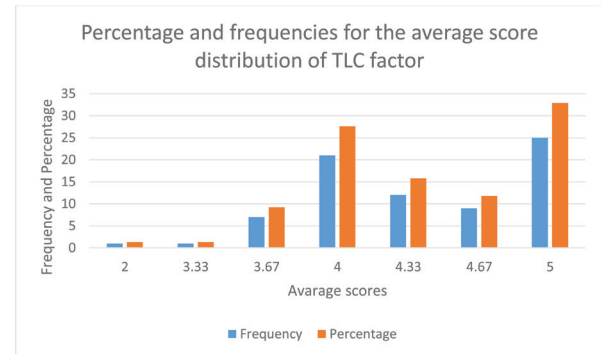


Figure 6: Percentage and frequencies for the average score distribution of TLC factor

Most teachers; 32.9% (approximately 33%) strongly agreed to the 3 items representing the TLC factor.

Table 7: Kruskal-Wallis results for the difference in the distribution of average scores

	TOC items	PDL items	AAE items	PPP items	SEL items	PTA items
Chi-Square	33.316	37.526	34.596	28.352	20.668	32.012
df	10	10	10	10	10	10
Asymp. Sig.	.000	.000	.000	.002	.024	.000

P-value of the Kruskal Wallis Test for the distribution of average score of item scores for; TOC factor, PDL factor, AAE factor, and PTA factor was .000 respectively, signifying a high significant statistical difference of the mean ranks among the 11 schools. P-value for the distribution of average of item scores for PPP and SEL factors is .002 and .024 respectively, implicating a significant statistical difference. For this reason, Post-Hoc Hypothesis (Independent-Samples Kruskal-Wallis) of the average distribution was conducted. The focus was on Pairwise comparison of the 11 schools.

9. The Difference in the Distribution of Average Scores of Items Under the 6 Factors

9.1. TOC Factor Items

There was a significant statistical difference of the distribution of average scores of items under the TOC factor between Kolhapur English School versus Shri Hanumantrao Chate School, and Kolhapur English School versus Dr. D. Y. Patil Academy’s Shantiniketan. Comparing Kolhapur English School

and Shri Hanumantrao Chate School, the adjusted P-value of the distribution of average item scores under TOC factor was .007, indicating a significant statistical difference of the distribution of average scores between the 2 schools. The adjusted P-value of the distribution of average item scores under TOC factor for Kolhapur English School and Dr. D. Y. Patil Academy’s Shantiniketan was .014, implicating that there is a significant statistical difference of average item scores under TOC factor between the two schools.

9.2. PDL Factor Items

There was a significant statistical difference of the distribution of average scores of items (adjusted P-value of .029) under the PDL factor between Kolhapur English School versus Shri Hanumantrao Chate School, and Kolhapur English School versus Shri Hanumantrao Chate School. Comparing the previously mentioned schools, the adjusted P-value was .038, also indicating a significant statistical difference of the distribution of average scores of items between the two schools.

9.3. AAE Factor Items

A significant statistical difference for the distribution of average scores of items under the AAE factor between Shri Vasantarao Jayvantrao Deshmukh and Shri Hanumantrao Chate School was adjusted P-value of .008, indicating a significant statistical difference for the distribution of average scores of items. There was also a statistical difference (adjusted P-value of .029) for the distribution of average scores of items under the AAE factor between Shri Vasantarao Jayvantrao Deshmukh and Fort International Academy.

9.4. PPP Factor Items

There was a significant statistical difference for the distribution of average scores of items under the PPP factor items between Private English School and Dr. D. Y. Patil Academy's Shantiniketan at an adjusted P-value of .040, indicating a statistical difference for the distribution of average scores of items under the PPP factor items.

9.5. SEL Factor Items

There was no significant statistical difference observed for the distribution of average scores of items under the SEL factor items among the 11 schools, indicating that all teachers' NETS-T educational technology practices under SEL factor do not differ significantly.

9.6. TLC Factor Items

There was no significant statistical difference observed for the distribution of average scores of items under the TLC factor items among the 11 schools, indicating that all teachers' NETS-T educational technology practices under TLC factor do not differ significantly.

10. Findings and Discussions

Most teachers, from the 11 schools, (31.6%, approximately 32%) and (10.5%, approximately 11%) strongly agreed to the items mentioned under Technology Operations and Concepts (TOC) factor and Productivity and Professional Practice (PPP) factor. This implies that teachers are well versed with the basic skills and knowledge of operating educational technology gadgets. Teachers are also well equipped with the knowledge of functions and application of educational technology devices, and their operations. It is also evident that teachers have full knowledge of how

to use educational technology effectively in teaching and learning activities. Another finding is that teachers have a great capacity of searching on the internet so that they can be more effective in content delivery of the subject matter. It is evident that teachers use communication platforms, new technology tools, in order to enhance the comprehension, interests, and thinking capacity of their students. There is also an indication that teachers collaborate by observing their fellow teachers using educational technology in their teaching processes. It is evident that teachers know the importance of educational technology on educational activities, hence can explain how important these educational technologies are to parents. Most teachers agree (approximately 18%, 24%, 22%, and 28%, respectively) to items under the PDL factors, AAE factors, SEL factors, and TLC factors.

There is a significant statistical difference in the distribution of TOC items average scores between Kolhapur English School and Dr. D. Y. Patil Academy's Shantiniketan. For all other schools, there was no significant statistical difference between the paired schools. This implies that teachers from Dr. D. Y. Patil Academy's Shantiniketan strongly agreed to the items under TOC factor more than Kolhapur English School teachers. There was also a difference in the distribution of PDL items average scores between Kolhapur English School paired against St. Xavier's High School, Fort International Academy, Shri Hanumantrao Chate School, and Dr. D. Y. Patil Academy's Shantiniketan. This implicates that more teachers from St. Xavier's High School, Fort International Academy, Shri Hanumantrao Chate School, and Dr. D. Y. Patil Academy's Shantiniketan agreed to the items under PDL factor more than the teachers from Kolhapur English School. A significant statistical difference was found in the distribution of PPP items average scores between Private English School and Dr. D. Y. Patil Academy's Shantiniketan, meaning that teachers from Dr. D. Y. Patil Academy's Shantiniketan strongly agreed/agreed to items under the PPP factor more than teachers from Private English School. There was no significant statistical difference on the distribution of items under TLC factor and SEL factor between the school pairs.

11. Recommendations

- Teachers need to be imparted with more skills and knowledge related to items under AAE factor, SEL

factor, and PTA factor, since most of them agree, instead of strongly agreeing to the items.

- Kolhapur English School teachers can collaborate with teachers from Dr. D. Y. Patil Academy's Shantiniketan in order to upgrade themselves with the TOC items knowledge and skills.
- Kolhapur English School teachers can collaborate with teachers from St. Xavier's High School, Fort International Academy, Shri Hanumantrao Chate School, and Dr. D. Y. Patil Academy's Shantiniketan in order to upgrade their skills and knowledge related to items under the PDL factor.
- Shri-Vasantrao Jayvantrao Deshmukh can collaborate with Shri Hanumantrao Chate School, and Fort International Academy, in order to improve their educational technology skills related to items under AAE factor.
- Further studies that would cover; different theoretical framework, experimental design studies, a larger sample, different school mediums, different boards, other variables, expanded methods of data collection, different boards, and other concepts; are recommended.

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Conflict of Interest

Authors have no conflicts of interest.

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Chitkara University, Saraswati Kendra, SCO 160-161, Sector 9-C,
Chandigarh, 160009, India

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