Impact of Technology Readiness and Techno Stress on Teacher Engagement in Higher Secondary Schools

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Abstract

Rapid technology advancements resulted a fundamental shift in the education sector which redefined the teaching-learning process and teacher engagement. Based on numerous studies on work engagement models and technology readiness, this study explores, how the teachers' readiness to embrace educational technologies, impact on teacher engagement. With stratified cluster sampling model, data were collected from principals, managers, students and 122 teaching staff from the Higher Secondary Schools of Kerala participated in this quantitative study using standardized tools. The study affirmed that age has negative relation with technology readiness and teacher engagement shows an organic technology adoption trend than a disruptive style. Teachers were highly engaged with students-colleagues and varied across experience/age groups. Technology readiness factors positively impacted on social engagements with students-colleagues. As education technology usage is exponential, more future research is needed.

Keywords: Technology Readiness, Teacher Engagement, Work Engagement, Techno Stress

I. Introduction

Education has a pivoting role in shaping the future leaders of the nation and world. Every country is heavily investing in up-grading education technology to reap the first mover edge, without which the society can't survive for long ahead (Adams, 2018; Collins & Halverson, 2018). The effectiveness of the today's education system depends heavily on the breadth and depth of the knowledge-skill, imparted through the Digital Learning Environments- DLE within a curriculum backdrop (Langer & Yorks, 2018). Studies had suggested that teacher interactions and their devoted engagement in teaching-learning process at the Higher Secondary Schools or K-12 is vital for effective students' learning, as teachers' role is essential even in digital era (Huang, 2018; Sharma & Kamal, 2020; Xu & Ko, 2019). Teacher engagement has a direct relation to the students' learning process, and it act as a 'human factor' -referred in the Hawthorn experiment- to catalysis education process (Gil-Flores, Rodríguez-Santero, & Torres-Gordillo, 2017).

The education philosophy of parent-students' community was encircled around the personification of education with their teacher. Hence, teacher engagement was counted as the critical success factor in school education system, as the engaged workers were the backbone of organizational success (Sharma & Kamal, 2020). Studies had proven that engaged employees demonstrate enthusiasm, involvement and commitment while contributing to their organization's productivity and performance. Organizations benefit from creativity, innovation, and problem-solving efforts of engaged employees. Meanwhile, the non-engaged employees lack energy or passion related to their work (Cesário & Chambel, 2017). Even in today's digital education system the faculty engagement is a critical factor for students' self-regulated personal learning beyond the normal school hours (Barr & Askell-Williams, 2020; Xu & Ko, 2019).

Teacher Engagement is evidently distinct from general 'work engagement' because, teachers' committed interaction with students (social engagement) and emotional attachment with school environment are indispensable for students' success, even in the automated era (Klassen, Yerdelen, & Durksen, 2013; Perera, Vosicka, Granziera, & McIlveen, 2018). The students are readily adopting technology enabled learning systems due to their 'digital native' nature and for the teachers' the technology incorporation became a herculean task due to their 'digital immigrant' nature (Kirschner & De Bruyckere, 2017). Studies indicated that technology incorporation induced an anxiety factor and technostress in teachers and were more hesitant to embrace the technology than the industry employees (David Agogo & Traci Hess, 2015; Li & Wang, 2020; Razak, Alakrash, & Sahboun, 2018; Sun, & Mei, 2020). The inevitability of technology adoption and 'technology determinism' in education system reduces teacher engagement and lead many teachers even to the verge of burn out stages (Agogo, 2015; Califf & Brooks, 2020). The overemphasis on inevitability of technology adoption may negatively affect the less technology ready teachers and their teaching engagement (Getto, 2020; Lewin, 2016; Webster, 2016). This study is aimed to address how the affinity to technology (Technology Readiness) and technostress are affecting teacher engagement and thereby the effectiveness of education system as a whole. This study is more relevant as the Federal State of Kerala, India, is undergoing massive and unparalleled technology incorporation in education sector with massive investment in IT infrastructure, smart classrooms, Free WiFi hubs and regular teacher-technology-trainings under the Kerala Infrastructure and Technology for Education (KITE), Government of Kerala (KITE, 2021; Joseph & Thomas, 2020; Mourtzis, 2018). The researches having long teaching experience with active involvement in technology adoption process in education systems, find it a competent area to research with and contribute for the future teacher technology trainings, policy implementations and to the new virtual leaning mode emerged due to Covid-19 impact.

II. Relevant literature

a. Work Engagement

The critical success factor of any organization is the Work Engagement of the employees and it contribute heavily towards profitability through the 'esprit de-corps' or belongingness among the members of the workforce. The positive relationship of varying degrees of work engagement was brought to light through many studies related to the in-role and extra-role performance, business unit performance and client satisfaction (Dubbelt, Demerouti, & Rispens, 2019; Samsudin, Saputra, & Abdinegoro, 2020). The work engagement is a positive aspect of work fulfilling, involvement and work-related state of mind that is characterized by vigor, dedication, and absorption (Bakker, Schaufeli, Leiter, & Taris, 2008; Liu, 2019; Schaufeli, Salanova, González-Romá, & Bakker, 2002). Many studies were done around the work engagement and according to the engagement theory of Kahn and Heaphy, (2013) multiple factors affect the employee's engagement and disengagement in organizational work atmosphere as -individual, interpersonal, group, intergroup and organizational levels. These factors correspond to the physical, cognitive, and affective domains of the workers who prefer to create their own work atmosphere in the organizational backdrop called 'preferred self' in every activity (Kahn & Heaphy, 2013; Liu, 2019; Samsudin et al., 2020). This specific and individualistic contribution of each employee induce a personalized achievement factor in psycho- cognitive-affective domains and which in turn help them to better engage in their jobs.

The work engagement was researched vividly with multiple human resource conceptual frames as the Kahn's (2013) engagement and disengagements, new versions of 'Maslach Burnout Inventory-MBI' items, the grounded theories of 'individuals' expression of themselves' in the work atmosphere and other recent theories of Employee Involvement. The three psychological theories as Conservation of Resources Theory, the Social Cognitive Theory, and the Broaden-and-Build Theory were served to better understand the engagement of the workers in their job (Garg, Murphy, & Singh, 2021; Kahn & Heaphy, 2013; Maslach, & Leiter, 2017; Schaufeli et al., 2002). The Utrecht Work Engagement Scale (UWES) of Wilmar Schaufeli and Bakker which undergone multiple revisions was constructed on three engagement elements- vigour, dedication, and absorption- the extend of which found to reduces the burnout elements- exhaustion, inefficiency and cynicism- in the workers (Dimitriadou, Lavidas, Karalis, & Ravanis, 2021; Schaufeli et al., 2002). Utrecht Work Engagement Scale (one having 17 item – with more internal reliability and construct validity than the 9 item-scale scale) is extensively used in the industry sector to measure the work engagements and address the burnout issues of the employees (Dimitriadou et al., 2021). Further deliberations on employee dedication element resulted in the development of Job Engagement Scale (JES) to measure the engagement of the workers (Rich et al., 2010). The Oldenburg Burnout Inventory (OLBI) which simultaneously measured the engagement/burnout factors, brought to light that, the burnout dimension seemed to be opposite of the 'dedication' dimension of the employee engagement (Demerouti, Mostert, & Bakker, 2010). The service sector jobs demanded more personalized self and dedication, expressed through emotional and social engagements as in education sector and customer relationship regimes, which were not fully addressed in the above measurement studies.

b. Teacher Engagement

Teaching is a unique profession, where the teacher engagement is distinctly different from work engagement in general. Teacher engagement consisted of teacher competence, autonomy, and interpersonal relationships (Yerdelen, Durksen, & Klassen, 2018). The 'competence' dimension of the teacher engagement is the effectiveness of accomplishing the defined educational outcome by exploring and manipulating available educational environments. 'Autonomy' is the psychological

freedom or flexibility available to the teachers in organizing the academic related activities within the academic time frame. Creating and fostering the 'interpersonal relationship' is counted as the most important success promoting factor in education, which not only foster the student's learning process but also creating a sense of personal accomplishment in teachers (Van den Broeck, Vanteenkiste, De Witte, Soenens, & Lens 2010). Arnold B. Bakker (2011) denoted that autonomy, interpersonal interactions and opportunities for development were positively correlated with faculty engagement.

As teachers substantially differ in engagement models, they expect higher autonomy for preferred self in every activity interwoven with networked interaction in their workplace (Kahn, 1990). Interpersonal interactions are esteemed in learning process as the subject matter of their concern is human beings who are more concerned about the nonverbal clues of the relationship than of the official learning channels. Faculty engagement contributes to higher levels of academic freedom and flexibility to maintain an innovative and creative teaching models in the classrooms to accomplish advanced student learning outcomes (Sharma & Kamal, 2020; Sudibjo & Sutarji, 2020). The higher level of teacher engagement provides an effortlessness or free-flow in education process in which teachers and students could fully immersed in learning process with a feeling of energized focus, full involvement and enjoyment as proposed by Mihaly Csikszentmihalyi (Csikszentmihalyi, 1997, 2020). Advanced teacher engagement levels can lead to higher order of learning outcomes for the students, initiated through the self-regulated learning, as the students use resources available in the virtual modes, innovative personal learning styles and prior outcomes in developing learning strategies (Sharma & Kamal, 2020; Sudibjo & Sutarji, 2020; Xu & Ko, 2019).

The interpersonal belongingness and increased teaching engagement could transform the teachers to be amalgamated with the organization vision, mission, and work culture with a measurable attachment with their job, workplace associates and the organization itself (Durksen, Klassen, & Daniels, 2017; Liu, 2019). Teacher engagements immerse them emotionally, physically, and intellectually while performing their teaching function (Kahn, 1990, Kahn & Heaphy, 2013). The engaged teachers not only regular in their workplace, but their increased level of psychological presence manifest in belongingness to teaching focus, attentiveness in individualized students' learning progress, job integration with their diversified roles, internalized personal sacrifices for the organizational development and high levels of organizational identification (Barr & Askell-Williams, 2020; Liu, 2019). These engagement features are the manifestations of teacher's cognitive, emotional, social domains which are rather distinctively underpinned from the general work engagement in non-educational sectors (Saks, 2006; Klassen et al., 2013). Based on these dimensions Robert M. Klassen et al. has developed separate 16 item Engaged Teacher Scale- ETS to measure the teacher engagement without prejudice to the leanings of William A. Kahn (1990), WB Schaufeli and Arnold B. Bakker (2008) and others who studied extensively the workers' engagement with burnouts inventories as JES, OLBI, UWES etc. (Klassen et al., 2013). Engaged Teacher Scale- ETS addresses interpersonal connectedness of the teacher jobs with students and colleagues as well as their emotional engagement with teaching environments. (Durksen et al., 2017). The ETS measures the cognitive, emotional, and social domains of the teacher engagement with 16-items, divided in to four dimensions as Cognitive Engagement- CE, Emotional Engagement- EE, Social Engagement with Students- SES and Social Engagement with Colleagues- SEC. The cognitive Engagement domain consisted of philosophical/conceptual and physical aspect of teacher engagement; whereas, the emotional engagement is manifested through excitement, love, and happiness associated with teaching process. The social engagement is an interpersonal relational realm of the teachers, associated personally with colleagues and students. The interpersonal relationship with colleagues provided support, belongingness, esteem, and peer learning which enhanced teaching effectiveness. The social engagement with students, contributed for the psychological presence of the teachers, beyond the physical school environments. It includes the teachers' feeling togetherness and attachment with sympathy, warmth of relatedness and appropriately understanding their feelings (Durksen et al., 2017;

Klassen et al., 2013). This study aptly adopts 16-item Engaged Teacher Scale- ETS to measure the teacher engagement in digital technology enabled learning environment (DLE) of the higher secondary schools under study.

c. Technology Adoption in Learning Environment

The education system throughout the world is remodelled with the myriad of emerging technology innovations and the countries are heavily investing for reaping the technology first-mover benefits by incorporating it in education system to form the workforce and leaders in par with expectations of the future. Allan Collins and Richard-Halverson urges to reap the benefits of this ultimate educational technology innovations, which opened a divergent learning models from memorization to lifelong flexible learning with 'three encapsulated concepts of customization, interaction, and control' (Collins & Halverson, 2018). The millennium generation were initiated education process with these conceptualized flexible frames whereas, their teachers trying hard to be fitted into these educational technology platforms (Agogo, Traci Hess, 2015; Ahlers, 2016).

Many theories have been proposed to understand the complex process of rapid technology adoption that occurred after the world war-II. The technology adaptation-diffusion process is mainly explained with the Everett Roger's theory of 'Diffusion of Innovations'-(DoI) model formulated in 1960-62, which under gone a serious of revisions through subsequent researches (Rogers, 1995, 2010; Dearing & Cox, 2018). The technology diffusion process is determined by the four elements as: effectiveness of communication channels, time factor, technology innovation itself and the social eco system in which the technology is propagated. Based on the propensity to absorb technology and its time factor, Everett Rogers identified five levels or stages in Technology Diffusion process and they are called innovators, early adaptors, early majority, late majority and laggards with respect to the adoption time (Rogers, 1995; 2010; Punie, Christine, Redecker., 2017; Avis, 2018; Joseph & Thomas, 2020).

Many studies were conducted along with the swift advancement in technology expansion and considering the 'attitude of users, perceived usefulness of the technology and perceived ease of using it' in the work place, Fred D. Davis proposed Technology Acceptance Model-TAM, adapted from Theory of Reasoned Action-TRA and widely used as the model to study for technology acceptance (Davis, Bagozzi, & Warshaw, 1989). Modifications of the TAM models as Modified TAM, TAM-2, TAM-3 models, Unified Theory of Acceptance and Use of Technology (UTAUT) were formulated through the technology adoption studies (Agogo, 2015; Joo, Lim, & Kim, 2016). Technology adoption frame works, as TPACK (Technological Pedagogical Content Knowledge), by Punya Mishra and Matthew J. Koehler, integrated the technology adoption process in education system with stressing Technological Content, Pedagogical Content and Knowledge Content elements which is widely accepted (Dong, Xu, Chai, & Zhai, 2019; Koehler, & Mishra, 2009; Joo, Park, & Lim, 2018). These studies were concentrated around the technology adoption process with respect to the features of technology, however, the disparity in individual technology affinity across the generations was not taken into account in those studies.

d.Technology Readiness of the Teachers

The disparity in individual technology affinity across the generations was affirmed through the studies of Marc Prensky who denoted the population categories as with digital immigrant and digital native nature. Adoption of technology enabled learning process with the paradigm-shift from traditional models to modern digital pedagogies, significantly affected the engagement of the digital immigrant natured teachers (Prensky, 2001, 2010). School administrators and faculty have to possess technology ready inclination for adopting millennium models of teaching-learning environments (as Digital Learning Environment- DLE, Personal Learning Environment-PLE, Social Learning Environment-SLE), which transformed the traditional interactions of teachers and

learners; teachers were reconsidered from Sage on the Stage to Guide on the Side (Collins & Halverson, 2018; Lim & Newby, 2019). Integrating technology into teaching-learning became a complex process in which technology ready teachers foster this integration readily and others may encounter a number of difficulties as negative attitudes, beliefs and unwillingness incorporate technology which infuses an alienation and reduces their engagement gradually (Agogo, 2015; Efilti & Çoklar, 2019).

Based on the Diffusion of Innovations, TAM models and other relevant frame works, A. Parasuraman denoted that apart from the existing technology adoption models, the impact of individual characteristics or affinity to embrace technology played a major role in adoption process and this deviation was vividly observed across generations and ages (Parasuraman, 2000). The Technology Readiness Index (TRI), developed by A. Parasuraman addressed this individual specific attitudinal difference in technology adoption process than other models, which addressed the technology adoption with respect to ease of use and usefulness in a device specific manner (Parasuraman, 2000; Rojas-Méndez, Parasuraman, & Papadopoulos, 2017).

The 'Technology-Readiness- TR, is a construct which refers to people's propensity to embrace and use new technologies for accomplishing goals in home life and at work' (Parasuraman, 2000). It consisted of two paired dimensions as:

- Contributing factors for technology acceptance: Optimism and Innovativeness
- Inhibiting factors of technology adoption: Discomfort and Insecurity

The Technology Readiness Index -TRI 1.0 is a registered 36-item scale with four dimensions, tested across generations to measure technology readiness of the populations. It is used in service as well as production sectors with validity and reliability. Teacher population exhibits distinct individual specific attitudinal difference in 'Technology Readiness- TR' or Technology Quotient- TQ and like to enjoy more 'autonomy' dimension for 'preferred self' in teaching process than to other organizational workers (Kahn, 1990). So, TRI 1.0 scale is adopted in this study with permission to measure the technology readiness of the teacher population under study.

III. Research Methodology

This study was aimed to address: how the teachers' affinity to technology (Technology Readiness) is affecting their teacher engagement? How the age and experience of the teachers influence their technology readiness and their engagement? How the education technology adoption process is viewed by the students and management?

Based on the above research queries the study was aimed

a. To identify the impact of technology readiness of the teachers on their teacher engagement in HSS.

b. To study the influence of age and experience on the technology readiness and teacher engagement.

c. To understand the teacher engagement and technology adoption in HSS teachers

d. To understand the technology adoption in HSS with respect to the students' and management perspective.

From the review of related literature, it is formulated that

a. Technology readiness is negatively related with ages/experience

b. There is no significant relation between Teacher Engagement and age/experience group

c. There is no significant relation between Teacher Engagement and their Technology Readiness

The study falls under the descriptive research design with cluster sampling model. The population under study was the permanent teachers of the Higher Secondary Schools with sampling frame limited to Kannur and Kasaragod, Kerala. Preliminary field study interviews were conducted among teachers, students and administrators to assess the population model. Focus group discussions were conducted to understand the student's feedback on the use of digital learning facilities at school level.

The stratified sampling model was based on the categorization of the Higher Secondary Schools (HSS) into Government sector, Government aided sector and unaided-center syllabus sector. 135 responses were collected from teachers 30 HS schools in cluster sampling model and 122 samples were taken as complete. Permission for data collection was obtained from the state level KITE authorities and informed consent was received before the data collection from every school principals and staff. Respondents' basic demographical data, except personal identification details, were collected through the printed physical instruments. Data were collected from 30 principals, 20 managers of those 30 HS schools (10 HS schools were in government sector, without local managers) through detailed discussions and 80 students from HSS were participated in the focus group discussions. Discussions in details were conducted with teachers after the data collection to access their teacher engagement and technology readiness. The analysis was done with MS Excel 2016 and IBM SPSS v.21. The data coded, secured from unauthorized access and the code of ethical research is maintained throughout different stages of this research.

a. Measurement tools

This study uses the 'Engaged Teacher Scale- ETS' developed by Robert M. Klassen for measuring the teacher engagement. Technology Readiness Index- TRI 1.0 developed by Parasuraman. The researchers received adequate permission to use these tools for this research purpose. Assessment tools were administered in printed form with a stratified cluster model among the HSS teachers with permanent status of appointment and collected the responses in Likert scale as 1= Strongly disagree to 5=Strongly agree.

b. Engaged Teacher Scale- ETS

Klassen et al. (2013) intended to create a tailor-made teacher engagement measure offers the advantage of including content that reflects the unique characteristics of teachers and the teaching context and tested as applicable universally (Klassen et al., 2013; Yerdelen, Durksen, & Klassen, 2018). The Engaged teachers Scale- ETS is a 16-item scale, developed to address the three domains predominant in the teachers' engagement at work place which falls in four categories as:

- Cognitive Engagement- CE: Cognitive Engagement consisted of 4 items that influence teachers' physical availability to the students and their rational engagement in the teaching process.
- Emotional Engagement- EE: It is a 4-item scale measuring the emotional level of the teacher with learning process. The items express teacher's level excitement, love, happiness in associating with teaching.
- Social Engagement with Students- SES: Interpersonal relationship is crucial in teaching field as the subjects are human beings. These 4-item scales measure how the teacher is personally associated with students and this is considered as the major elements which contributed the engagement of the teacher. It includes the teachers feeling togetherness and attachment with sympathy, warmth, understanding their feelings etc.

- Social Engagement with Colleagues- SEC: Teachers value more collegial relationship in the workspace than the industry workers. These 4-item scales measure their interpersonal relationship in technical and personal aspects.

c.Technology Readiness Index- TRI 1.0

Technology Readiness of the teachers were assessed using TRI 1.0 scale adopted from A. Parasuraman. These scales were formed to measure the 'propensity of the users to embrace technology' which varies from individual to individual (Parasuraman, 2000, p38). The TRI 1.0 has battery of 36 items with four divisions to measure the dimensions of Optimism-10 items, Innovativeness-7 items, Discomfort-10 items and Insecurity-9 items; the first two are contributors of technology adoption, while the other two inhibits the technology adoption process as defined as:

- Optimism: A positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives.
- Innovativeness: A tendency to be a technology pioneer and thought leader.
- Discomfort: A perceived lack of control over technology and a feeling of being overwhelmed by it.
- Insecurity: Distrust of technology and skepticism about its ability to work properly.

Of these four dimensions, optimism and innovativeness are drivers of technology readiness, whereas discomfort and insecurity are inhibitors (Parasuraman, 2000; Elliott et al., 2008).

IV. Results

The overall sample resembles the population under study in terms of gender, age group, experience, qualification and graduate specialization. All respondents are B.Ed. qualified teachers appointed in permeant role, majority were married and settled. The tools adopted (TRI 1.0 & ETS) were with proven reliability and validity score and are confirmed in this study too.

The mean value of the TRI of the teachers were above the average (3.13±.468) with acceptable Cronbach's α (.767) and that of the ETS is reported as high (4.25±.463; Cronbach's α=.872). The section wise details are in table no 1, along with Construct, item nos, mean value, Std Deviation and Cronbach's α. The Cronbach's α values are above accepted limit of 0.6, to confirm the internal consistency of the data (Taber, 2018). The SD of the optimism (±.864) is higher to other constructs and all the subscales of the ETS exhibit higher engagement with rather lower deviation.

Constructs	Items	Mean	Std. Deviation	Cronbach's alpha
Optimism	10	3.630	.8635	.747
Innovation	7	2.898	.6811	.794
Discomfort	10	2.804	.5246	.636
Insecurity	9	3.190	.6599	.759
TRI	36	3.133	.4675	.767
Cognitive. Engagement	4	4.243	.5834	.745
Emo. Engagement	4	4.383	.4801	.609

Social Engagement Student	4	4.055	.6722	.775
Social Engagement colleague	4	4.303	.6736	.869
ETS	16	4.246	.4624	.872

Table 1: The list of constructs, number of items, Mean, SD- standard deviation, and Cronbach alpha coefficients of the items under study

a. *Impact of age and experience on TR*

The technology readiness of teachers with respect to the 'age group' and 'experience group' reported a statistically significant difference in the variance analysis (one -way Analysis of Variance) *F(3, 118)* =4.336, *p*= .006); and in the 'experience group', it is *F(4, 117)* =2.781, *p*= .030). The experience and age of the teachers under study were negatively correlated to the technology readiness (Pearson correlation, r = -.254, *p=.005*; r = -.307, *p =.001* respectively). These results agree with the earlier studies on the impact of demographical variables on Technology Readiness of population (Parasuraman, 2000; Rojas-Méndez et al., 2017). The same was expressed by the teachers during the in-depth open interview that many experienced teachers (above 10 years) felt it difficult to incorporate the technological tools prescribed/suggested in the curriculum and the senior teachers (above 45-50 years) reported that they feel it very difficult to undergo the KITE or similar training as they need more time to get familiarized with the terms and usage of the technology tools like Samgra, open office system, solving issues of connectivity during the class, searching for apt materials etc. They opinion that the traditional methods are best for the teaching and they incorporate the traditional pedagogy in their classes for better satisfaction/engagement.

b. Impact of age and experience on ETS

The teacher engagement with respect to the 'age group' and 'experience group', had a statistically insignificant difference in the variance analysis (one -way Analysis of Variance) *F(3, 118)* =2.571, *p*= .057; *F(4, 117)* = 1.029, *p* = .395 respectively. The study population shows a negative correlation between the ETS in terms of experience and age groups, with p-values were nearing to significant mode (Pearson correlation, r = -.157, *p* = .084; r = -.174, *p* = .056 respectively). On detailed discussion with the teachers, it is learned that many teachers were liked to engage with students and colleagues. The middle-aged teachers (30-40yrs) suggested that they were not caring for teacher engagement in their earlier years of career and slowly they took it as their passion to engage in teaching process fully. On focus group discussion it is reported from the students that the senior teachers also associate with students in a better way as the other middle-aged teachers do. The analysis reports the same trend that even though the age and experience of the teacher plays a role in teacher engagement, the disparity within the group is not very much manifested.

c. Impact of Technology Readiness on Teacher Engagement

The descriptive statistics of Technology Readiness-TRI of the teachers under study scored above average- TR (3.133±.468) with its four dimensions as Optimism (3.63±.864), Innovation (2.898±.681), Discomfort (2.804±.525) and Insecurity (3.1903±.66), when collected in 5point

Likert scale. The score of Engaged Teachers-ETS also recorded in 5-point Likert scale and recorded a high engagement with score total ETS (4.25±.46) and its sub-dimensions as Cognitive Engagement (4.24±.58), Emotional. Engagement (4.38±.48), Social Engagement Student (4.1±.67), Social Engagement colleague (4.3±.67).

The Technology Readiness of the teachers is significantly correlated (Pearson correlation, r =.316, *p*=.003) with teacher engagement. The relations between the sub-dimensions of TR and ETS are shown in table no-2. The contributing sub-factors of TR as Optimism (r =.341, *p* =. 000) and Innovation (r = 299, *p* =.001) were positively contributed for the teacher engagement, while the Insecurity factor (r=.096, *p* = .291) put an inhibition to ETS (in an insignificant manner). Teacher's Technology Readiness positively contributed for the Social Engagement of the teachers with Students (r= .383, *p*= .000) and colleagues (r= .278, *p*=.002) and contributed for their Emotional Engagement (r=.306, *p*=.001) in teaching learning process. It is to be noted that the cognitive engagement (physical and rational engagement) of the teachers were not at all affected by the technology readiness or by their sub-dimensions significantly.

From the detailed discussion with teachers, principals and managers of the HSS, it is reported that teachers who are efficient in the technology usage with teaching tools and multimedia class rooms, were well appreciated among student groups and were functioning as the technology facilitators for fellow staff. The students during the focus group discussion, recommended those teachers who could support them with digital teaching and they prefer to approach those for further clarification with gadgets. This analytical study also proofs the same and it is to be worth mentioning that teachers who are not expert in technology usage expressed their anxiety in using technology enabled classes and they fear that they will not be able to solve any unexpected technological issues during their lecturing- as failure/lag issues of projectors, issues in connecting projector with laptop, software issues, nonresponsive systems etc, which was reported in other researches also (Agogo, 2015; Joo et al, 2016; Al-Fudail & Mellar, 2008; Çoklar, Efilti, & Şahin, 2019). So, they prefer to use the traditional models, whenever possible, and many of them like to integrate the technology in an organic model than in disruptive style. The cognitive engagement or rationality element of the ETS is not significantly (r=-.023, *p*=.084) affected by the TR under study conditions.

	Cognitive Engagement	Emotional. Engagement	Social Engagement Student	Social Engagement Colleague	ETS
Optimism	-.021	.309**	.392**	.289**	.341**
Innovation	.038	.215*	.360**	.275**	.299**
Discomfort	.099	.163	.030	.127	.131
Insecurity	-.060	.053	-.216*	-.035	-.096
TRI	-.023	.306**	.383**	.278**	.316**

**. Correlation is significant at the 0.01 level (2-tailed).*. Correlation is significant at the 0.05 level (2-tailed).

Table no -2: Technology Readiness and Teacher Engagement

V. Inference and conclusion

This study was aimed to identify the effect of the so-called inevitability of technology application in the teaching learning process on the teacher engagement, which in turn affects the effectiveness of the learning process of the students with special refence to the Kerala Model of Technology implementation under the KITE, Kerala Govt. The teacher engagement is positively affected with the TR of the teachers in a considerable manner along with other factors. Teachers as a general, like/expect to be physically engaged with the teaching process so, the cognitive engagement is not at all affected with the TR of the teacher population.

The highly engaged teachers (having more ETS score) even with less technology adoption temperament, could found many substitute methods than digital tools, to impart education effectively, -in DLEs even with chalk and board/white board. Many teachers followed an organic model of technology implementation in education sector, rather than the disruptive model of the industry as human intervention is indispensable for student's learning effectiveness (Sun & Mei, 2020). They believed that organic model of the technology adoption will have a synergic effect as it incorporate the senior teachers who are little bit reluctant to undergo the digitalized educational technology transformation. Teachers under the study, exhibited a high engagement in all dimensions of the ET scale and they believed that it was their primary responsibility in teaching. It was also noted that the technology readiness exhibited a considerable difference across the age and experience spans.

It is reported that the teacher training programmes on the use of technology tools and digital resources as per the syllabi were conducted regularly during the vacation periods by KITE, Kerala. Teachers were readily incorporating the technology with DLEs with the support of the student facilitators (Little KITEs), who were supporting the teachers in physical infrastructure connectivity and troubleshooting during the class. These student facilitating groups were established in most of the schools as per government directions. Teachers and students agreed that the usage of technology for creative thinking/projects were very minimal and the information gathering using the internet was increased gradually. The issues pertaining to the interruption in data connectivity, backup supply, compact & rigid academic schedule, nonconformity of the syllabus to the digital delivery were few other concerns.

It was learned from the focus group discussions that students were very much influenced by the technology integration in class rooms. As similar to the earlier studies, students expressed that they like to learn by audio-visual, social learning and collaborative models than the traditional instruction styles. The digital resources were easily accessible to them and they wished to use them for the learning, provided it was monitored by the teachers for better results (Skues & Cunningham, 2013). The focus group discussions also noted that many teachers were reluctant to use the DLEs because of the time frame kept for portion coverage. This feedback seems to be in tune with the technology readiness stage of the 'digital immigrants' and which influenced the teacher engagement (Parasuraman, 2000; Prensky, 2001; 2010; Klassen, 2013; Agogo, 2015; Rojas-Méndez, 2017).

Teacher training programs need to be addressed teachers' technology affinity issues and the tools to be organically incorporated to the training sessions. The trainings need to be categorized in age group models than in a pooled style. Real time feedback and hands-on session are expected from the teachers, with regular per to peer support. Teachers may be supported by the students' groups (as Little KITEs) in a better way for infrastructure maintenance and technology assistance.

VI. Future scope of research

With the Covid-19 pandemic the education systems along with the other industries are adopting technology in an exponential manner. The massive investments for digital transformation in education sector will be utilized only with the support of the teacher population. The teacher's technology adoption is incremental whereas the 'net generation' integrates technological usage with exponential pace (Welsh, & Fischer, 2016). The next generation skill acquisition and preparedness for the jobs of Industry 4.0 is ineluctable for the education system and teachers need to be connected with the digital education ecosystem with effectiveness (Carretero, Vuorikari, & Punie, 2017; Mourtzis, 2018; Cech & Tellioglu, 2019). The enhancement of technology readiness of the teachers, organic model of technology adoption in education, sector based specific adoption parameters, intervention of students' support system for teachers (as Little KITEs) etc need to be taken into consideration for any post Covid-19 studies and the use of the technology for the organic creativity skilling is be interrogated. These concerns are to be addressed in the future studies.

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