

Sensitizing The Drivers Impacting Online Learning Efficacy in An University Education System - (Validation of A Hypothetical Concept)

Effulgence

Vol. 23, No. 1

January - June 2025

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Abstract

The objective of the paper is to illustrate a hypothetical model that conveys the idea – 'Learners need to have both emotional quotient and technological quotient to enhance their online learning inclination'. Contrary to IQ, these aptitudes can be educated/trained and hence the paper recommends a formal orientation program for online learners. This paper adhered to the correlation research approach to establish the power and direction of the aforementioned relationship. The proposed model was developed based on the secondary literature survey, and proceeded with validating the same with the sample of 661 undergraduate students. Stratified random sampling based on the different departments of the college was used to choose samples. Data was collected in person and finally, it was analyzed using SPSS & AMOS software. Emotional quotient and technological quotient, both had positive relationships with online learning efficacy. Students needed extra knowledge regarding newer online learning technologies and mind management tactics to draw their attention towards online learning and to harness the benefits. This insisted the need for emotional management classes for building self and environmental awareness, motivation, confidence and other required inner qualities to excel in learning. Students also needed practical technological skills related to digital learning methods.

Keywords: Emotional Quotient, Technology Quotient, Online Learning Efficacy, Online Learning.

INTRODUCTION

Preface & Scope of the Research

Computerized tools and technologies have

revolutionized our way of living in almost all aspects like communication & information broadcast, education, healthcare, business & work life, marketing, networking, transportation, tourism, shopping, entertainment and everything else. This trendy state of affairs has resulted in the incarnation

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of a 'new constituency of students' stipulating more online/blended learning courses (Doig & Hogg, 2013). Many research works are available with respect to the viability of the online learning model, still there are neglected factors which need to be counted for its productive application (Alem et al. 2016). This paper deliberates the digital revolution in the education field and a couple of co-acting elements underpinning its sustenance. The impact of the two elements namely, emotional quotient and technology quotient over the online learning readiness were explored independently but certainly not together. We assume that examining the total effect will be more sensible to validate the synergistic effect of emotional and technology quotient over online learning readiness.

2. Background & Specific Concern

Online learning can benefit individuals to become productive human assets which will help them to advance their standard of living and successively progress the socio-economic enrichment of India (Bordoloi, 2018). India is emphasizing on online education to encounter the rising demands of our ever-increasing population. 'Digital India' movement was initiated by the Government of India on July 01, 2015 with the intent to offer all government services including education electronically. They took initiatives for improving online infrastructure and digital knowledge of the public, specifically in rural India. The National Education Policy (NEP, 2020) was also envisioned to strengthen the use of education technology to offer flexibility, affordability, quality & equivalence. Recent studies have reported on the surging digital economic growth stories as nations and society lay emphasis on digital transformation although diffusion of digital technology tools is seen unequal. This has been described variously as economic divide among "some segments of the society", between the "haves and have not", disadvantaged sections, gender specific divide among the "male and female" (Mathrani et al., 2022; Venkatesh & Sykes, 2013). Changes are taking place at a fast pace

as we see old models for teaching and learning as of networking to traveling are changing. In this context of education, studies conducted post pandemic have dwelled on this theme of research outcomes and has motivated researchers to look for measures to identify the divide and address workable solutions. Also more studies have to be done with reference to local policies of the government in order to consider the feasibility of transforming towards online learning (Mathrani et al., 2022) and to identify other issues relating to online situations. This disparity has provoked government machinery to identify specific sections of the society where digital technology practices are exclusionary and work to develop the necessary infrastructural requirements like system/device, internet connection for achieving inclusive learning in schools & colleges (Kasturirangan, 2019). This has initiated a battery of research work on how to bridge this social gap in digital access and leverage it as a tool while harnessing the power of online education to reach the disadvantaged of all. This is an opportunity to undertake this study at the level of a Community College in India that is a constituent college of a University to vet this situation after a comprehensive study of the technology factors and exploring the influence of any other factor that has been ignored. Studies have considered how socio-cultural settings and government policies impact (Verger et al., 2018) on online learning but the need for a strong psychological driver along with technology has not been considered. This reasoning can catalyze the stakeholders' efforts to reap rich dividends from the demographic advantage and contribute in developing a knowledge economy that can drive innovation to uplift to a developed country.

3. Problem Statement

Dissimilarity between online and traditional classroom settings - There is a considerable difference between contemporary online and conventional classroom learning environments. Essentially, the learners need to upgrade themselves with fresh aptitudes for online learning (Al-Asfour,

2012). Online learning commands for self-regulated learning and students without this motivation will easily drop out from these courses. Therefore, the continuance of the course is comparatively challenging in an online setting (Ni, 2013). Although the online environment delivers loads of benefits like flexible time & place adoptions, economical, work life balance and others (Ferri et al. 2020), it also escorts the students towards vulnerability of screen addiction if not managed properly (Kardaras, 2016).

Emotional Welfare of the student - Addressing the emotional needs of the students and educating them about self-emotional management should be taken care of if we want our education system to be more comprehensive. Generally, in all types of classroom settings (face-to-face/hybrid/online) the emotional requirements of the students are not taken much care

by the academicians and also by researchers to point up this concern (Zeidner & Matthews, 2018). When the setting is about an online classroom, the instructor needs to be even more careful about the emotional management of the students to improve the learning process (Arghode et al. 2022).

Lack of special orientation in technological skills - Most of the institutions don't have any formal induction programs to equip online learners with the specific technological skills demanded. Independent and highly motivated learners may cope with self-learning, but some below average students will feel the discomfort to attend the course. Beckford (2015) argued that the online learning orientation programs can act as students' retention tool which prevents early dropouts.

4. Structure of the Research Paper

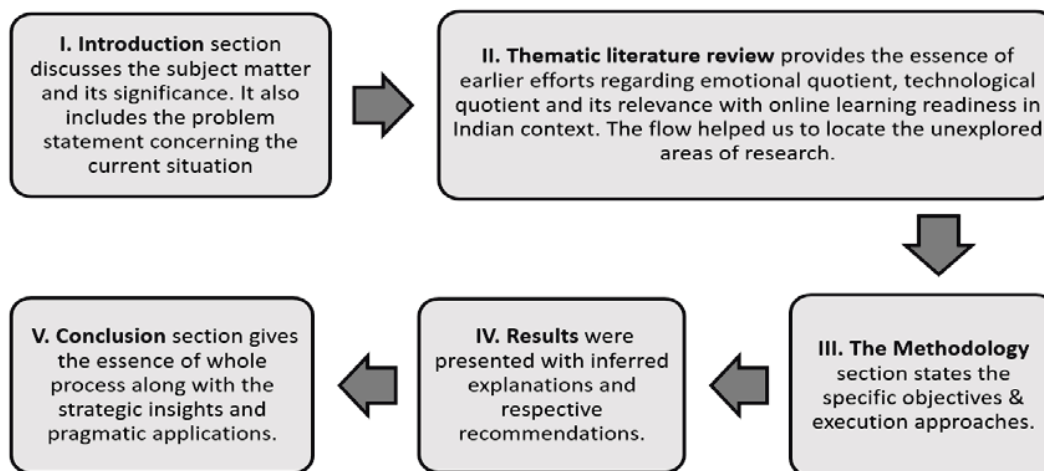


Fig. 1: Arrangement of different sections and Flow of the research work

REVIEW OF PREVIOUS STUDIES

1. Online Learning

A meta-analysis of 69 research articles to comprehend the variation in the outcomes of online and onsite (traditional classroom) learning (Woldeab et al. 2020) revealed that the outcomes were almost similar in both settings, but then the authors pointed out that further enquiries needs to be done in the online learning context because of its steadfast growth. There is also another meta-analysis report which revealed that online learners surpassed the onsite learners in their academic performance (Allen et al. 2004). This is a very interesting

revelation as online mode has been criticized for its ability to connect the learner-learner, learner-teacher and learner-content which is the framework of the educational system since time immemorial.

2. Emotional Quotient

All human deeds are grounded on some emotional base, that might be basic communications or complex learning processes (Zeidner & Matthews, 2018). It will be a win-win scenario, if the teacher and students work cooperatively to articulate and understand the emotional patterns to progress the learning outcomes. Emotions can be positive, negative or neutral and as a general rule, positive emotions have constructive impact on student behavior including communication, enthusiasm, memory, learning etc. whereas negative emotions have adverse influence on these actions (Goleman,1995). Strangely, there was a study conducted by Moridis & Economides (2008) which demonstrated an unusual concept that positive emotions may broaden the thinking process and collapse the learning process. Negative emotions hinder the thought process and thereby distractions. Hence negative emotions may also do good things in learning because it helps the individual to focus better. Emotions are intricate and we cannot precisely predict the resulting behavior. This demands for the constant regulation of emotions, in order to ensure the acceptable and useful behavioral outcomes. Students definitely need a support system from their teachers and institution to guide them on the subject of emotional management.

3. Technological Quotient

In the modern age, the whole world is using electronic gadgets, at least smartphones and people probably have basic understanding of these devices and internet technologies. The Question is, will this knowledge be enough for students to enroll in any online course and complete it fruitfully? Existing literature has evidence to state that specialized preparatory training is needed for the potential online learners. They need specific computer skills related to their courses to prosper in learning. Beckford (2015) emphasized that the educational institutions should conduct exclusive orientation sessions regarding the pre-preparations for joining online courses and this will help them to retain the online students. Entry level skills are taught for the successful online learning process. A study conducted at some community colleges in Florida exposed that technology skills, access to gadgets & internet and previous online course experiences had a positive effect on the students' performance (Harrell & Bower, 2011). Another study conducted in Taiwan, proved that there was a strong relationship between computer literacy and the attitude of students towards online learning (Li & Lee, 2016). Mohammadyari & Singh (2015) contributed a model displaying the significance of digital literacy on retention and performance levels of the learners (Fig. 2). They used the UTAUT model and added some fresh variables to link the series of connections between digital literacy and learning performance. The representation of the model as per our understanding is shown below.

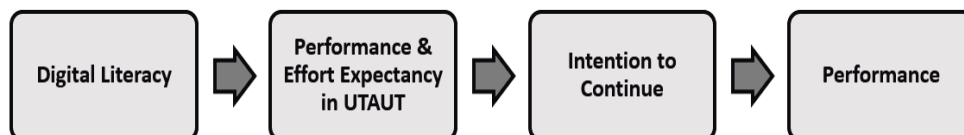


Fig. 2: Model linking digital literacy and online course performance of students

It may look very understandable that students need to be trained in technological aspects, but there are also studies in literature which proved that efficiency of students in using the gadgets and technologies had no impact on some aspects of online learning (Jan, 2015; Simmering et al. 2009). These authors proved that computer knowledge has nothing to do with initial motivation and satisfaction of online learning courses. Students need to have subject-oriented motivation and this digital literacy will only help them to navigate the process of learning. We need to look into these studies to really understand if the students who know the basics of online learning technologies are underestimating the need for this knowledge.

4. Unexplored scope

- Fair number of projects were imparted by the Indian Government to inspire the technology assisted learning. However, we don't have adequate numbers of research studies to understand the prevailing situation in India with respect to the willingness of the participants as well as the efficacy of existing online programs (Muthuprasad et al. 2021).
- There were controversies in literature regarding the role of technology quotient of students in online learning. Many studies demonstrated that students need technological training to excel in online learning, whereas some studies also proved that there is no relationship between technical knowledge and online learning.
- There are no formal induction programs conducted for students who are newly taking online courses. They are expected to self-learn about the emotional management and practical concerns related to digital gadgets and online technologies.

METHODOLOGY

1. Objective of the Study

Foremost intention of the study was to establish the

validity of a model relating EQ (Emotional Quotient), TQ (Technology Quotient) & OLE (Online Learning Efficacy). This will sensitize the policy makers and educational institutions to provide a concerted effort on the drivers that can enable the diffusion of online learning as an effective learning tool.

2. Research Design

The study design is basically a correlational research to prove the hypothetical concept stating that there is an inter-relationship among three main constructs (EQ, TQ & OLE). Secondary data was collected from various online databases like JSTOR, ScienceDirect, Emerald, Scopus and other major sources of research publications and a survey method through google forms was used to collect first-hand data using standard questionnaires.

3. Sampling Technique

Government Community colleges in Puducherry Union Territory region were chosen to be the Population. Stratified random sampling was used to choose the sample based on the department wise sections. The departments available in these community colleges were management studies, commerce, biochemistry, healthcare, computer science, visual communication, physical education. Simple random sampling using the lot method was employed to choose the proportionate number of students to give their responses. The minimum sample size required for our study was 297 (Krejcie & Morgan, 1970), but the researchers collected as many as possible more than this minimum requirement to improve the data accuracy and to make it more suitable for analysis using AMOS software. The final sample size of the study was 661 after employing all data cleaning processes.

4. Data collection and analysis

A standard questionnaire was prepared by adopting standard instruments and adding a few relevant

questions based on the literature review (Adopted scales were WLEIS by Wong & Long, 2002; UTAUT scale by Venkatesh et al. 2003; OLRs scale by Hung et al. 2010). The questionnaire was consulted with an expert panel for content validity and pre-tested with students for confirming their understandability. Followed by main data collection using hard copies of questionnaires and also through google forms. The researchers preferred to meet the students in person to collect the data to avoid misperceptions of the questionnaire. Hard copy responses were manually entered in SPSS with the help of assistants and consolidated with online responses. IBM - SPSS & AMOS software were used to analyze the data and present the findings.

RESULTS & REFLECTIONS

1. Model designing & Instrument Selection

We intended to measure the online learning efficacy in terms of psychometric and technical competencies of the selected sample. This will sensitize the magnitude of EQ & TQ components determining the knowledge acquisition and application over and above the IQ component. Further these intelligence measures can be explained as non-trait factors that can be molded unlike the trait factors of cognitive ability. Hence this model is described as Intelligence for Online Learning Efficacy (IOLE) Model. We

adopted three standard scales to establish a correlation model among three variables namely Emotional Quotient, Technology Quotient and Online Learning Efficacy. Conclusive intention is to calculate the students' efficacy level (OLE) in terms of psychometric capabilities (EQ) and technological competencies (TQ) of the nominated sample group.

- EQ - Emotional Quotient helps us to measure the student's emotional capacity in regard to Self-Emotional Appraisal (SEA), Others Emotion Appraisal (OEA), Use of Emotion (UOE) & Regulation of Emotion (ROE)
- TQ - Technological Quotient enables us to determine the student's competencies in using computers/digital devices and internet technologies. The sub-constructs included are Performance Expectancy (PE), Effort Expectancy (EE), Social Factors (SF) & Finance and Facilitating Factors (FFF)
- OLE - Online Learning Efficacy actually evaluates the student's efficacy level for online learning acceptance (Students viewpoint about the usefulness of online learning which acts as a deciding factor for online learning readiness). The sub-constructs were Computer Self-Efficacy which also includes the online communication self-efficacy (CSE), Self-Directed Learning (SDL), Learners' control (LC), Motivation for Learning (MF).

2. Items Revision

Table 1: Scale adoption and Corresponding Modifications made

Scale & Reference	Constructs	Modifications	Number of Sub-constructs (Modified)	Number of items
WLEIS (Wong & Law, 2002)	EQ	No revisions	4 (4)	12

UTAUT (Venkatesh et al. 2003)	TQ	One new sub-construct with Finance & Facilitating Factors (FFF) with 3 items was introduced (Total 15 items).	3 + 1 (4)	15
OLRS (Hung et al. 2010)	OLE	Consolidated two constructs (Computer Self-Efficacy CSE & Online Communication Self-Efficacy OCSE) and shifted one item from SDL and grouped under LC	5 - 1 (4)	17

The internal consistency of the sub-dimensions of the constructs were tested using Cronbach's Alpha technique in SPSS. If the Cronbach's Alpha values are above 0.6, they are deemed for acceptance and if the values are above 0.8, then they are reflected as excellent. The reliability of EQ scale varied from 0.739 to 0.802; TQ scale 0.600 to 0.801 & OLE scale 0.699 to 0.801.

2. Pre-testing and Pilot Study

We consulted a panel of experts comprising EQ practitioners, online content creators, academicians, psychologists and IT experts to seek suggestions regarding applicability of the instrument for the current population. Later, twenty students from our population were chosen purposefully, explained about the study and we asked them to fill the questionnaire. Main objective was to confirm their understanding of language. We used the queries regarding clarity and simplicity of language and understandability of its meaning. It took approximately 12 to 15 minutes for them to answer the questions. Subsequently, we proceeded to collect data from 200 students and calculated pilot study results. Lastly, we progressed with main data collection and we could extract 661 utilizable responses after data cleaning.

3. Covariance Based Structural Equation Modeling (CB-SEM)

In Confirmatory Factor Analysis, we know the items and its corresponding sub-constructs and test our assumptions to authenticate if these are accurate. Confirmatory Factor Analysis (CFA) for pre-standardized scales is typically performed to re-validate the instrument. We can explicitly make a choice either to implement the scale as it is (if the validity values are agreeable) or to modify the scale according to the current sample. We made a few revisions in the standardized scales based on the modification indices as represented in the above table (Table No. 1). First order CFA is done to confirm the grouping of individual items under predetermined sub-constructs. Second stage is to group the sub-constructs under the main constructs (EQ, TQ & OLE). Finally, the covariance values among three main constructs are drawn to validate our hypothetical idea that these variables are interrelated (CB-SEM Covariance Based Structural Equation Modeling). This is the novelty introduced into the existing prevalence of literature in the area of online learning and the same is being validated.

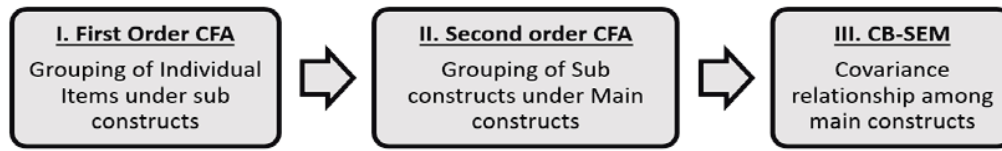


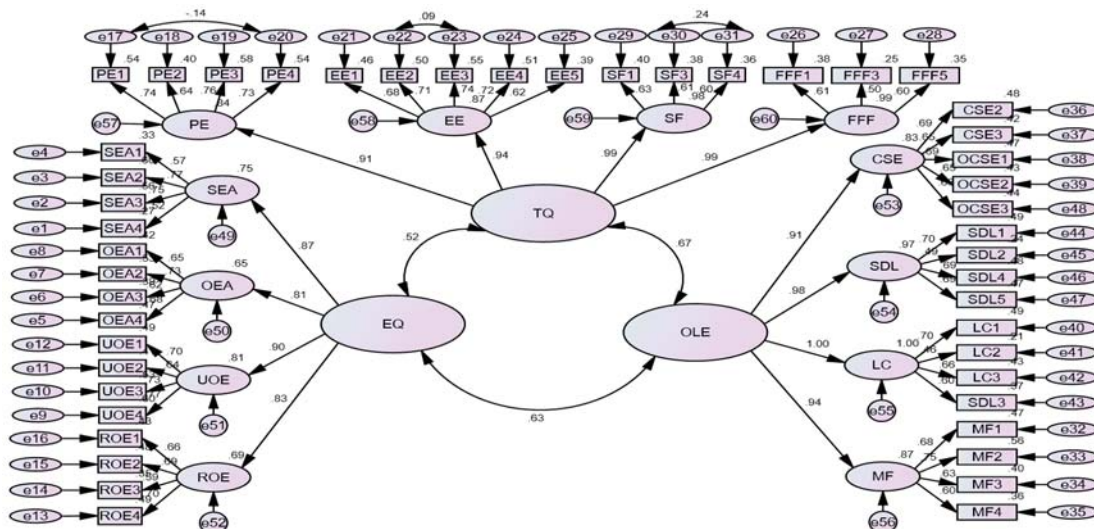
Fig. 3: Steps in carrying out CB-SEM

The model fitness of the instrument with respect to the current sample is confirmed based on the following output values that we got from AMOS software. The standard values for comparing with the obtained values are also included in the above table. The key finding is that the covariance values relating the three main constructs are positive and indicate that there were positive relations which implies one facet improves by improving the other two facets. The covariance values also measure the power of the association among the three variables. Emotional quotient helps the individual students to decide about their online course initiation and it also influences the technology factors.

Table 2: Model Fitness Summary

Indices	Obtained Values	Standard Values for Comparison
CMIN/DF	1.886	< 5.00 (Hair et al., 1998)
GFI	0.884	> 0.90 (Hu & Bentler, 1999)
AGFI	0.872	> 0.90 (Hair et al., 1998)
NFI	0.858	> 0.90 (Hu & Bentler, 1999)
CFI	0.927	< 0.08 (Daire et al. 2008)
RMR	0.053	< 0.08 (Hair et al. 2006)
RMSEA	0.037	< 0.08 (Hair et al. 2006)

Fig. 4: CB-SEM - Covariance Based Structural Equation Modeling - ‘Intelligence for Online Learning Efficacy (IOLE)’



4. Computation for the Model Validation

In succession, we worked out the estimates of Construct Validity and Composite Reliability of the instrument. Convergent & Divergent validity together confirms the construct validity of the instrument. Composite reliability of three independent scales were 0.914, 0.979 & 0.980 (Acceptable levels is > 0.70 – Hair et al. 2010). Convergent validity of the scales was based on AVE (Average Variance Extracted) values 0.728, 0.921 & 0.916 (Acceptable levels > 0.50 – Hair et al. 2010).

Table 3: Convergent Validity & Composite Reliability of the Instrument

			Factor Loading (FL)	Item Reliability (IR)	Delta	AVE	Sum of FL	Sum of Delta	CR
SEA	←	EQ	0.869	0.755	0.245	0.728	3.409	1.090	0.914
OEA	←	EQ	0.809	0.654	0.346				
UOE	←	EQ	0.900	0.810	0.190				
ROE	←	EQ	0.831	0.691	0.309				
PE	←	TQ	0.915	0.837	0.163	0.921	3.837	0.314	0.979
EE	←	TQ	0.935	0.874	0.126				
SF	←	TQ	0.992	0.984	0.016				
FFF	←	TQ	0.995	0.990	0.010				
CSE	←	OLE	0.910	0.828	0.172	0.916	3.826	0.335	0.978
SDL	←	OLE	0.983	0.966	0.034				
LC	←	OLE	0.998	0.996	0.004				
MF	←	OLE	0.935	0.874	0.126				

Table 4: Discriminant Validity

Factors	AVE	Squared Inter-Correlation		
		EQ	TQ	OLE
EQ	0.728	1	0.720	0.794
TQ	0.916	0.720	1	0.817
OLE	0.921	0.794	0.817	1

Discriminant validity of the scales was confirmed by comparing the values of AVE and respective SIC values. If AVE values are greater than the corresponding SIC (Squared Inter-Construct Correlation) values, then the Discriminant Validity of the instrument is confirmed. The table values are presented below for the reference.

To brief up, this research work made a major contribution to the significant studies in the context of exploring

the online learning settings so as to make them a more sustainable tool of learning that helps not only for the continuous learning requirements of individuals but also to spread education to the unreached masses a reality. The study had developed a new instrument, 'Intelligence for Online Learning Efficacy (IOLE)' and the construct validity was tested using CB SEM. The sub constructs and their dimensions were evaluated for its internal consistency and reliability using Cronbach alpha and EFA where the mentioned modifications were incorporated. This study then established an evidence for the construct validity of IOLE instrument with 2 constructs (EQ and TQ) with their sub-dimensions (EQ comprising of Self emotion appraisal, Others emotion appraisal, Regulation of emotion and Use of emotion) and TQ comprising of Performance expectancy, Effort expectancy, Social factors & Finance and Facilitating factors) and this is supported by literature that individually measures the validity of these constructs on online learning efficacy. Our findings stating that there is a positive and significant relationship between EQ & OLE are in line with previous research works (Abdelfattah et al, 2023; Ahmad & Salim, 2021; Mirmoghtadaie et al, 2020; Engin, 2017). Other part of the result that there is a positive and significant relationship between TQ & OLE are in line with previous research works (Kaushik & Agrawal, 2021; Firat & Bozkurt, 2020; Tang & Lim, 2013; Hung et al. 2010). The hypothesized model containing an item structure of 44 items in the IOLE model was verified as an acceptable fit for the data (Table 2, 3 & 4).

5. Theoretical Implications

The IOLE instrument is a significant contribution of this research work as it helps the stakeholders of educational institutions to evaluate the intelligence of the learners in higher education in terms of traits that can be trained and molded, namely EQ and TQ. This paper invokes the much needed sensitization of the drivers to online learning settings. The concept of studying the collective influence of emotional and technical features in online learning efficacy throws

light on unexplored factors for the productive learning process. When we perceive the paradigm shift in the educational field towards online learning, it becomes imperative to analyze the impediments leading to acceptance levels of technology. We also need to understand that conventional classrooms and contemporary online classes are dissimilar and to make it comprehensive, exploration of unobserved factors is essential. IOLE instrument is a potential tool that can be used by educators to evaluate their learners online learning efficacy and thereby work to build the much needed facilitating conditions, operate them in a systematic manner through training of the stakeholders (from content creators to learners) in both psychometric and technical competency and transfer them during appropriate phases in their learning journey, for acquisition of the needed intelligence.

6. Pedagogical Implications

Innovative methods of teaching which encourage student participation is much needed as the teacher is not supervising them directly. As literature points out that online learning demands for self-discipline, motivation and other psychometric qualifications, the current emotional quotient of the student needs to be assessed and mentorship needs to be offered accordingly. Proper induction programs can be formulated for the students who are initiating their online courses. we reinforce the recommendations made by Beckford (2015). Basic education regarding emotional management can be included in the regular syllabus which will help the students to build awareness and constructive use of emotions.

7. Acknowledge the Limitations

There are many literature works relating the technological aspects of online learning and few papers related the emotional aspects and online learning. We couldn't find any base paper which replicated the same model proposing the combined effect of emotional and technological quotient over online learning willingness in this context. This is

also the uniqueness about this work. The verified model was specific to the current sample group community college students. We need to validate the instrument in future research works involving regular college students and also comparative studies between these two groups. The study is a self-reported survey and there may be possibility for bias and future studies can work to capture actual performance on online learning apart from perceived performance.

CONCLUSION

Many research works are available with respect to the viability of online learning, still there are missing factors which need to be counted for its success. Our study addressed two of the aspects for ensuring the comprehensiveness of the online learning system. The key finding is that all the three main constructs namely emotional quotient, technological quotient and online learning efficacy are positively related and implies that if one aspect progresses by upgrading the other two facets. To the best of the authors' knowledge, this is the first study that addressed the coupled effect of emotional aspect and technology knowledge aspects over the willingness of online learning. The current study contributed a validated model in the direction of creating an all-inclusive online learning system and annexed a tiny slice to fill the literature gap.

ACKNOWLEDGEMENT

The present work is a part of a minor research project funded by ICSSR, New Delhi. We are thankful to the funding agency for this knowledge-sharing opportunity.

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