
Trust among faculty and students as an essential element of Smart Education System

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Abstract: The Covid19 pandemic negativity has come up with one silver lining in the educational system, that of more use of smart and intelligent technological interventions in education: Smart and education system. This has sensitised the educators about the kind of technological change that the education systems are about to experience. As with all the technologies smart education system has its pros and cons. However, one of the main impediments in adopting this technological transformation is trust.

During the next phases of the pandemic, colleges everywhere must be able to transition to a completely online format at a moment's notice. Once the COVID-19 crisis ends, the need for agile teaching models will continue, as a potential health or climate crisis may occur at any time. However, getting the technology in place to offer course content online is not enough to ensure robust teaching.

This research paper is exploring the importance of 'trust' with effective and appropriate use of smart education tools and techniques and establish relationship between 'Smart education' and 'trust' as well as 'Evaluation and attentiveness' and 'trust' to ensure broad understanding between the faculty and students as their individual experiences. The paper also focuses on involving ethical practises particularly in evaluation procedure while using smart education system.

Keywords: Smart Education; Trust; Ethics; Smart Classroom; Learning Technology, Evaluation and Attentiveness

INTRODUCTION

With the declaration of United Nations strategy for education for sustainable development, educational institutes are looked forward as the primary agent for achieving sustainable development goals. This requires educational institutions to be focusing on innovative approach which is a combination of interdisciplinary and transdisciplinary methods. Along with other things, teaching methods is an integral part of education. For achieving the aforesaid goals, the entire chain of education has to undergo transformation which includes students, teaching methods, evaluation methods among the others (Corcoran, P. B., & Wals, A. E., 2004).

The rapid oncoming of disruptive technologies has changed the way the teaching-learning activities are performed globally. The corona virus crisis has further hastened the process of this change. Educational institutes, teachers and students must equip themselves with new modalities of teaching and learning to face this twin challenge of disruptive technologies and innovation.

Use of the e-resources as a teaching aid is now globally accepted method of imparting professional education to students. Education in India particularly the higher education is criticized at the world level for its standards in research. To develop this endeavour of research in Students E-resources can play a critical role. These allow students access to latest and the best available in their sphere of study. However, this method of pedagogy requires a different digital mindset and skill set for both teachers as well as students.

With all the benefits, the smart education strategy also has some grey areas. Particularly, in the areas like student's attention, student's participation, assurance about the outreach of the teachers and performance evaluation. Conventional teaching assured these by personal intervention. However, for synergistic benefit of smart education strategy trust element has to be induced to overcome the aforesaid impediments.

The purpose of this paper is to determine the significance of trust in the smart and intelligent education system.

REVIEW OF LITERATURE

Smart education solution business forecast for the year 2024 predicts for the growth of fragmented markets. Major market players like blackboard, Dell technologies, Cisco Systems, Pearson and Adobe Systems will compete in what is this fragmented market space. There is a huge business potential that will be offered by increasing demand for smart education solutions (Huang, R et al., 2020). COVID-19 pandemic has had a significant impact on global higher education sector. The initial response by most of the universities was switching over to online training of students (Tsai, Y. S et al. (2020).

Many scholars have questioned readiness and viability of digital transformation in education that includes smart learning systems. At the same time, it is undeniable truth that resilient, agile and flexible systems of education are must for the unpredictable foreseeable future (Veletsianos, G., & Houlden, S., 2019). The Covid pandemic has compelled teaching staff to undergo Copernican turn in the pedagogy that they were accustomed to. Work from home has presented additional challenges because of lack of technical support and content knowledge for such pedagogical interventions. (Hodges, C.et al., 2020)

Universities from time immemorial have been epitome of societal change. Universities always have been flagged bearers for transformation of society. The recent evolution of technology has brought forward new challenges for educational system. The technology has enabled ease and advancement in almost all sectors thus posing a challenge of adoption of new technology and paradigm shift in hitherto in hitherto pedagogy. To cater to these requirements universities cannot just stop at being smart but should strive to become “smarter” allowing shared knowledge between all stakeholders (Coccoli, M. et al., 2020). There is a general acknowledgement and consensus about the fact that education plays a pivotal role in sustainable development of society (Mulà, I., & Tilbury, D.,2009)

At the current state of development, the cognitive level of humans and technology cannot be distinguished. Digital environment allows teachers and students to work in cooperative spirit. Since the beginning of this century disruptive technologies are having a significant effect on learning methods (Flavin, M., 2012). Disruptive technologies leading to disruptive education allow affordability of the education to those sections of community where the reach of education was limited because of its complex nature, cost and inaccessibility. Disruptive technologies have allowed use of smart education models which make the process of education less complex, affordable, and self-paced (Basu, C., 2009). Smart education systems have played a critical role of digital transformation and empowerment of teachers, students and administrators. Smart education involves combination of diverse technologies (Singh, H., & Miah, S. J., 2020). Smart pedagogy increases higher order thinking capacity of students in a significant manner (Meng, Q., Jia, J., & Zhang, Z., 2020).

Smart Education System - impediments

Undoubtedly, smart educational devices allow faster retrieval of information to the students. But it also leads to certain complexities like lack of communication and discussion between students, interaction with teachers and relevance of the material so retrieved (Raeder, J. et al., 2008). Smart classrooms offer an appropriate tool for students and learning process. However, a certain level of ambient intelligence is essential for designing such classrooms (Santana-Mancilla P. C. et al., 2013)

Cultural, educational, learning, and environmental disparities have to be taken into consideration while developing smart education system. A generic solution will not be able to serve the purpose (Bajaj, R., & Sharma, V., 2018). A smart learning system enables to bridge the gap between the corporate world expectations and the outcomes of conventional education system. In order to achieve this goal training and up skilling of teachers as well as students is necessary (Tikhomirova, N., Gritsenko, A., & Pechenkin, A., 2008).

Research Questions (RQ)

RQ1) What is the gap between Students’ and Faculty’s experience about ‘transformation of education as a smart education system’ and associated ‘trust’ in the COVID19 Pandemic situation.

RQ2) What is the gap between Students’ and Faculty’s experience to the gaining of trust in evaluation and attentiveness in smart education system?

Objectives

1. To study the gap between Students’ and Faculty’s experience about ‘Transformation of education as a smart education system’ and associated ‘Trust’ during the COVID19 Pandemic situation.
2. To identify the gap between Students’ and Faculty’s related to the gaining of ‘Trust’ in ‘Evaluation and Attentiveness’ in smart education system during the COVID19 Pandemic situation.

Conceptual Framework and Hypothesis Development

Relating ‘Smart Education System’ to associated ‘Trust’

Cultural, educational, learning, and environmental disparities have to be taken into consideration while developing smart education system. A generic solution will not be able to serve the purpose (Bajaj, R., &

Sharma, V., 2018). A smart learning system enables to bridge the gap between the corporate world expectations and the outcomes of conventional education system. ‘Trust’

Trust: Trust comprised of following attributes which are gained from the answer received for Subjective question asked to the Faculty and students “List out the attributes which defines the term ‘Trust’ in the smart Education during the Pandemic Covid19 situation”. Total 25 supporting attributes received through this data, which is then analysed by the researcher and filtered redundant attributes and obtained final 13 attributes of ‘Trust’

1. Attentiveness
2. Transparent Evaluation
3. Effective use of Technology
4. Mixed Pedagogy
5. Paced learning
6. Flipped Classroom
7. Students Counselling
8. Real time Assessment
9. Quality Assignments
10. Learning flexibility
11. Quality Focussed Process
12. Use of appropriate online tools and techniques.
13. Training for the effective use of online tools at student end as well as at faculty end

HA₀: There is an insignificant difference in Students’ and Faculty’s experience about ‘Transformation of education as a smart education system’ and associated ‘Trust’ during the COVID19 Pandemic situation.

Relating to ‘Evaluation and Attentiveness’ to associated ‘Trust’

Evaluation and Attentiveness refers to the transparency and timely evaluation which indirectly associated with attentiveness required to give various tests and assignments which are real time to be attempted by the students for which the evaluation results will be immediately displayed with feedback for supporting the result.

Trust in terms of used tools for keeping students attentive in the class so that they can attempt the real time tests in either type and transparency in publicizing the result and impartial feedback for further learning improvement.

HB₀: There is an insignificant relationship between the gaining of ‘Trust’ and ‘Evaluation. and Attentiveness’ the experience of Students’ and Faculty’s in smart education system during the COVID19 Pandemic situation.

RESEARCH MODEL

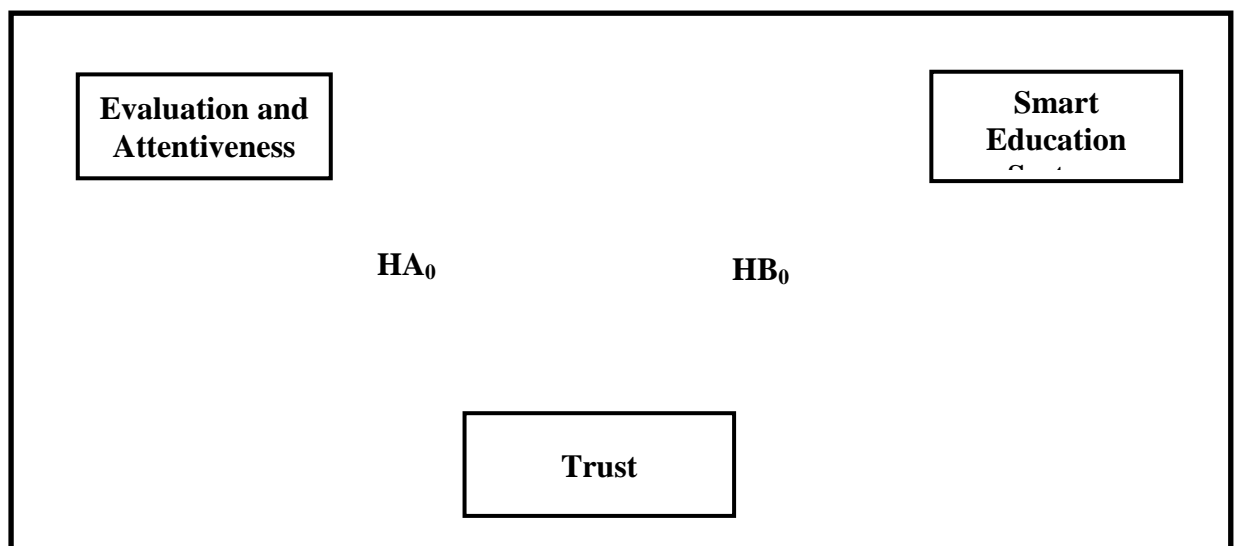


Fig.1: Research Model

DATA AND RESEARCH METHODOLOGY

Sample Design

- Population: 1000

- Sample Size: 278 (Ref. Morgan’s Table)
- Sample Element: Faculty Members teaching, and Students associated for UG Programme in selected colleges.
- Sampling technique: Stratified Random Sampling

RESEARCH METHOD

Exploratory Research: The questionnaire intended to acquire students and faculty’s responses based on their experiences. Questionnaire was comprised of ten questions asking about development of ‘trust’ between students’ and Faculty during the pandemic as Online teaching learning took place of traditional class. Ten attributes which forms the ‘Trust’ tested with respondents- students and faculty using 5-point Likert Scale. The scale reliability was 0.968. and validity tested for the two versions of survey questionnaire using correlation and found valid as correlation coefficient ‘ $r=0.752$ ’.

The study aims at identifying the ‘Trust’ for individual variable i.e. ST1, ST2, -----, ST10 from students’ and faculty’s point of view with smart education takes place in Pandemic period.

Independent Sample t-test applied to know the relationship between Paradigm Shift in Educational System and Trust through students’ and faculty’s experience. One Sample t-test is used to determine the relationship between Trust and ‘Evaluation Techniques in smart and intelligent Education.

DATA ANALYSIS AND RESULT

Table 1: Independent Samples t-Test

Parameters	Respondents’ Group	Levine’s Test for Equality of Variances	Mean	S.D.	t-value	p-value	Result
ST1	Student	Variances are Equal (P>0.05)	4.27	.799	.620	.540	P>0.05 Insignificant
	Faculty		4.07	.961			
ST2	Student	Variances are Equal (P>0.05)	4.20	.775	7.432	.000	P<0.05 Significant
	Faculty		2.00	.845			
ST3	Student	Variances are Equal (P>0.05)	1.87	.915	-9.015	.000	P<0.05 Significant
	Faculty		4.47	.640			
ST4	Student	Variances are Equal (P>0.05)	4.27	.799	11.254	.000	P<0.05 Significant
	Faculty		1.33	.617			
ST5	Student	Equal Variances not assumed (P<0.05)	3.80	.775	2.247	.036	P<0.05 Significant
	Faculty		2.73	1.668			
ST6	Student	Variances are Equal (P>0.05)	4.13	.834	.834	.411	P>0.05 Insignificant
	Faculty		3.87	.915			
ST7	Student	Variances are Equal (P>0.05)	4.00	1.195	-.180	.859	P>0.05 Insignificant
	Faculty		4.07	.799			
ST8	Student	Variances are Equal (P>0.05)	3.80	1.082	-1.586	.124	P>0.05 Insignificant
	Faculty		4.33	.724			
ST9	Student	Variances are Equal (P>0.05)	4.07	.799	.000	1.000	P>0.05 Insignificant
	Faculty		4.07	.884			
ST10	Student	Variances are	3.93	1.033	-.395	.695	P>0.05

		Equal (P>0.05)					Insignificant
	Faculty		4.07	.799			

Independent Samples Test is carried out using IBM SPSS 23.0. As per the Test statistics, Levene’s Test for Equality of Variances and t-test for Equality of Means are determined. As per the Values obtained for the Levene’s Test for equality of variances between two groups namely ‘Students’ and ‘Faculty’ are checked against their P-Values. Where we got the significance value (p)<0.05, Equal Variances are not assumed and where we got significance value (P)>0.05, Equal Variances are assumed, and corresponding t statistics considered for analysing the Equality of Means.

As per the t-statistics, ST1, ST6-ST10 have their significance value (P)> 0.05, hence we can say that there is no significant difference between ‘Students’ and ‘Faculty’ about ST1- The current educational system is based on the concept of check and balances, ST6- Technological intervention can resolve this issue of distrust, ST7- Online Educational technologies and changed Teaching Pedagogy on this online platform is one of the reforms in developing the Educational trust amongst the stakeholder, ST8- Learning Management Systems Like Moodle, Blackboard and Edmodo are the backbone in the Online Learning System (As it fulfils teaching, Evaluating and Learning Management in transparent way), ST9- Online Teaching-Learning brought human interaction between teachers and students as well as amongst students, ST10- Structuring of Smart Education Classes dealt with in an appropriate manner.

As per the t-statistics, ST2-ST5 are having their significance value (p) < 0.05, it means that there is a significant difference between ‘Students’ and ‘Faculty’ about ST2- Teachers are mostly bothered about Lecture delivery, Attendance and Evaluation, ST3- The major concern about Smart learning solutions is issue of trust particularly when concerned with attendance and evaluation process, ST4- Traditional orthodox mindset is the major reason for such lack of trust, ST5- Both faculty and students need to undergo training to transform their mind sets.

In summarising, we can say that for ST1, ST6-ST10 there is an insignificant difference between ‘Students’ and ‘Faculty’ about their perception about paradigm shift in educational system and associated trust between the teachers and students in the COVID19 Pandemic situation and for ST2-ST5 it is significant.

HB₀: there is an insignificant relationship of trust and evaluation techniques in smart and intelligent education.

Table 2: One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ST1	26.103	29	.000	4.167	3.84	4.49
ST2	12.363	29	.000	3.100	2.59	3.61
ST3	11.313	29	.000	3.167	2.59	3.74
ST4	9.304	29	.000	2.800	2.18	3.42
ST5	12.891	29	.000	3.267	2.75	3.78
ST6	25.154	29	.000	4.000	3.67	4.33
ST7	22.104	29	.000	4.033	3.66	4.41
ST8	23.585	29	.000	4.067	3.71	4.42
ST9	26.911	29	.000	4.067	3.76	4.38
ST10	24.083	29	.000	4.000	3.66	4.34

From Table No-2, the Sign. Value (P)=0.000, which is less than 0.05, therefore we can reject the null hypothesis at $\alpha=0.05$, which mean that the sample mean is significantly different from the hypothesized value. There is a significant relationship of trust and evaluation techniques in smart and intelligent education.

DISCUSSION AND CONCLUSION

The focus of this paper is on understanding the impediments in implementation of smart classroom and intelligent education systems. The paradigm shift towards smart classrooms has three major components: the technology element, the human intervention in the form of teacher student interaction and technology human interface. Smart pedagogy has its own advantages like – Student oriented approach; Shift from static teaching methods to dynamic methods; Teaching strategy focusing on wisdom rather than knowledge and novel way of open classroom against the close classes. However, success of this methodology is based on so many diverse factors like the process of teaching, the process of learning, the smart classroom environment, availability of simple yet comprehensive smart tools, a ubiquitous internet, understanding between the teachers and students and amongst the students themselves and training and competence of both teachers and students.

Another critical impediment in implementation of smart and intelligent education systems are presented by the Cultural factors - the orthodox conventional mindset of the academia, students and society in general. The current educational system is based on closely monitored classroom interaction between the teacher and students and amongst students themselves. This primarily involves daily interaction between teachers and students in a close classroom environment allowing a sense of accomplishment of task. This important psychological element is deep-rooted in the mindset of all the stakeholders in education. The system is habituated with visual satisfaction and physical presence giving a sense of accomplishment. This is deep rooted on the system of checks and balances creating an inherent atmosphere of distrust. This distrust is particularly more when it comes to issues like conduction and evaluation of exams and other performances involving student participation.

While implementing Smart classroom or intelligent classroom technologies another aspect is the student attention span. As in above-mentioned issues here, teachers also have a cultural hangover of physically observing the students' attention in the classrooms. Smart education has to come up with a solution to satisfy this necessity. Based on Bandura 's Social Cognitive Theory, models have been proposed for evaluation of academic self-efficacy using long and short-term memory network-based electroencephalograph signal analysis. This will allow a tool for gauging attention span and other self-efficacy related to academics in new learners (Yu, Z et al., 2020).

Measurement and evaluation of academic success of students is a highly researched topic nowadays. This involves research and development of novel upskilling strategies, pedagogy, learning strategies based mathematical models using data sciences more particularly data analytics. A new field of analytics – learning analytics of students' academic success has arisen due to the need of collecting, organising, analysing, categorising and presenting data related to student performance. The characteristics of students learning on parameters like adaptation, collection, and analysis of data, sensing and learning can be studied using smart learning analytics. Using various types of quantitative methods based on advanced data analytic techniques like predictive and prescriptive analysis evaluation systems for analysing students' academic performance can be tested (Uskov, V et al., 2020). Continuous improvement in student performance can be ensured by developing a new strategy which is student centric applying review of performance using educational data mining and learning analytics (Aldowah, H., Al-Samarraie, H., & Fauzy, W. M., 2019). Predictive analysis has been used to predict the graduation performance based on first and second semester's performance without analysing social economic or demographic data to higher level of accuracy (Asif, R., Merceron, A., & Pathan, M. K., 2014). Using advanced statistical tools like fuzzy genetic algorithm and decision tree predictions can be drawn about the students' performance. This predictive analysis allows teachers to focus on specific needs of individual students allowing them an opportunity to improve in the areas of predicted weakness (Hasan, R., Palaniappan, 2018).

The paper thus concludes that development of trust is an essential parameter for synergistic benefit of Smart and intelligent education systems. Many technological interventions are being researched for developing a trust in smart pedagogy strategy. The Research paper recommends training of all stakeholders along with use of technologies to ensure aforementioned trust element in pedagogy.

Theoretical and Managerial Implications

The result of this research study reveals that gaining 'Trust' through the effective use of smart education was the key success factor during Pandemic Covid19 which ultimately applicable after it also. Earlier research literature was restricted about the 'trust' and how to establish it which is fulfilled by this research study and will be helpful for researchers to carry it further in different dimensions.

This Research study also helpful for the faculty to understand how the effective use of relevant online tools available helps in establishing trust between students and themselves which ultimately improves students' attentiveness in the lecture and transparency in assessment with the help of LMS creates a positive impact on students' performance. The research study was a sincere effort to give better insight to students, faculty, academic administrators.

Limitations of the study and Scope for further Research

The research study was carried out in Pune City with the selected BBA institutes with the population of 1000, sample size of 278. For sake of starting the research somewhere only BBA respondents are randomly selected. It can be extended to the rest of the courses and PG programmes. Geographical constraints were there during the pandemic period for the higher coverage.

This research can be extended with the PostGraduate programmes and variety of courses. This research can be extended by means of proposing a valid model of trust.

Authors' Contribution

Dr. Naim Shaikh conceived the idea and developed the Quantitative Research Design to undertake the empirical study. Dr. Kishori Kasat extracted the research papers with high repute as per the title requirement written

abstract. Mr. Mahesh Shinde is exceptionally good in English proficiency and actually developed scale and collected the data. Dr. Naim Shaikh analysed the data and generated results. Dr Kishori Kasat contributed in manuscript compilation and writing conclusion and discussion. Finally, Mr. Mahesh Shinde wrote theoretical and Managerial Implications. Before submitting the manuscript, verified by all three authors, and then submitted to the Journal.

CONFLICT OF INTEREST

The authors satisfy that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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