The Impact of Technological and Infrastructural Facilities on Student’s Learning: A Change Management Perspective.

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ARTICLE DETAILS

ABSTRACT

Purpose: Change management is a systematic and methodical approach to dealing with organizational transitions and transformations with the ultimate goal of a prospective future. Technological and Infrastructural upgrades in any organization have been linked with strategic transformational change. This paper sheds light on the impact of technological and infrastructural facilities on students’ learning.

Design/Methodology/Approach: By following a quantitative research approach, data was collected through a survey questionnaire from 437 students enrolled in Public Sector Universities of Sindh province.

Findings: The findings revealed that Technological and Infrastructural facilities in Higher Education Institutes can positively influence the learning experience of students. The subdivision of technological facilities into basic, moderate, and advance level offers deeper insight pertinent to students’ perceptions of technological literacy and its interaction with their learning experience in this digital era. Moreover, infrastructural facilities are linked with a conducive environment that ultimately could enrich students’ learning experience. This study's findings call for notable measures for the provision of adequate facilities to students across public sector higher education institutes.

Implications/Originality/Value: So it is concluded that technological and infrastructural facilities in Public Sector Higher Education Institutes have positive impact on the Learning experience of Students.

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Introduction
In the fast-paced changing world, all organizations are requiring change, and becoming the fittest survives, “fittest” means organizations that are managing the change well (Vlachopoulos, 2021).
Change tends to foster the level of growth individually and collectively. To experience an economic boost in any organization, technological change is one of the main sources where the stakeholders involved witness a huge shift in organizational functions which gives a pathway towards productivity (Farzana Akmal Memon et al., 2020). The socio-economic development of the society is dependent on the availability and the usage of technological change and infrastructural change in society. Social infrastructural development in society requires the construction of Educational Institutes with upgraded infrastructural facilities, hi-tech libraries for the masses, and development programs for the community. It is a reality that developing countries have enormous challenges in terms of technology and infrastructure for the people who wish to expand their education level to the upright quality, however, it is a calculated hope that with the advent of change management paradigms, Higher Education Institutes bring changes in technological and infrastructural facilities for their stakeholders (Bhattacharya & Sharma, 2007) because Higher Education Institutes are considered to be one of the major sectors which provides a bridge between society and development also known as socio-economic development (Kamugisha Samuel, 2013).

Literature Review

Change Management is a strategic process for the transition and transformation of individuals, groups, and organizations to move from the current state to a new and advanced state to experience growth and productivity (M. N. et al., 2019). Historically and in modern days, the doers and winners of societies are considered as having the top-notch ability to accept and manage to change scenarios rapidly for the betterment of their concerned people. Change agents who help organizational leaders to bring technological and infrastructural changes in their working systems have achieved prominent locus of control in business sectors. Apart from involving change agents to bring change in an organization, involving multiple stakeholders in the process will be of key importance (Sampe & Pakiding, 2015). If organizations, at a small scale or large scale, attempts to envision success at a greater level, managers and executive with their top to bottom level scalar need to have a change-oriented framework and an understanding of the key areas that accompany the management of change (Kamugisha Samuel, 2013). Change management works hand in hand with organizational competitiveness and readiness toward changing environment. It is fundamental for the organization to innovate and fill the gaps to capture the market competitiveness, and this is only possible with the right attitude of getting ready for the upcoming change in terms of planning and executing.

Technological change has an impact on the socio-technical development of society (Sharif et al., 2021), which means that technology change has brought development in areas like Industrial Engineering (Robotics), Software Engineering, the Internet of Things (IoT), and improved Data Analytics for decision making and Social Media platforms. Social media is a Web-based dialogue between communities, individuals, and organization, in which people tries to build social networks and create creative content for the viewers (Wilson et al., 2012). Individuals who have adopted the change in their lives seize more opportunities than the ones who have not upgraded with technical skills, because technology has created more jobs in the job market than it has destroyed. Technological change and its implementation have an impact on remote access to personalize education. Researchers (Iqbal & Ahmad, 2010) argue that technological change and the confident usage of Information Communication Technology (ICT) are in high demand in this century. Whether at the educational level or industrial level, success is directly dependent upon the effective implementation of technological change.

The trends of the changing world show that Higher Education institutes are transforming their academic delivery structure from traditional face-to-face methods to hybrid and blended methods. Higher Education institutes are continuously improving their technological status by bringing updated working processes which include Learning Management Systems (LMS) which are less
paper-based and more technology-based. Learning Management systems (LMS) are defined as the technology adopted by Higher Education Institutes for the formation, academic commencement, and delivery of course content (Sabharwal et al., 2019).

With the help of LMS, Higher Education Institutes are enhancing and bringing quality to the learning experience of students (Kattoua et al., 2016). The hybrid and blended education methods define that Higher Education Institutes are promoting both Teacher's intellectual capacity with the use of technological facilities in classrooms. The blended method allows the stakeholders to have education with ease and interest, flexible learning with the familiarization of different multimedia facilities. If the teacher has the mindset of inculcating knowledge in the classroom by providing on-site and practical experience with the topic, then the teachers have the opportunity to use video visuals and audio sources to make students understand the topic with real-life assumptions (Bennett, E. E. 2014).

Some Higher Education Institutes are using the facility of (Virtual Reality) in classrooms by providing VR-Kits to the students to bring revolution to their learning experience of students (Delello et al., 2015). In today’s ubiquitous technological and digital environment, Higher Education Institutes are providing the opportunity of Machine Learning (ML) to software engineering, computer science, business-oriented students, and other education-related degree programs. (Kann, 1983) stated that the purpose of Machine learning is to train computers with the help of Artificial Intelligence to follow patterns to predict some behavior or circumstance or to detect some phenomenon (Rosenbusch, 2020). Many higher education institutes have administered strong network routes which also provides added advantage to the management of the educational institutes in terms of managing all academic activities. The provision of Intranet and Internet in Higher Education Institutes enabled them to provide fast and multidimensional access to the academic setting.

Higher education is a prerequisite for constructing knowledge, stabilizing the economy, and building societies nationwide (Hasbullah et al., 2010). It has been stated that the efficiency and effectiveness of the upper administration and the management of Higher Education Institutes who has the ultimate responsibilities for facilitating the students with upgraded technology ad infrastructures so that students can take maximum benefit out of the available facilities for their academic development and future career achievements (LeBlanc & Nguyen, 1997). University infrastructure includes a proper classroom setup, lighting, interior facilities, air-conditioning, cleanliness, and well-equipped research labs and libraries. Infrastructure such as comfortable classrooms with cleanliness and updated technology, attractive hallways, restrooms, updated libraries, computer labs with upgraded software and hardware, canteens with a hygienic atmosphere, and open areas for non-curricular activities have a considerable impact on the learning of the students. Numerous researches show that students’ perception is directly proportional to the upgraded Infrastructure available and educational service quality. Infrastructure facilities in Higher Education Institutes (HEIs) can be built by determining three levels, Basic – Moderate, and of Advance level. Basic level infrastructural facilities include: classrooms with wall painted and balanced air quality, students' counseling area, meeting rooms, libraries, digital libraries, laboratories, cafeteria, hallways, pathways, seminar halls, halls for sports and extracurricular activities, photocopy, and printing facilities, hostels for stakeholders and parking areas, these basic level facilities are mandatory to have to meet the basic objective and aims of Higher Educational Institutes. Moderate level Infrastructure facilities include: Stores (Departmental, medical), hospitals or clinics, separate offices for student societies, hostel facilities for research scholars, and facilities for student’s recreational activities, the intention to build a moderate level of Infrastructure facilities is to satisfy the educational stakeholders and also to gain a competitive edge over other HEIs. Advance-level infrastructural facilities include: centralized Air-conditioned tech-oriented academic buildings, state-of-the-art facility gym, and
swimming pools, separate hostels for international students, top-notch studios for university press and media indoor and outdoor stadiums, the purpose of building an advanced level of infrastructure in educational institutes is to put a high impact on the stakeholders and also to create independence among other Higher Education systems.

Conceptual Framework

![Conceptual Framework Diagram]

**Methodology**

**Research Participant**

The research participants comprised students from 7 Public Sector Universities in Sindh province, Pakistan. The participants of the study were sampled randomly based on the consideration that they are the main stakeholders of Higher Education Institutes. Data was collected from 437 students of Public Sector Universities of Sindh Province using a convenience-based sampling technique. Demographic details are shown in Table 1.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>264</td>
<td>60.41</td>
</tr>
<tr>
<td>Female</td>
<td>173</td>
<td>39.59</td>
</tr>
<tr>
<td>Total</td>
<td>437</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-23</td>
<td>369</td>
<td>84.2</td>
</tr>
<tr>
<td>24-29</td>
<td>57</td>
<td>13.0</td>
</tr>
<tr>
<td>30-35</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>36-40</td>
<td>4</td>
<td>0.9</td>
</tr>
<tr>
<td>Above 40</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>437</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sector</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>437</td>
<td>100</td>
</tr>
</tbody>
</table>

**Instrument**

Questionnaire scales were adapted from the study “Effective Implementation of Technology Innovations in Higher Education Institutes”, (Kandiri, 2014) to investigate the Current Technological Status at Basic, Moderate, and Advance levels and also to investigate the current Physical Infrastructural Status in the Public Sector Higher Education Institutes. The questionnaire comprising of 7 Items in **Basic Level** (Classroom desktop with mouse and keyboard, classrooms
equipped with multimedia projectors with ceiling mount, separate screen or whiteboard for multimedia projection, classrooms equipped with the audio system or could be arranged if requested, academic buildings must have wired Internet connections throughout the classrooms, labs, and libraries, WIFI routers should be placed for an accessible internet facility and classroom PC’s must-have internal storage devices for the lecture material to be saved), 10 Items in Moderate Level (Laptop in classrooms for faculty, secure charging points, availability of wireless mouse, classrooms to be equipped with CCTV cameras, accessibility of public address equipment in seminar halls, facility of photocopy, printing and scanning, facility of sending SMS/emails to the students for rescheduling of cases, Higher Education Institutes must design and build academic-based social media applications and use video conferencing tools to accelerate the interaction level among students of different Universities (Marina et al., 2021), labs and libraries to be facilitated with Licensed software’s, television screens to be placed in canteen or cafeteria with restricted channels), and 10 Items in Advance Level of technological facilities (E-Notice Boards are replacing traditional wooden notice boards, digital cameras and camcorders are being used to record all the academic and non-academic events, live video streaming coverage facility of the campus events, E-library system, e-solution portals for course catalogs, attendance status, exam results and also to get the access of online academic resources, practical learning lecture halls with virtual reality (VR) tool kits for the students to get the real-life experience of the topic (Paja et al., 2020), arranging Webinars/online workshops/ and online conferences on multiple mainstream topics, placement of security cameras throughout the academic buildings indoor and outdoor, Ticker/Electronic machine for Food Menu in Canteen. To boost the knowledge economy, it is the Higher Education Institutes that are bringing Silent Revolution in multiple fields (Shaikh & Khoja, 2011). Moreover, it is the fundamental aspect of the higher education institutes to facilitate their stakeholders with upgraded and updated Infrastructural facilities (Musa & Ahmad@Baharum, 2012).

To assess Current Physical Infrastructural Facilities, 13 items are being constructed (classrooms with proper lighting/fixtures/painted furniture, case study-based classrooms with proper seating arrangements, a well-constructed library, well-designed computer/practical labs, separate study area, common rooms with a comfortable and cozy environment, Indoor and outdoor area for extracurricular activities, standby generators, air conditioning facilities in classrooms/labs/libraries, separate offices for official students societies/bodies, well-designed seminar halls, hostel facilities and canteen with hygienic atmosphere.

To study the impact of Technological and Infrastructural facilities on the learning experience of students, research participants were asked to respond on the five-point Likert Scale ranging from 1= Strongly Disagree, 2 Disagree, 3 Neutral, 4, Agree, 5 Strongly Agree. The 9 items were being constructed for the Technological Driven Learning Experience of students (Motivation (Francis, 2017), enhanced brainstorming capacity, Improvement in grades, improved class engagement, tech-oriented learning, increased activity-based learning, advancement in IT skills, enriched communication skills, and strong leadership skills, 10 items were being constructed for Infrastructural Driven Learning Experience of students (physical and mental comfort while being at the campus, confidence building, continual attendance status, improved practical/scenario-based learning with the availability of case study based classroom, enticing academic personality, improved aesthetic sense/creativity, physical and emotional attachment with the institute, smart thinking and observation and sense of personal safety)

Research Hypothesis
H1: There is a positive impact of the Current Technological status at the Basic Level (CTSB) on the Technological Driven Learning Experiences (TDLE) of students.
H2: There is a positive impact of the Current Technological status at the Moderate Level (CTSM) on the Technological Driven Learning Experiences (TDLE) of students.

H3: There is a positive impact of the Current Technological status at the Advance Level (CTSA) on the Technological Driven Learning Experiences (TDLE) of students.

H4: There is a positive impact of Current Physical Infrastructural Status (CPIS) on Infrastructural Driven Learning Experiences (IDLE) of students

Data Analysis

Table 2
Descriptive Statistics of Change Management and its link with Technological and Infrastructural Upgradation:

<table>
<thead>
<tr>
<th>Item</th>
<th>Coding</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Change management is a systematic approach to dealing with</td>
<td>1 Yes</td>
<td>1.17</td>
</tr>
<tr>
<td>Organizational transition and transformation. Do you think that</td>
<td>2 No</td>
<td></td>
</tr>
<tr>
<td>Technological Upgradation/ Intervention will play a role in</td>
<td>3 I Don’t Know</td>
<td></td>
</tr>
<tr>
<td>managing change in Higher Education System?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Do you think that Infrastructural Upgradation/ Intervention will</td>
<td>1 Yes</td>
<td>1.23</td>
</tr>
<tr>
<td>play a role in managing change in Higher Education System?</td>
<td>2 No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 I Don’t Know</td>
<td></td>
</tr>
</tbody>
</table>

Source: Researcher

Interpretation
To begin the research, respondents were asked about change management and its linkage with technological and infrastructural upgradation. When inquired about the technological upgradation has a role to play in managing change in higher education institutes, 89.5% of respondents, responded Yes, 4.1% respondents said No, whereas, 6.4% of respondents said I don’t Know. Resultantly, the 1.17 mean value shows that majority of the respondents agreed with the statement.

Moreover, when the respondents were asked about infrastructure and its role in managing change in the higher education system, 85.6% of respondents, responded Yes, 5.5% of respondents said No, whereas, 8.9% of respondents said I don’t Know. Resultantly, the 1.23 mean value shows that majority of the respondents agreed with the statement, as shown in Table 2.

Table 3
Summary of Reliability Statistics

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Technological Status - Basic Level</td>
<td>.868</td>
<td>.867</td>
<td>7</td>
</tr>
<tr>
<td>Current Technological Status - Moderate Level</td>
<td>.870</td>
<td>.869</td>
<td>10</td>
</tr>
<tr>
<td>Current Technological Status - Advance Level</td>
<td>.887</td>
<td>.888</td>
<td>10</td>
</tr>
<tr>
<td>Current Physical Infrastructural Status</td>
<td>.929</td>
<td>.929</td>
<td>13</td>
</tr>
<tr>
<td>Technological Driven Learning Experience</td>
<td>.832</td>
<td>.834</td>
<td>9</td>
</tr>
<tr>
<td>Infrastructural Driven Learning Experience</td>
<td>.849</td>
<td>.850</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Researcher

Interpretation
Reliability is the measure of internal consistency of the construct in the study. A construct is reliable if the Alpha (α) value is > .70. Reliability was assessed by using Cronbach’s Alpha. The results revealed that the current technological status – basic level with 7 Items (α = .868) found
reliable, as shown in the summary Table 3, whereas the current technological status – moderate level with 10 Items following that α value = .870 found reliable, similarly, the current technological status – advance level with 10 Items following α value = .887 was also found reliable. The results for the construct current physical infrastructure status with 13 Items following α value = .929 were found reliable. Moreover, the results expressed that internal consistency of the construct technological-driven learning experience with 9 Items following α value = .832 and the construct infrastructural driven learning experience with 10 Items following α value = .849 was found reliable.

Moreover, the results expressed that internal consistency of the construct technological-driven learning experience with 9 Items following α value = .832 and the construct infrastructural driven learning experience with 10 Items following α value = .849 was found reliable.

### Table 4
**Significant Test Results of Regression Analysis**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Regression Weight</th>
<th>Beta Coefficient</th>
<th>R²</th>
<th>t – value</th>
<th>p-value</th>
<th>Hypothesis Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>CTSB → TDLE</td>
<td>.688</td>
<td>.473</td>
<td>19.790</td>
<td>.000</td>
<td>Yes</td>
</tr>
<tr>
<td>H2</td>
<td>CTSM → TDLE</td>
<td>.506</td>
<td>.256</td>
<td>12.255</td>
<td>.000</td>
<td>Yes</td>
</tr>
<tr>
<td>H3</td>
<td>CTSA → TDLE</td>
<td>.434</td>
<td>.188</td>
<td>10.061</td>
<td>.000</td>
<td>Yes</td>
</tr>
<tr>
<td>H4</td>
<td>CPIS → IDLE</td>
<td>.912</td>
<td>.833</td>
<td>42.192</td>
<td>.000</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Researcher

**Interpretation**

**H1: There is a positive impact of Current Technological Status at Basic Level (CTSB) on the Technological Driven Learning Experiences (TDLE) of students.**

This hypothesis tests, that the Current Technological Status at Basic Level carries a significant impact on the Technological Driven Learning Experience. The dependent variable TDLE was regressed on predictable variable CTSB to test Hypothesis H1. CTSB significantly predicted TDLE, p < 0.001, which indicates that CTSB can play a significant role in shaping TDLE (β = .668, p < 0.001). The result directs the positive effect of the CTSB. Moreover, the R² = .473 depicts that the model explains 47.3% of the variance in TDLE.

**H2: There is a positive impact of the Current Technological status at the Moderate Level (CTSM) on the Technological Driven Learning Experiences (TDLE) of students.**

This hypothesis tests, that the Current Technological Status at Moderate Level carries a significant impact on the Technological Driven Learning Experience. The dependent variable TDLE was regressed on the predictable variable CTSM to test Hypothesis H2. CTSM significantly predicted TDLE, p < 0.001, which indicates that CTSM can play a significant role in shaping TDLE (β = .506, p < 0.001). The result directs the positive effect of the CTSM. Moreover, the R² = .256 depicts that the model explains 25.6% of the variance in TDLE.

**H3: There is a positive impact of the Current Technological status at the Advance Level (CTSA) on the Technological Driven Learning Experiences (TDLE) of students.**

This hypothesis tests, that the Current Technological Status at Advance Level carries a significant impact on the Technological Driven Learning Experience. The dependent variable TDLE was regressed on the predictable variable CTSA to test Hypothesis H3. CTSA significantly predicted TDLE, p < 0.001, which indicates that CTSA can play a significant role in shaping TDLE (β = .434, p < 0.001). The result directs the positive effect of the CTSA. Moreover, the R² = .188 depicts that the model explains 18.8% of the variance in TDLE.

**H4: There is a positive impact of Current Physical Infrastructural Status (CPIS) on Infrastructural Driven Learning Experiences (IDLE) of students**

This hypothesis tests, that Current Physical Infrastructural Status carries a significant impact on the Infrastructural Driven Learning Experience. The dependent variable IDLE was regressed on the predictable variable CPIS to test Hypothesis H4. CPIS significantly predicted IDLE, p <
0.001, which indicates that CPIS can play a significant role in shaping CPIS ($\beta = .912, \ p < 0.001$). The result directs the positive effect of the CPIS. Moreover, the $R^2 = .833$ depicts that the model explains 83.3% of the variance in IDLE.

Table 4 shows the summary of the findings.

Discussion and Conclusion
Education is pivotal to the development of students in their academic journey, students are the significant stakeholders in educational setup, therefore facilitating them with utmost facilities in terms of Technology (Sadiq et al., 2021) and Infrastructure must be among the top priority of any Higher Education System (Singh, 2016). Research hypotheses 1, 2 and 3 emphasized the Technological phenomenon of the research. By applying regression analysis, it was found that the basic level of technological facilities in their Higher Education System is putting a positive impact on the motivation to study in classrooms, technical knowledge has become easier to get, improvement in grades, and students feel more engaged in their campus life, advancement in IT skills with hand-on practice, communication skills, followed by moderate level and advanced level technological facilities. The research outcome also supported previous studies conducted by (Courville, 2011) (Marshall, 2010) Shaikh, Z. A., & Khoja, S. A. (2011). Courville investigated two current trends in educational technology, Marshall investigated organizational change and the e-learning maturity model, and Shaikh, Z. A., & Khoja, S. A. studied the role of Information Communication Technology.

Research Hypothesis 4 emphasized the Infrastructural facilities in Higher Education Public sector universities of Sindh province. Since students of this time observe more aesthetic sense in their personal lives, they seek the same in their academic lives as well. The research observed that students who get classrooms with proper lighting, painted fixtures and furniture, discussion-based classrooms, attractive libraries, well-designed tech-oriented labs, common rooms with a comfortable and clean environment, power generators, indoor and outdoor area with CCTV monitoring, and canteen with hygienic atmospheres, all these infrastructural facilities carry an impact on the student’s ease of living in university, helps in confidence building, improved class attendance ratio, growth in academic personality, smart thinking and sense of personal safety. There seems to be a direct and positive relationship with the learning experience of students if they are provided with physical infrastructural facilities by the management of Higher Education Institutes (Paja et al., 2020).

The study has carried out findings that indicate the value of education pledged by the participants, their keen interest in technology and infrastructure determines their mindsets and also provides useful implications to the providers of the right technology and upgraded infrastructure in the Higher Education System. First and foremost is the availability of classroom basic hardware and software for uninterrupted concept delivery inside the classrooms, and the provision of stable internet connection for multidimensional and interactive learning.

Secondly, the education providers, teacher, and management must also integrate their academic practices with an e-learning system that will ultimately help the students to become more tech-oriented.

Thirdly, the provision of appropriate infrastructure inside and outside of the academic building and also timely maintenance will save the assets for the longer term and also boosts motivation and engagement among students (Hill & Kathryn, 2010).
References


