BIGM Journal of Policy Analysis
Vol.2 | No.1 | 2025
doi:

Nexus of Change Management and Effective Teaching During and Post-COVID-19 Pandemic: A PLS-SEM Approach

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Abstract

This study aims to assess the factors of change management in teaching during and after the COVID-19 pandemic. A structured questionnaire was developed and pre-tested, yielding a sample size of 132 participants selected through convenience sampling. The data were analyzed using path analysis with Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings reveal that while organizational and structural changes do not significantly affect change management, technological change has a positive impact. Furthermore, effective change management is shown to positively influence teaching effectiveness. These insights emphasize the necessity for organizations to invest in change management strategies to facilitate successful implementation. The changes in the educational environment have profound implications for teachers' beliefs and attitudes, which can lead to shifts in teaching practices that ultimately affect student learning outcomes. To adapt to these evolving demands, professional development and training for teachers are essential. Additionally, changes in educational policy and funding can influence the broader social context of education, impacting the quality of education and opportunities available to students.

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Practically, it is crucial for teachers to embrace adaptation to meet new expectations, and adopting learner-centered approaches can significantly enhance student motivation and engagement.

Keywords: Change management; Effective teaching; Organizational culture; Teaching technology; PLS-SEM.

2.1 Introduction

Organizational change is a critical issue that affects an organization's ability to achieve its mission. By adapting a set of activities, an organization can move towards a desired state and increase its effectiveness. This set of managerial actions is initiated in response to environmental forces to achieve operational excellence by exploiting opportunities and countering threats. According to Huang et al. (2020), there is a positive correlation between acceptance of change and change in actions. As a result, organizations take initiatives to neutralize resistance and ensure greater acceptance of change, which is positively related to implementation effectiveness.

Since the COVID-19 lockdown began in March 2020, countries have implemented significant measures to contain the spread of the virus. Firstly, the international community closed borders and suspended international flights, followed by restrictions on domestic mobility. Secondly, many countries imposed restrictions on individuals below the age of 20 or over the age of 65, prohibiting them from leaving their homes. Thirdly, to protect employees, many countries have banned companies from terminating employment or service contracts for at least three months. As a result, people were compelled to stay at home, and educational institutions underwent a radical change. Teachers around the world had to quickly learn how to set up virtual classrooms, record and upload lessons, and create new online courses. Although the change management process was initially challenging, with the help of each other and online platforms like iReady, Delta Math, and Khan Academy, the learning process improved. For students, the transition to online learning was also a crucial learning experience (Barrows, 1986). However, it was not an easy task for many students in Bangladesh who lack high-functioning devices and fast internet access. Despite the challenges, the learning curves for both teachers and students have been growing positively. While the world was working to create a vaccine and save lives, teachers around the world were striving to bring consistency, clarity, and structure to online education.

To provide quality online education in Bangladesh, factors such as high-volume internet access and electronic devices for teachers

and students are required. Western countries have been using online techniques for years, and it is suggested that Bangladesh's infrastructure needs to be more powerful to support online education. To explore the feasibility of online higher education in Bangladesh, the University Grants Commission (UGC) conducted an online survey of 200 university students from both undergraduate and postgraduate levels using a Likert scale. The UGC separated the research findings into two categories, hardware and software requirements, which included financial problems, digital tools, training for teachers on taking online classes, lack of content, boost in ZOOM application, and facilities of the Bangladesh Research and Education Network (BdREN). Private universities in Bangladesh are ahead of public universities as they started e-learning at the beginning of the pandemic, and they are providing IT support to students and faculty to conduct classes smoothly. Conducting classes smoothly refers to the seamless operation of online teaching and learning processes, ensuring minimal disruptions and an effective learning environment. This involves reliable technology, clear communication, user-friendly platforms, and readily available support for any technical issues.

Rahman et al. (2022) focused on the challenges and prospects faced by the learners during this pandemic situation; the authors tried to identify the variables that affected learners while they were availing online classes and the evaluation process. They also suggested a change management model for overcoming the challenges.

Change is a critical issue for all organizations as it does not always lead to optimized job performance. However, adapting to new activities can enable an organization to move towards its desired state and increase effectiveness (Lunenburg, 2010). Changes are necessary not only for survival but also for remaining competitive in the face of technological advancements and rapid communication. Despite the numerous theories and models for change management (Berger et al., 1994; Bushe & Shani, 1991; Cummings & Worley, 1993; Kanter, 1983; Lewin, 1951; Lippitt, 1958; Schein, 1969), there is no comprehensive guide to successfully managing change. Change management in education involves preparing for upcoming changes and managing the process effectively. Without proper management, change can result in confusion and chaos. Therefore, a set of organized processes, such as informing people why the change is necessary and training them accordingly, must be followed. When implementing change in education, its effectiveness should be estimated before deciding how to organize it at different levels.

Scholars have classified changes as evolutionary, revolutionary, gradual, or radical (Hayes, 2022; Weick & Quinn, 1999). This paper specifically focuses on revolutionary or radical changes and aims to assess the factors that affect change management from the perspective of teachers. The study seeks to address two primary research questions: 1.) What are the factors that affect change management in educational institutions? 2.) What is the relationship between change management and effective teaching? By exploring these questions, the research aims to uncover the critical elements that influence successful change initiatives and how these initiatives impact teaching practices and educational outcomes.

This paper makes a significant contribution to the existing literature by providing a comprehensive examination of the factors influencing change management within the framework of effective teaching during and after the COVID-19 pandemic. While prior research has investigated change management in various organizational contexts, there remains a considerable gap in understanding its specific ramifications in educational settings, particularly in light of the abrupt transition to online learning (Gutiérrez et al., 2022; Zhang & Diao, 2023; Fawaz et al., 2021). By analyzing both phases of the pandemic, this study offers a nuanced comparative analysis that illustrates how change management practices have adapted in response to immediate challenges and have evolved into long-term teaching methodologies.

Moreover, the research uncovers critical insights into how these changes have influenced educators' beliefs, attitudes, and overall teaching effectiveness. This exploration of the intricate relationships between change management and effective teaching not only enriches the academic discourse on the subject but also highlights the pressing need for educational institutions to develop robust change management strategies (Gupta, 2021; Sung & Kim, 2021). By addressing these crucial dimensions, the paper not only fills a vital gap in the literature but also provides actionable strategies for educational leaders and policymakers. These strategies are essential for guiding institutions through future disruptions, thereby ensuring that they can maintain educational quality and adapt effectively to ongoing changes in the learning environment.

2.2 Literature review

The concept of organizational change has been a focus of management scholars since the late 1980s and early 1990s, especially as they sought to understand why American companies struggled to compete with Japanese firms (Schein, 1990). Organizational change reflects the processes and adjustments that organizations undergo in response to internal or external pressures.

Organizational change is more than just adjustments initiated by top management; it involves shifts in the everyday practices and behaviors of all employees, from leadership to staff (Raza et al., 2018). The alignment between an organization's culture and its change management strategies is critical for ensuring that change is effectively managed. This is because organizational culture establishes the foundation for how change is perceived, accepted, or resisted by employees. Research suggests that an organization's ability to manage change is closely tied to its culture, as certain values and beliefs may either support or inhibit the implementation of change (Ojo, 2010).

During the COVID-19 pandemic, educational institutions worldwide faced unprecedented challenges that required significant organizational change to ensure the continuity of teaching and learning (Nabokikh et al., 2020). One of the most critical changes was the rapid shift from traditional in-person instruction to online and hybrid learning environments. This transformation necessitated not only technological adaptations but also shifts in organizational processes, communication structures, and teacher-student interactions. Teachers had to quickly adapt to new digital tools, learning management systems, and virtual teaching platforms, which fundamentally altered the traditional classroom dynamics. Institutions that embraced flexible organizational structures were able to provide timely training for teachers, invest in necessary technological infrastructure, and establish new protocols for virtual classrooms.

Moreover, Baker (2002) highlighted that the concept of organizational culture became prominent in the early 1980s, with scholars such as Deal and Kennedy (1983) suggesting that a strong corporate culture is essential for managing organizational change effectively. When an organization's culture supports adaptability, it can ease the resistance to change and foster a more seamless transition, enabling the organization to align its structure, strategies, and processes with evolving external demands. Thus, organizational change is inherently associated with change management, as the effectiveness of managing change is often determined by the underlying culture that supports or resists these efforts.

In the context of Bangladesh, the COVID-19 pandemic led to significant organizational changes in the education sector, particularly regarding the adoption of online learning. The sudden shift to virtual classrooms exposed existing infrastructural challenges, such as inadequate access to high-speed internet and the lack of digital devices for both teachers and students (Islam, 2023; Al-Amin et al., 2021). To manage this change, many educational institutions, particularly private universities, were quicker to adapt by providing IT support, training educators to navigate digital tools,

and modifying teaching methods to suit the online format (Gezer, 2023). Teachers had to shift from traditional teaching methods to conducting classes through platforms like Zoom and Google Meet, which required significant organizational restructuring in terms of communication, resource allocation, and training (Tahar et al., 2021).

Public universities faced a slower transition due to infrastructural limitations and the lack of widespread digital literacy among teachers and students (Al-Amin et al., 2021). However, institutions, with support from government bodies like the University Grants Commission (UGC) and the Bangladesh Research and Education Network, gradually introduced policies and training programs to facilitate online learning (Islam, 2023; Al-Amin et al., 2021). The pandemic brought structural changes in teaching strategies, requiring more collaboration among faculty and administrators to ensure continuity in education (Tejedor et al., 2020). Post-pandemic, many institutions continued to use hybrid teaching models, demonstrating how organizational change during the pandemic has had a lasting impact on effective teaching in Bangladesh (Islam, 2023). These changes underscore the importance of organizational adaptability in navigating crises and fostering a more resilient educational environment for both teachers and students (Tejedor et al., 2020).

This relationship is further reinforced by the research of Raza et al. (2018), which demonstrated a positive and significant link between organizational culture and employee performance. As organizational changes unfold, management must recognize the crucial role culture plays in shaping the outcomes of change management initiatives. A supportive organizational culture can help manage change more effectively by fostering collaboration, innovation, and open communication, all of which are essential to achieving successful outcomes in educational settings.

H1: Organizational change affects change management in effective teaching

Understanding organizational structure is essential because it functions as a sub-system within the broader management system. Organizational structure refers to the formal division, grouping, and coordination of tasks and roles within an organization (Habte, 2020). It encompasses the system of rules, authority, and tasks that dictate how individuals collaborate to achieve the organization's objectives (Usman et al., 2011). In educational institutions, this structure includes vertical and horizontal interactions between different work units, describing how tasks are divided, how communication flows, and how cooperation is maintained across various levels (Pidarta, 2011).

The COVID-19 pandemic brought about significant structural changes in educational institutions globally, including in Bangladesh. As educational institutions were forced to close, the traditional classroom model of teaching was abruptly replaced by online and remote learning systems (Islam, 2023; Al-Amin et al., 2021). This shift demanded rapid adjustments in organizational structures to support new methods of instruction. In Bangladesh, where digital infrastructure was not as robust, educational institutions faced immense challenges. Schools and universities had to restructure their internal systems to accommodate remote teaching, which involved reorganizing communication channels, redefining roles, and reallocating resources.

Structural changes, which involve adjustments in roles, responsibilities, or lines of communication, are a fundamental aspect of organizational change management. These changes have a direct impact on how efficiently institutions operate and, by extension, on their ability to implement change effectively. As noted by Habte (2020), organizational structure affects employee performance and job satisfaction, which are influenced by personal preferences and cultural norms. Changes in structure, such as the reorganization of work units or the delegation of authority, can lead to improved task performance and communication patterns (Colquitt et al., 2014).

Key structural changes included the establishment of virtual teaching platforms, the introduction of digital tools like Zoom and Google Classroom, and the reallocation of administrative duties to support online learning environments (Islam, 2023; Al-Amin et al., 2021). Teachers, who traditionally worked within the confines of a physical classroom, now had to coordinate with IT staff and management to ensure smooth operations. Additionally, universities had to create new policies for online assessments, student-teacher interactions, and administrative support.

In the context of educational institutions, structural changes can significantly influence teaching effectiveness. A well-designed structure can streamline processes, enhance communication, and improve collaboration between teachers and administrative staff, ultimately fostering a more dynamic and innovative learning environment (Pidarta, 2011). For instance, implementing cross-functional teams where teachers collaborate and share best practices can lead to more effective teaching approaches. Moreover, transparent communication and active teacher involvement during structural changes can facilitate greater acceptance and smoother transitions, promoting a work environment that supports educators and motivates them to deliver high-quality instruction (Robbins & Judge, 2007).

Private universities in Bangladesh adapted more quickly to these structural changes than public universities. They provided IT support to both faculty and students, ensuring smoother transitions to online platforms (Islam, 2023; Al-Amin et al., 2021). Structural changes also involved rethinking the hierarchical dynamics within institutions, with more emphasis on technology support staff, and cross-functional teams working to ensure the continuity of teaching during the pandemic (Tahar et al., 2021). The effectiveness of these structural changes was critical for maintaining the quality of education during and after the COVID-19 pandemic, as institutions had to navigate both the immediate demands of online teaching and the longer-term adaptations required for future disruptions.

Hutabarat (2015) found that both organizational structure and culture directly influence teacher motivation and performance. In particular, there is a significant relationship between organizational structure and effective teaching, with structural changes impacting the ability of teachers to adapt to new teaching methods and organizational requirements. Based on this literature, it is evident that structural changes play a crucial role in managing change effectively within educational institutions.

H2: Structural change affects change management in effective teaching

The importance of technology in education has become even more pronounced in the 21st century, particularly with the rapid technological advancements and the increasing reliance on digital tools for knowledge transfer. The integration of Information, Communication, and Technology (ICT) into education has fundamentally transformed how instruction is delivered and received. This shift has not only changed traditional teaching methodologies but has also reshaped societal norms, influencing how individuals work, think, and learn. In educational settings, ICT refers to the use of computer-based tools to enhance classroom instruction, with teachers playing a pivotal role in integrating these technologies to create more dynamic and interactive learning environments (Arnseth & Hatlevik, 2010).

The technological shift, though initially challenging, opened up new opportunities for enhancing the effectiveness of teaching. Teachers had to quickly adapt to digital tools and platforms, reshaping their pedagogical methods to suit an online format (Al-Amin et al., 2021). This required significant changes in technological infrastructure, including the provision of necessary resources like internet access, devices, and training for teachers on how to effectively use these tools. Furthermore, the reliance on technology continued even after the pandemic, with many institutions

adopting a blended learning approach, combining both in-person and online teaching methods (Islam, 2023; Al-Amin et al., 2021). In Bangladesh, where digital divides still exist, these technological changes highlighted the need for greater investment in ICT infrastructure, especially in rural areas where students faced connectivity issues. Despite these challenges, the integration of technology into teaching methods has the potential to improve educational outcomes by making learning more accessible and interactive (Islam, 2023). Therefore, the technological changes brought about during and after COVID-19 have played a pivotal role in shaping the future of effective teaching in Bangladesh, enhancing both access to education and the quality of teaching.

In the context of Bangladesh, the COVID-19 pandemic accelerated the adoption of ICT in educational institutions, leading to widespread technological changes that impacted teaching effectiveness. Schools and universities were compelled to move online, making ICT the backbone of educational delivery. This shift was not without challenges, especially in regions with limited digital infrastructure. However, the adoption of ICT allowed institutions to continue providing education during the pandemic, ensuring that students remained engaged through virtual platforms, digital resources, and interactive tools. The use of ICT has been shown to improve the quality, accessibility, and efficiency of education, particularly when teachers are trained to leverage these tools creatively and effectively (Albirini, 2006). Prior to the pandemic, the use of technology in Bangladeshi educational institutions was often limited and underutilized, particularly in rural areas. However, during the pandemic, the rapid shift to online learning forced institutions to adopt digital platforms for teaching, significantly altering the educational landscape. Tools such as Zoom, Google Classroom, and Microsoft Teams became essential for delivering lectures and facilitating communication between teachers and students.

The ongoing process of ICT adoption in education offers continuous support for both teaching and learning, facilitating innovative methods for knowledge exploration and interaction. Teachers can now utilize a wide range of digital resources, such as educational videos, data storage systems, online collaboration tools, and the World Wide Web, to enhance student engagement and promote active learning (Finger & Trinidad, 2002). Research consistently indicates that the incorporation of ICT into teaching practices positively impacts the learning process, helping students to develop critical thinking skills and fostering an active learning environment (Jamieson-Proctor et al., 2013; Jorge et al., 2003). As educational institutions in Bangladesh continue to integrate technological

advancements, these changes significantly affect the management of change in teaching methodologies. The effective implementation of technological change has a direct impact on how well institutions manage transitions and improvements in teaching practices. Hence, this study proposes the following hypothesis:

H3: Technological change is closely associated with change management in effective teaching

Effective change management practices are essential to achieving effective teaching, especially in the context of significant changes like those brought about by the COVID-19 pandemic. As organizations adapt to new educational demands, it is crucial to identify the factors that drive these changes and implement appropriate strategies to ensure a smooth transition. Lawrence and Yarlett (1995) emphasize that change managers must create a supportive environment, train and prepare educators for new methodologies, and motivate them to embrace these changes.

There is no universal model for change management; each educational institution has its unique structure and culture that must be considered (Ongaro, 2004). However, a planned approach is critical for successful implementation. It involves conducting a thorough analysis of the institution's current state to recognize and prepare the necessary infrastructure for effective teaching (Yeşil, 2018). As articulated by Jing and Xuejun (2009), organizational change consists of four essential components: people, technology, duty, and structure. This comprehensive view is particularly relevant in educational settings, where the adaptation of new technologies and teaching practices can significantly enhance teaching effectiveness.

Lewin's (1951) three-stage process of organizational change—preparation, implementation, and consolidation—serves as a foundational framework for guiding educational institutions through transitions, particularly during and after the pandemic. Caldwell (2003) identified various change management models that highlight the importance of leadership, organizational culture, and stakeholder involvement in facilitating successful change initiatives. Engaging teachers and ensuring they understand the rationale behind changes are vital for fostering commitment and reducing resistance (Sunal, 1982).

In the Bangladeshi context, effective change management strategies have become increasingly important as educational institutions navigate the challenges of integrating technology and new teaching methodologies. For instance, a faculty development program designed to enhance teaching

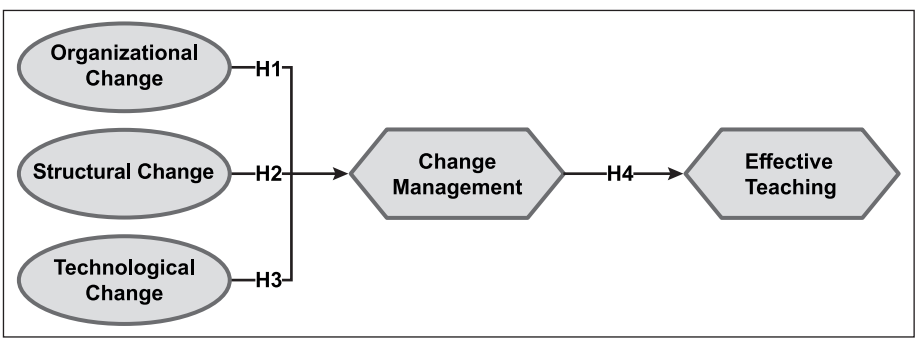
effectiveness has proven beneficial by providing ongoing support and training for educators. Such programs can significantly influence teachers' attitudes towards change and improve their pedagogical practices (Sherbino et al., 2006).

Ultimately, the relationship between change management and effective teaching is underscored by the necessity for leaders to communicate the reasons for changes clearly and engage all stakeholders in the process. By fostering a collaborative environment and equipping educators with the skills and knowledge needed to adapt to change, educational institutions can enhance teaching effectiveness and ensure that learning continues to thrive in the face of challenges.

H4: There is an association between change management and effective teaching

Based on the existing literature, the study develops Figure 2.1. Figure 2.1 illustrates the conceptual framework that depicts the relationships among key variables, including organizational change, structural change, technological change, change management, and effective teaching. This framework synthesizes insights from various studies, highlighting how effective change management strategies can facilitate organizational adaptations, enhance teaching practices, and improve educational outcomes, particularly in the context of the challenges posed by the COVID-19 pandemic.

Figure 2.1: Conceptual model of the research developed by the authors



2.3 Methodology

In order to ensure the quality of information and knowledge, acceptable and sound social science methods have been employed. Quantitative assessment through surveys and questionnaires serves as the primary

approach to achieve the objectives of the evaluation research. It prioritizes objective measurements, statistical analysis, and numerical data collection to explain phenomena and generalize across groups. This approach produces reliable and factual outcome data, often applicable to larger populations, as identified by Steckler et al. (1992). The study employed a convenience sampling technique, leveraging its practicality and efficiency in accessing participants within a limited timeframe. Data were collected using an online questionnaire survey from January to March 2023, targeting teachers, professionals, and researchers based in Dhaka City. This sampling approach was chosen due to the challenges of gathering data during the post-COVID-19 recovery phase, where accessibility to a broader population was constrained by time and logistical limitations. The respondents were deemed highly relevant to the study as they represent key stakeholders in the education sector, with direct experience and insights into the challenges and adaptations necessitated by the pandemic. Their diverse perspectives provided a robust foundation for examining the nexus between change management and teaching effectiveness, ensuring that the findings are contextually grounded and practically significant.

According to the Bangladesh Education Statistics (2019), the higher education system in Bangladesh encompasses a vast number of students and educators, exceeding 300,000. To ensure a confidence level of 95%, Yamane (1967) recommends a sample size of 400 for a target population exceeding 100,000. Furthermore, to determine an appropriate sample size for multivariate numerical investigation methods, Memon et al. (2021) suggest a sample size between 160 and 300. In consideration of the number of independent variables in this study, Green et al. (2018) propose a rule-of-thumb that $n \geq 50 + 8m$ (for multiple correlations) and $n \geq 104 + m$ (for partial correlations), where n is the sample size and m is the number of independent variables. As such, a minimum of 90 participants would be required for the current study. However, to ensure sufficient data for analysis, information from 132 respondents was collected for this study. A sample size around 150 (132 in this study) offers a balance between acquiring a comprehensive data set and ensuring thorough evaluation and analysis of each response. Therefore, the chosen sample size of 132 respondents embodies a balanced and well-thought-out approach to empirical research in the field of change management in teaching during and post the Covid-19 pandemic. We also interviewed a few experts on change management who are engaging in change management issues in the corporate world in order to pre-test the prepared questionnaire. After getting their affirmative indication, we have collected the data for the present study.

The operationalization of variables in this study involves defining and measuring key constructs related to change management, organizational change, structural change, information technology change, and effective teaching. Change management is assessed through indicators that capture the institution's training efforts, communication practices, staff involvement, and structured approaches to implementing changes. Organizational change is operationalized by evaluating the organization's adaptability, leadership communication, alignment of changes with educational goals, and staff support during transitions. Structural change focuses on collaboration among staff, the smooth implementation of structural adjustments, and clarity in roles and responsibilities. Information technology change is measured by examining the management of technology integration, training adequacy, alignment of technological changes with pedagogical objectives, and the overall enhancement of teaching and learning experiences. Finally, effective teaching is operationalized through a range of indicators reflecting diverse teaching methods, alignment with student needs, feedback mechanisms, classroom engagement, organization of lessons, assessment practices, use of technology, creation of inclusive environments, professional development efforts, responsiveness to student feedback, and contributions to student success. These operational definitions facilitate a comprehensive analysis of the relationships among these variables in the context of effective teaching during and after the COVID-19 pandemic in Bangladesh. Table 2.1 shows the measurement items.

Table 2.1: Measurement scales

Variables	Item Sign	Items
Change Management	CM1	Training programs for staff are effectively implemented.
	CM2	Communication regarding changes is clear and timely.
	CM3	Staff members are actively involved in the change process.
	CM4	There is a structured approach to managing changes.
	CM5	Feedback mechanisms are in place to assess the effectiveness of changes.
	CM6	The organization supports staff during transitions.

(Contd.)

(Table 2.1: continued)

Variables	Item Sign	Items
Organizational Change	OC1	The organization adapts well to changes in the educational environment.
	OC2	Leadership effectively communicates the rationale behind changes.
	OC3	Changes align with the overall educational goals of the institution.
	OC4	Staff members feel supported during organizational changes.
	OC5	There is a positive attitude toward changes among staff.
Structural Change	SC1	Collaboration among staff improves during structural changes.
	SC2	The implementation of structural adjustments is smooth.
	SC3	Roles and responsibilities are clearly defined during changes.
	SC4	There is an improvement in communication patterns as a result of structural changes.
Information Technology Change	ITC1	Technology integration in teaching is well managed.
	ITC2	Adequate training for staff on new technologies is provided.
	ITC3	Technological changes align with pedagogical objectives.
	ITC4	The use of technology enhances teaching and learning experiences.
Effective Teaching	EOC1	Diverse teaching methods are employed to meet student needs.
	EOC2	Lessons are well organized and engaging for students.
	EOC3	Feedback is regularly provided to students on their performance.
	EOC4	Students are actively engaged in classroom activities.
	EOC5	Assessment practices effectively evaluate student learning.
	EOC6	Technology is effectively utilized in teaching practices.
	EOC7	An inclusive environment is created for all students.
	EOC8	Professional development opportunities are pursued to enhance teaching skills.
	EOC9	Responsiveness to student feedback is prioritized in teaching practices.
	EOC10	Contributions to student success are emphasized in teaching approaches.
	EOC11	There is a continuous effort to improve teaching effectiveness.

The formulation of the scales followed a rigorous process to ensure validity and reliability in measuring the constructs of interest. Initially, a comprehensive literature review identified key dimensions and indicators associated with each variable, including Change Management, Organizational Change, Structural Change, Information Technology Change, and Effective Teaching. Based on these insights, a draft of items was developed, emphasizing clarity and relevance to the context of effective teaching during and after COVID-19 in Bangladesh. Each item was carefully crafted to reflect the nuances of the constructs and was subsequently subjected to expert review to gather feedback on content validity. The refined items were then tested through a pilot study with a sample representative of the target population. This pilot testing allowed for the assessment of the scale's reliability and provided opportunities for further revisions based on participant responses. The final version of the scales incorporated adjustments from the pilot study, ensuring that the items effectively captured the intended constructs and contributed to robust data collection.

In this research work, the Statistical Package for Social Sciences (SPSS), Version 25, was used for the analysis of descriptive quantitative data. The software is an excellent choice for preliminary data analysis, including checking data distributions and missing values. SPSS is also user-friendly and offers a broad range of statistical tests. For the exploration of complex models and the testing of causal interactions, the most appropriate option is Partial Least Squares Structural Equation Modeling (PLS-SEM), as noted by Alshurideh et al. (2020). This approach allows for the simultaneous analysis of both the measurements and structural models, resulting in more accurate estimations of the construct reliability and validity (Deb et al., 2022; Rahman, 2023; Rahman & Akhter, 2021; Rahman et al., 2021). In this study, the two-stage approach recommended by Hair Jr (2006) was used. First, the measurement model was analyzed to test the reliability and validity of different model variables and confirm the outer model's excellence. Second, the structural model was assessed to test the significance of the relationships within the inner model, describe the variance of the endogenous variables, and test the hypotheses.

2.4 Results

2.4.1 Measurement model

The measurement model of the present study, which includes all the items, is depicted in Table 2.2. To meet the first criterion, the square root of each

latent variable's average extracted variance (AVE) was calculated. The measurement model was evaluated based on two criteria: reliability and validity. Reliability was assessed using both item and internal consistency measures, such as Cronbach's alpha (CA) and composite reliability (CR), to ensure that the constructs are reliable. In addition, the validity of the constructs was evaluated using convergent and discriminant validity, ensuring that the constructs measure what they are supposed to measure and are distinct from one another. It is important to consider both reliability and validity measures to ensure that the data collected is of high quality and can be used to test the research hypotheses accurately.

Table 2.2 displays all items along with their factor loadings. The reliability of the constructs was assessed using Cronbach's alpha (CA) and composite reliability (CR), which were both above the acceptable threshold of 0.80 and 0.70, respectively, as recommended by Hair Jr (2006) and other researchers. The convergent validity (CV) was also established, as each model item had a significant and statistically meaningful standard loading on its target construct, and the average extracted variance (AVE) values of the model constructs ranged from 0.632 to 0.699, which is higher than the recommended threshold of 0.5 set by Fornell and Larcker (1981). Overall, these findings confirm the reliability and validity of the measurement model for the present study.

Table 2.2: Measurement model summary

Variables	Indicators	Outer Loadings	CA	CR	AVE
Change Management	CM1	0.811	0.772	0.863	0.678
	CM2	(Dropped)			
	CM3	(Dropped)			
	CM4	0.902			
	CM5	(Dropped)			
	CM6	0.751			
Organizational Change	OC1	(Dropped)	0.728	0.837	0.632
	OC2	0.761			
	OC3	(Dropped)			
	OC4	0.756			
	OC5	0.863			
Structural Change	SC1	0.893	0.849	0.892	0.676
	SC 2	0.710			
	SC3	0.809			
	SC4	0.866			

(Contd.)

(Table 2.2: continued)

Variables	Indicators	Outer Loadings	CA	CR	AVE
Information Technology Change	ITC1	0.870	0.782	0.895	0.661
	ITC2	(Dropped)			
	ITC3	(Dropped)			
	ITC4	0.751			
Effective teaching	EOC1	0.716	0.792	0.865	0.616
	EOC2	0.859			
	EOC3	0.887			
	EOC4	0.832			
	EOC5	0.875			
	EOC6	(Dropped)			
	EOC7	(Dropped)			
	EOC8	(Dropped)			
	EOC9	(Dropped)			
	EOC10	(Dropped)			
	EOC11	(Dropped)			

KMO test=0.935 and BS test=p<0.001

Note: CA indicates Cronbach's Alpha, CR indicates Composite Reliability, AVE indicates Average Variance Extracted, KMO indicates Kaiser–Meyer– Olkin, and BS indicates Bartlett's Sphericity.

According to Khan et al. (2019), "the factor loadings of the measurement instruments should be greater than 0.50". The factor loadings of all the indicators are greater than 0.50 except OC1, ITC2, EOC6, and EOC9. The factor loadings of all OC4, SC1, SC3, SC4, ITC3, CM1 and CM4E are greater than 0.80. The factor loadings of all the following indicators, that is, OC2, OC5, SC2, ITC1, ITC4, EOC1, EOC2, EOC3, EOC4, and EOC5 are greater than 0.70, and all other measures are greater than 0.60. The factor loadings score less than 0.7 have been discarded, and after reducing items having less than 0.70; the measurement model is represented in Table 2.2.

In addition, the authors follow the requirements of Kline (2015) and Rahman (2023), where all measurement items in the model are statistically significant at $p < 0.01$. According to Hair et al. (2019) and Fornell and Larcker (1981), "The accepted value for AVE, CR, and a is greater than 0.50, 0.70, and 0.70, respectively". This research finds AVE> 0.63, CR > 0.83, and > 0.70 and confirms the convergent validity of the SEM (Table 2.3). Additionally, it is crucial to assess a measuring model's constructs' discriminant validity (DV). We estimated the DV for all variables using the heterotrait–monotrait correlation ratio (HTMT) criterion. The DV is

the degree to which one construct is distinct from others. HTMT values close to 1 indicate a lack of discriminant validity. Using the HTMT as a criterion involves comparing it to a predefined threshold. If the value of the HTMT is higher than this threshold, one can conclude that there is a lack of discriminant validity. Some authors suggest a threshold of 0.85 (Henseler et al., 2009).

Table 2.3: HTMT Matrix

	Change Management	Effective teaching	IT Change	Organizational Change	Structural Change
Change Management					
Effective teaching	0.544				
IT Change	0.808	0.414			
Organizational Change	0.747	0.386	0.758		
Structural Change	0.727	0.342	0.738	0.833	

The current study also passed the Fornell-Larker test criterion for discriminant validity (see Table 2.4). Our analysis revealed that the model had significant discriminant validity. The maximum HTMT score attained was 0.833, supporting the DV of the constructs. Overall, the components of our model demonstrated reliability and validity (Ansari et al., 2022; Rahman et al., 2021).

Table 2.4: Fornell-Larcker criterion

	Change Management	Effective teaching	IT Change	Organizational Change	Structural Change
Change Management	0.823				
Effective teaching	0.490	0.836			
IT Change	0.479	0.282	0.813		
Organizational Change	0.704	0.340	0.612	0.795	
Structural Change	0.616	0.325	0.464	0.642	0.822

According to cross-loadings in Table 2.5, a particular item should have higher loadings on its own parent construct in comparison to other constructs in the study. If an item loads well onto another construct in comparison to its own parent construct, then there are issues of discriminant validity. The difference in loading less than .10 also indicates that the item

is cross-loading onto the other construct and hence could be a threat to discriminant validity (Henseler et al., 2009; Sarstedt et al., 2021). Generally, if the cross-loadings of the items of the two constructs are quite high (i.e., around 0.8), indicating problems with discriminant validity. From Table 2.5, which represents the cross-loading values of the indicators, we found that there is no issue with discriminant validity.

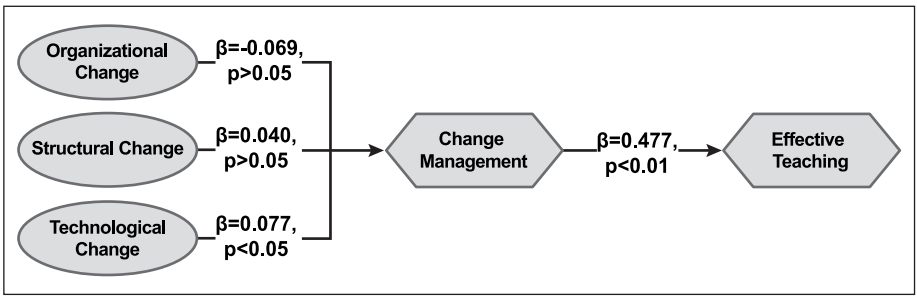
Table 2.5: Cross-loadings

	Change Management	Effective teaching	IT Change	Organizational Change	Structural Change
CM1	***0.811***	0.306	0.402	0.646	0.639
CM4	***0.902***	0.535	0.373	0.575	0.505
CM6	***0.751***	0.294	0.454	0.559	0.409
EOC1	0.379	***0.716***	0.268	0.432	0.267
EOC2	0.346	***0.859***	0.206	0.207	0.248
EOC3	0.389	***0.887***	0.164	0.236	0.304
EOC4	0.419	***0.832***	0.240	0.246	0.287
EOC5	0.488	***0.875***	0.287	0.302	0.255
ITC1	0.394	0.259	***0.870***	0.417	0.281
ITC4	0.392	0.194	***0.751***	0.614	0.513
OC2	0.479	0.161	0.564	***0.761***	0.512
OC4	0.604	0.231	0.493	***0.756***	0.762
OC5	0.585	0.354	0.463	***0.863***	0.363
SC1	0.617	0.378	0.392	0.613	***0.893***
SC2	0.321	0.115	0.290	0.384	***0.710***
SC3	0.445	0.214	0.365	0.430	***0.809***
SC4	0.531	0.244	0.465	0.606	***0.866***

2.4.2 Structure model

The data were first examined for potential issues with multicollinearity before evaluating the structural model. The correlation analysis indicated that the highest correlation coefficient between the latent components was 0.495, indicating the absence of multicollinearity. Additionally, the reliability of each variable was assessed using the variance inflation factor (VIF), and all values were well below the maximum threshold of 5.00. Therefore, it was confirmed that there was no multicollinearity in the model, making it suitable for PLS-SEM analysis. To test the proposed hypotheses and evaluate the structural model, we used SmartPLS 3.3.3 software, as shown in Figure 2.2.

Figure 2.2: Structure model analysis



Because PLS-SEM does not provide global goodness-of-fit measures, the researchers evaluated the fitness of the model and SEM performance by utilizing several indicators: "Standardized Root Mean Squared Residual" (SRMR), "f-square" (f^2), "Normed Fit Index" (NFI), and "R-square" (R^2). The results can be found in Tables 2.6 and 2.7. It is worth noting that the R^2 values for the effective teaching in Table 2.5 exceeded 0.1.

Table 2.6: Model evaluation

	R-square	R-square adjusted	f-square
Change Management	0.434	0.429	0.345
Effective Teaching	0.495	0.219	0.442

Table 2.7: Model fit

	Saturated model	Estimated model
SRMR	0.072	0.072
d_ULS	1.768	1.768
d_G	0.674	0.674
Chi-square	471.330	471.330
NFI	0.639	0.639

To further evaluate the model's fitness, the PLS-SEM SRMR was employed (Table 2.7). The results showed that the SRMR value was 0.072, which is below the maximum threshold of 0.08. Therefore, based on the findings of Hair et al. (2019), the model demonstrated a good fit.

2.4.3 Hypothesis testing

According to Table 2.8, the coefficient for the relationship between Organizational Change and Change Management is -0.069, with a t-statistic of 0.428. The confidence intervals (CI) range from -0.377 to

0.249, which includes zero. Therefore, the hypothesis that Organizational Change positively influences Change Management is not supported. This suggests that in the context of this study, changes within the organization do not significantly impact how change is managed, indicating a potential disconnect between organizational shifts and the effectiveness of change management processes. This hypothesis is not supported because organizational changes often face resistance from employees who may feel uncertain or uninformed about the changes. In many cases, a lack of clear communication and inadequate involvement of staff can lead to confusion, making it difficult for change management initiatives to be effective. This disconnect can prevent organizational changes from being smoothly integrated into existing processes.

Table 2.8: Path analysis

	Coef.	T-stat.	2.5% CI	97.5% CI	Decision
Organizational Change -> Change Management	-0.069	0.428	-0.377	0.249	H1: Not Supported
Structural Change -> Change Management	0.040	0.357	-0.155	0.286	H2: Not Supported
IT Change -> Change Management	0.077**	0.641	-0.155	0.319	H3: Supported
Change Management -> Effective Teaching	0.477***	4.386	0.248	0.677	H4: Supported

The results for Structural Change and Change Management yield a coefficient of 0.040 and a t-statistic of 0.357. The confidence intervals span from -0.155 to 0.286, again including zero. As a result, H2 is not supported, implying that structural changes within the organization do not have a significant effect on the change management process. This may indicate that simply altering the structure of an organization does not inherently enhance the capability to manage changes effectively. The hypothesis is not supported, as structural changes frequently disrupt established workflows and relationships among staff. In educational institutions, such changes may create uncertainty and anxiety among teachers and administrative staff, leading to a reluctance to embrace new structures. Without adequate support and clarity during these transitions, the potential benefits of structural changes can be lost.

For the relationship between Information Technology Change and Change Management, the coefficient is 0.077 with a t-statistic of 0.641 (H3). The p-value indicates significance, suggesting that the relationship is statistically significant. The confidence intervals range from -0.155 to

0.319, which still includes zero; however, the positive coefficient indicates a trend towards support for this hypothesis. This suggests that changes in information technology have a positive influence on change management processes, reflecting the growing importance of technology in facilitating effective organizational change. This hypothesis is supported because technological changes can enhance communication and streamline processes, making change management more effective. In the context of education, the adoption of new technologies facilitates access to resources and information, helping educators adapt to new teaching methods and collaborate more effectively. Successful integration of technology often empowers teachers to engage in change management more proactively.

The results for Change Management and Effective Teaching show a coefficient of 0.477 and a t-statistic of 4.386, with a confidence interval ranging from 0.248 to 0.677. The p-value is highly significant; thus, H4 is supported. This finding indicates a strong positive relationship, suggesting that effective change management practices significantly enhance teaching effectiveness. In the context of the study, this implies that when change is managed well within educational institutions, it leads to improved outcomes in teaching, highlighting the critical role of effective management strategies in education. This hypothesis is supported, as effective change management practices can lead to improvements in teaching quality. When change is managed well, educators feel supported and are more likely to adopt new instructional methods, ultimately benefiting student learning. In the context of educational institutions, strong change management fosters a positive environment that encourages continuous improvement in teaching practices.

The findings of this study highlight the importance of effective change management in enhancing teaching quality, particularly technological changes within educational institutions. The positive relationship between information technology change and change management suggests that integrating technology is crucial for fostering an adaptable learning environment. This implies that educational leaders must prioritize technology adoption and provide adequate training to educators, ensuring they are equipped to utilize new tools effectively. Furthermore, the significant link between change management and effective teaching indicates that well-managed changes lead to improved teaching practices and student outcomes. Educational institutions should therefore implement structured change management processes that involve continuous communication, staff training, and collaboration among educators.

Conversely, the lack of support for the hypotheses concerning organizational and structural change emphasizes the need for a more nuanced approach to these aspects within the Bangladeshi education system. The findings suggest that merely altering organizational structure or implementing changes without considering the existing culture and individual preferences may not yield the desired improvements in teaching effectiveness. Thus, institutions must engage in thorough assessments of their organizational cultures and structures before implementing changes. Tailoring change initiatives to align with the specific needs and contexts of educators will enhance the likelihood of successful outcomes. Policymakers and educational leaders must consider these dynamics when designing and implementing change initiatives to ensure they positively impact teaching effectiveness and student learning.

2.5 Conclusions

This study provides valuable insights into the dynamics of change management, organizational structure, and effective teaching within the context of educational institutions in Bangladesh, particularly during and after the COVID-19 pandemic. The findings reveal that while structural and organizational changes do not significantly enhance change management or teaching effectiveness, the integration of information technology plays a pivotal role in facilitating successful change management. This underscores the necessity for educational leaders to prioritize technological advancements and provide comprehensive training for educators to effectively utilize these tools in their teaching practices.

Moreover, the study highlights that effective change management significantly correlates with improved teaching quality, emphasizing the importance of well-structured processes that foster collaboration, communication, and adaptability among staff. It indicates that for educational institutions to thrive in a rapidly changing environment, a focus on change management strategies that resonate with the existing organizational culture and individual preferences is essential. Overall, the research underscores the critical role of technology in shaping educational practices and calls for tailored change initiatives that account for the unique characteristics of the Bangladeshi educational landscape to enhance teaching effectiveness and improve student outcomes.

By examining organizational, structural, and technological changes through the lens of change management theory, this research advances the understanding of how specific types of change influence the

adaptability and effectiveness of teaching practices. Unlike traditional studies that focus on broad organizational changes, this study emphasizes the pivotal role of technological adaptation as a driver of successful change management in educational settings, particularly during periods of disruption. Additionally, the research highlights the mediating role of effective change management in enhancing teaching effectiveness, bridging a gap in existing literature by linking change management strategies directly to pedagogical outcomes. These findings contribute to the theoretical discourse by offering a framework that integrates change management principles with educational theory, providing a foundation for future research to explore context-specific strategies for resilient and adaptive educational practices.

This study has limitations that may affect the interpretation and generalizability of its findings. Firstly, the relatively small sample size restricts the ability to draw broad conclusions applicable to the entire population of educational institutions in Bangladesh. A larger and more diverse sample would enhance the reliability of the results. Additionally, focusing primarily on organizational and structural changes, along with information technology, may overlook other significant factors such as leadership styles, teacher motivation, and external influences like governmental policies. These factors could play crucial roles in shaping change management and effective teaching dynamics. As a result, the findings may not fully capture the complexities of the educational environment, highlighting the need for further research that includes a wider array of variables and explores different contexts to enhance the robustness of the conclusions drawn.

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