Increasing the Effectiveness of Pedagogical Technologies in Education: Psychological Experience of Technological Change Management

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Abstract

This paper investigates the psychology of change management involving a technological change in the educational organization and the administrative and teaching staff. In particular, the paper delineates the staff's psychological experience regarding the incorporation of pedagogical and educational technologies. In this regard, this article provides theoretical support based on the stimulus-organism-response theory, technological self-efficacy, and technological acceptance model and develops a theoretical model. A quantitative approach was applied to test the model, and research assumptions were drawn from the aforementioned theories. Particularly, disruptive statistics and correlation analysis were employed to test the assumption empirically by collecting data from 500 staff members. The research results highlight that a psychological response serves as the antecedent of the effectiveness of pedagogical and educational technologies, whereby the positive psychological responses (happiness, inspiration, or drive) would increase the effectiveness, while the negative psychological responses (anxiety, stress, and discomfort) would decrease it. This psychological response depends on the perceived self-efficacy and perceived ease of use of the staff, whose lower levels of the two raise the negative psychological response. Generally, to increase the effectiveness of pedagogical and educational technologies, it is essential to effectively manage the psychological well-being of the staff by reducing their negative psychological responses and developing their technological competence (self-efficacy and ability to use with ease).

1- Introduction

1-1- Background

The rapid adoption of advanced digital learning technologies has been reforming the education sector in terms of both how administrative practices are carried out and how learning is delivered to students. As per the European Commission's [1] Digital Education Action Plan, the adoption of advanced technologies in education paves the way for flexibility and more personalized and student-centered learning activities and pedagogical practices. Despite such

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high ambitions, it is found that digital technologies are majorly being used for supporting the existing practices of education [2]. In this regard, to enhance the effectiveness of the administrative and teaching practices of educational institutes in pursuit of the aforementioned educational ambitions, it is imperative to incorporate effective pedagogical and educational technologies [3].

To conceptualize, the notion of pedagogical technology can be understood as the integration of programs, processes, practices, and tools aimed at the implementation of an educational process that is characterized by a shift from the conventional approach to a new student-centered approach [4]. This entails the management and coordination of instructional aids and resources and advanced technology to effectively address the learning needs of the students [5]. However, regarding educational technology, it can be understood as the stimulus that facilitates engagement in different learning situations. Educational technology also makes learning more effective and makes topics and educational content easier to understand [6, 7].

Recognizing the importance of technology integration in education and pedagogy, the education sector has been undergoing a change in recent times characterized by massive transformation. In this regard, it is worth noting that the staffs of educational institutes, including teachers and administrative staff, have faced this digital disruption and felt pressure and uncertainty amid this digital transformation [8]. Similar to any other change situation, the administrative and teaching staff of educational institutes may feel uncertain and reluctant, which calls for effective change management.

1-2- Problem Statement and Gap

The adoption of pedagogical and educational technologies in the educational institutes brings along a change across all the administrative and learning practices and procedures of the educational institutes. In this concern, similar to any other change situation, the effective management of the teaching and administrative staff is imperative for facilitating the change and leveraging the effective use of pedagogical and educational technologies. However, the extant literature lacks analysis of the psychological experience of the administrative and teaching staff during the technological change that affects the overall effectiveness of pedagogical and educational technologies in education and prevents the realization of their full potential. To improve the change management during the technological transformation of educational organizations, it is important to understand the psychological response (either positive or negative) of teaching and administrative staff to the adoption of such technologies and develop strategies to reduce the negative responses for effective change implementation. In this recognition, this article aims to analyze the psychology of change management in the educational environment by focusing on the responses and management of the administrative and teaching staff. In particular, the article aims to investigate and propose adequate mechanisms, methods, practices, and procedures for increasing the effectiveness of pedagogical and educational technologies by the administrative and teaching staff of an educational organization.

1-3- Research Aims and Objectives

- To analyse the psychological response and behavior of the teaching and administrative staff in the context of the technological transformation of the educational institute;
- To determine the factors that must be focused on for increasing the effectiveness of pedagogical and educational technologies by administrative and teaching staff;
- To determine the practices and procedures for increasing the effectiveness of pedagogical and educational technologies by administrative and teaching staff.

2- Literature Review

2-1- Pedagogical and Educational Technologie

The integration of technology in education has enabled students to learn course materials independently, choose their own pace of learning, get results immediately, and track their progress. The incorporation of modern technologies has made education more interactive and simulative for the students than conventional learning [7]. The notion of educational technology is characterized by various important implications for educational organizations. Educational technology is used to effectively leverage one-on-one coaching and reflection, especially in remote locations, through the use of offerings such as interactive communication, audio-visual media capabilities, and easy access on mobile devices [9]. It is concerned with the major goal of modernizing educational institutes in terms of both the teaching and learning methods and the administrative and operational processes involved in the educational organizations. This calls for the possibility of the incorporation of modern technologies to shift from conventional practices to more contemporary ones [10]. In this sense, the incorporation of technology into the disciplines of education has two dimensions. The first is pedagogical technologies, and the second is pertinent to operations and administrative purposes [11].

The former concerns technologies that have applications in the context of the teaching and learning process, e.g., the use of interactive technological tools in the classroom by the teachers to make lessons more effective for the students or the use of the Internet by the students to explore phenomena. Thus, in such a case, the use of technology

contributes to the improvement of the effectiveness of pedagogy [7]. This is a scientifically grounded selection of types of behavior in the process of interactive communication in the classroom. Pedagogical techniques are the concrete projections of educational theory and methodology onto an educational practice that are selective, largely imperceptible, and individualized by various personal characteristics [5]. The second dimension concerns the application of technologies in the administrative realm, with no direct involvement in teaching and learning activities. The adoption of technology in this regard supports the operational or administrative part of the educational institutes, thereby enhancing the effectiveness of administrative staff's practices. For instance, they may use technological tools to maintain the electronic data of the students [11].

2-2- Psychology of Change Management – Response of the Teacher and Administrative Staff to Educational and Pedagogical Technologies

The educational system changed rapidly as learning technology developed in the late 20th century, owing to the technology's ability to provide proactive, easily accessible, and immersive learning environments. Despite their best efforts, many educational institutes face a similar problem of teachers not making the most of technological tools [12]. This undermines the effectiveness of the pedagogical and educational technologies, as previous studies have demonstrated that the use of technology in educational practices and the pedagogical process improves student performance [2]. Many studies have sought to determine the factors that influence the acceptance of these technologies by the staff of educational institutes. It has been shown that the biggest barrier to the full exploitation of the effectiveness of the pedagogical and educational technologies by the teaching and administrative staff is their lack of expertise and knowledge, which increases reluctance on their part [13]. Thus, the staffs in the educational institutes have not been able to keep up with the digital disruption in the education sector and feel pressured to implement technology in their teaching and administrative practices [8].

2-3- Theoretical Framework

In this context, the application of the *stimulus-organism-response theory* can be established. As per this theory, the external stimulus may trigger a psychological response on the part of the individual by triggering their internal feelings and emotions that result in a response [14]. The stimulus refers to the external environment, which implies that a change in the external environment would trigger the psychological response of the individual [15]. Considering this theory, it can be noted that the pressure felt by teachers due to the digital transformation is because the adoption of technology in education and pedagogy brings additional demands for teacher development, which can lead to stress and anxiety on the part of the teachers [16]. This implies that the effectiveness of the use of personalized and adaptive technology can be fully realized when teachers have a positive attitude and can provide contextual input and feedback [9]. Thus, teachers' responses to the adoption of pedagogical and educational technologies influence the overall change process (digital transformation) and the effectiveness of such technologies. On the basis of this, the following hypothesis has been developed:

H1: The overall effectiveness of pedagogical and educational technologies is affected by the psychological response of teaching and administrative staff to the adoption of such technologies, with negative responses decreasing the effectiveness and positive responses increasing the effectiveness of pedagogical and educational technologies (Figure 1).
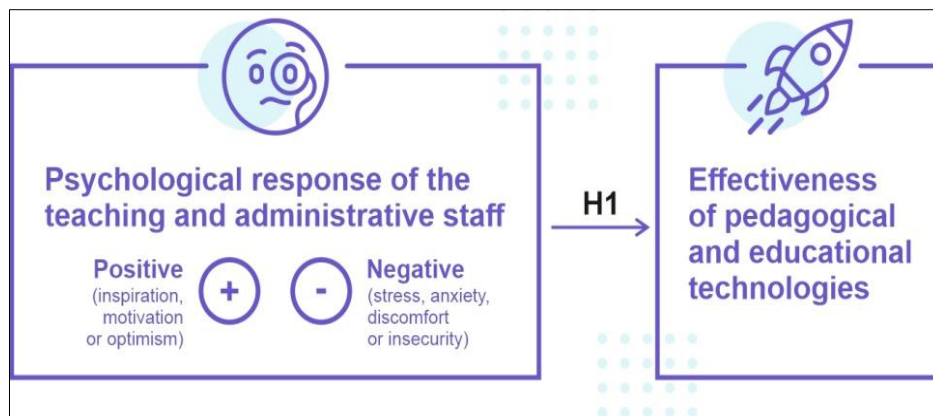

Figure 1. Hypothesis 1

It is also important to note that *technological self-efficacy* plays a major role in the acceptance of technology and the development of a positive attitude toward technology. It is the belief of an individual in his/her capabilities to be able to use technology and perform a technologically sophisticated task [17]. In this regard, it is asserted that confidence in the use of technology in the classroom and belief in technology are relevant to individual teachers. Furthermore, the reason for such a response can be the absence of leadership to prioritize change, a lack of development of a shared vision, and a lack of providing technical or educational support to be able to adjust to the

change in the context of digital transformation. Inadequate management of the change to support the staff in adopting educational and pedagogical technologies conveys the perception that the change is not valued [18]. The teacher's resistance to the use of technologies in education is due to a lack of pedagogical technology knowledge and pedagogical aspects focused on educational communication technology. Teachers with low technological competence may possess a low capability to integrate educational and pedagogical technology into the classroom. This suggests the need for focused development of the staff to increase their competence and equip them with the knowledge to adapt and ultimately enhance the effectiveness of pedagogical and educational technologies [19]. The notion of confidence demonstrates that teachers' self-confidence in their abilities influences their attitude toward technology. Hence, self-efficacy has been regarded as an important factor for understanding an individual's response to technology [17]. On the basis of this, the following assumption is made:

H2: The technological self-efficacy of the teaching and administrative staff affects their psychological response to the adoption of pedagogical and educational technologies (Figure 2).
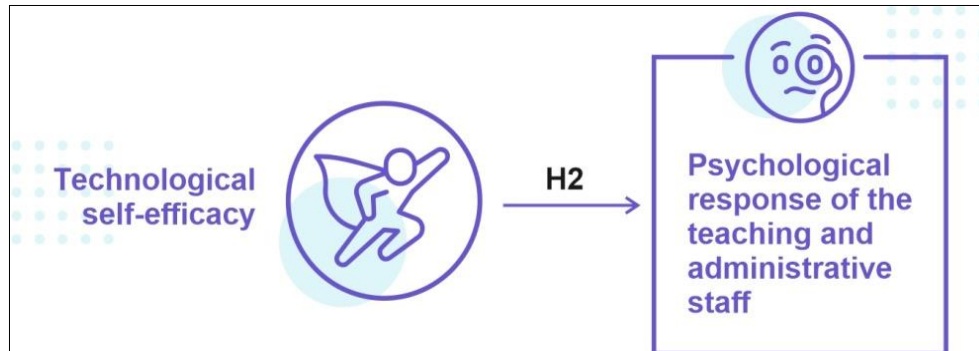

Figure 2. Hypothesis 2

Lastly, *the technology acceptance model* has been the most cited theory regarding technological acceptance. As per the technology acceptance theory, the acceptance of technology by an individual depends on his/her perception regarding the ease of use and usefulness of technology [20]. Anxiety arising from the use of technological systems is negatively associated with attitudes toward the use of technical devices [21]. Furthermore, a meta-analytic study of technology acceptance showed that negative responses such as anxiety were assessed as an external variable of technology use [22]. One study conducted on older users exhibited negative responses such as fear and anxiety in the Chinese healthcare system, and its implication was that stress and anxiety due to technology depended on the perceived ease of use and perceived usefulness [23]. Another study conducted in the context of digital libraries showed that users' anxiety about the use of technology was negatively affected by their perception of system usability [24]. In this regard, on the basis of these findings, it can be assumed that the attitude and psychological response of the staff toward the adoption of technology would depend on the perceived ease of use and perceived usefulness of the pedagogical and educational technologies. Thus, the following hypotheses have been formed (Figure 3):

H3: The perceived ease of use of pedagogical and educational technologies by teaching and administrative staff affects their psychological response to the adoption of such technologies.

H4: The perceived usefulness of pedagogical and educational technologies by teaching and administrative staff affects their psychological response to the adoption of such technologies.
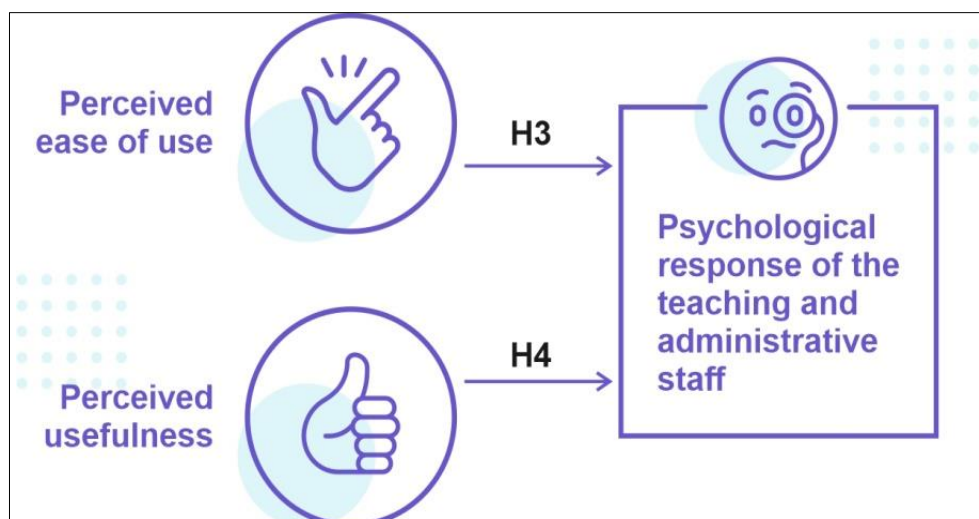

Figure 3. Hypotheses 3 and 4

2-4- Conceptual Framework

On the basis of the aforementioned theoretical underpinnings and assumptions made for this study, the following conceptual framework has been developed for this study showing the interplay of various variables that demonstrates the psychology of change management in the educational environment (Figure 4)

Figure 4. The study's conceptual model

The paper assumes that the overall effectiveness of pedagogical and educational technologies is affected by the psychological response (either positive or negative) of the teaching and administrative staff to the adoption of such technologies that are ultimately dependent on self-efficacy, perceived ease of use, and perceived usefulness. The negative psychological responses include stress, anxiety, discomfort, or insecurity that entail avoidance or withdrawal, while positive psychological responses include motivation or optimism that are associated with acceptance. Thus, negative psychological responses would decrease the effectiveness of pedagogical and educational technologies in an educational organization, while positive ones would have an opposing impact. In a similar vein, high self-efficacy, perceived ease of use and perceived usefulness would reduce negative psychological responses and improve positive psychological responses, while the low level of such variables would have an opposing impact.

3- Materials and Methods

3-1- Research Design

To determine the effectiveness of pedagogical and educational technologies in an educational organization, this research aims to maintain a quantitative research design. The rationale behind the selection of the quantitative research design is that it allows the investigation of research phenomena by maintaining an objective approach [25]. It helps answer questions of who, what, why, and when on the research topic, which would facilitate understanding how teaching and administrative staff view and perceive the pedagogical and educational technologies [26]. Also, quantitative research design supports a numeric and statistical analysis of the phenomenon under study, which increases the viability and reliability of the study. Based on these benefits, a quantitative research design is deemed appropriate to investigate the effectiveness of educational and pedagogical technologies.

3-2- Research Approach

To support the quantitative research design, a descriptive approach to research is opted to investigate the change management research. A descriptive research approach systematically obtains relevant information for describing and explaining a phenomenon, population, or situation [27]. Moreover, it facilitates answering questions of when, where, and how, which is also the focus of quantitative research [28]. Thus, by maintaining a descriptive approach to research, the researcher will be able to better understand and explain the effectiveness of educational and pedagogical technologies in an educational institution by specifically targeting the research question toward teachers and administrative staff. By scrutinizing their attitude toward pedagogical and educational technologies, the effectiveness of educational technologies can be determined.

3-3- Data Collection

For conducting the research, the researchers collect primary data to specifically investigate the phenomenon of change management in an educational institution. The first-hand information collected will serve as the elicit data, which specifically focuses on the study question rather than relying on second-hand information [29]. To gather the primary data, the researchers aimed to use a survey data collection method. Surveys are an effective way of collecting firsthand information and can be conducted via questionnaires and interviews. Since surveys include comparatively larger sample sizes, the data collection method offers greater statistical power and the ability to collect larger amounts of information [30]. This, hence, improves the validity of the research. For this study, the data will be collected using a five-point Likert scale semi-structured questionnaire. The benefit of using a questionnaire as a data collection tool is that it helps to generate accurate data while maintaining flexibility [31]. It also helps protect the respondents' anonymity and reaches a wide audience. For this research, the questionnaires were distributed through online media.

3-4- Population and Sampling Methods

The population for the study refers to the audience to whom the research is targeted. For this study, the population includes the teaching and administrative staff working in the educational institution using pedagogical and educational technologies. The sample for the study is the representation of the population, at which the research questions are targeted to deduce informed conclusions [31]. Thus, the sample for the study would include at least 20 administrative and teaching staff from one educational institution and their subsequent perception and attitude toward the pedagogical and educational technologies will be determined. The sample for the study will be selected using a non-probability sampling method. The convenience sampling method is deemed a suitable sampling technique for selecting the sample size, which caters to the convenience, ease, and accessibility of the respondents as well as the researcher for data collection purposes [32].

3-5- Data Analysis

To analyze the data collected from the semi-structured five-point Likert scale questionnaire, regression, correlation, and statistical analyses (descriptive and inferential) were used. The purpose of using the three techniques of data analysis is to facilitate the establishment of a relationship among the variables under study. Regression and correlation investigate the relationship between the independent and dependent variable [33], whereas, descriptive statistics would allow the investigation and description of the variables and their consequent impacts. The descriptive data analysis tool will help generate summaries about the data samples, whereas inferential statistics would help infer meaning relationships and conclusions regarding the phenomenon under study and the variables under scrutiny [34]. The software used for this purpose is SPSS.

The research methodology is illustrated in the following flowchart (Figure 5).
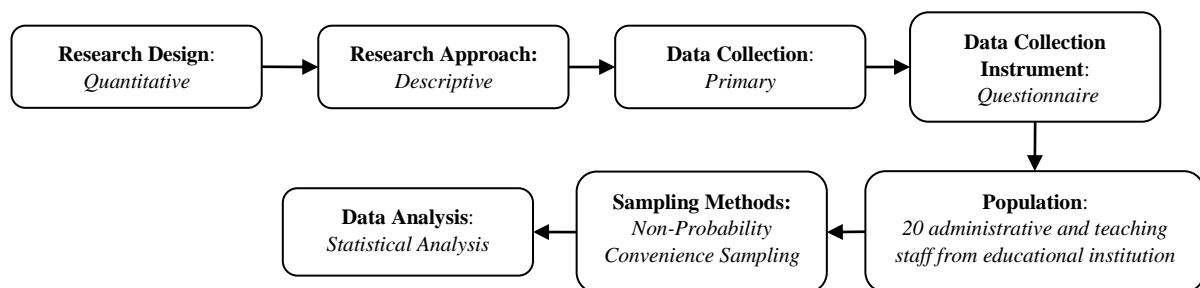

Figure 5. Research methodology

3-6- Ethical Considerations

Ethical considerations allow a rightful conduct of the research process. For this study, the ethical considerations include voluntary participation, informed consent, respondents' anonymity, data privacy, and confidentiality along with avoiding any form of miscommunication and ensuring the well-being of society as a whole [35]. To ensure voluntary participation and informed consent, each respondent in the sample will be required to agree to the consent form before being involved in the data collection process. Respondents will be made aware of the objective of the study and they will be allowed to withdraw from the study at any stage they want by just informing the researcher. For data protection, all the information collected via the online questionnaire is stored on a password-encrypted cloud server with access only to the researchers. The researchers ensure that the research contributes positively to the field of change management and education.

4- Results

4-1- Demographic Statistics

The collected data shows that most participants in the study were female with a 62.6-percent participation rate in opposition to only a 37.4-percent participation rate of male teaching or administrative staff (Figure 6). This disproportionality in the participation of the male and female teaching and administrative staff can be rationalized by a global survey of the education sector, which suggested that females' participation in the education sector of the world at all levels of education and in the teaching and administration realms is higher than that of males [36].
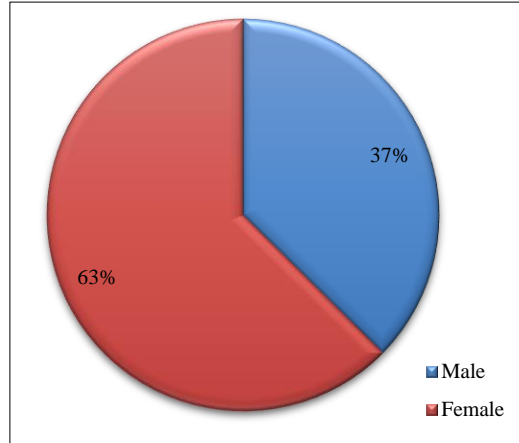
Figure 6. Genders of the participants

Furthermore, in the present study, 54.2 percent of the population is the representative of the teaching staff, and 45.8 percent of the population is the representative of the administrative staff in the educational organizations (Figure 7).
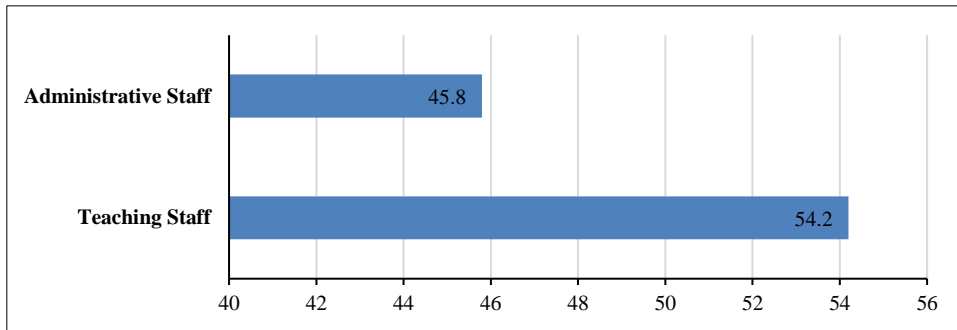
Figure 7. Functional areas

Lastly, in terms of levels of educational organizations, most participants were associated with the university (tertiary education) and secondary school (secondary education) with 31.4-percent and 23.8-percent participation rates, respectively. Along with that, 14.6 percent of the participants were from four-year colleges, 12.4 percent of the participants were from two-year colleges, and 17.8 percent were from elementary school (Figure 8).

Figure 8. Educational organizations

4-2- Descriptive Statistics

Table 1 presents the results of the descriptive statistics for the construct of self-efficacy to assess the confidence of the teaching and administrative staff in their ability to effectively use advanced educational and pedagogical technologies. The results show that the standard deviation values for all items are smaller than the arithmetic mean, which is the central tendency of the data. Thus, the SD value > mean value indicates that all data points (responses to the items) are located near the mean value. Therefore,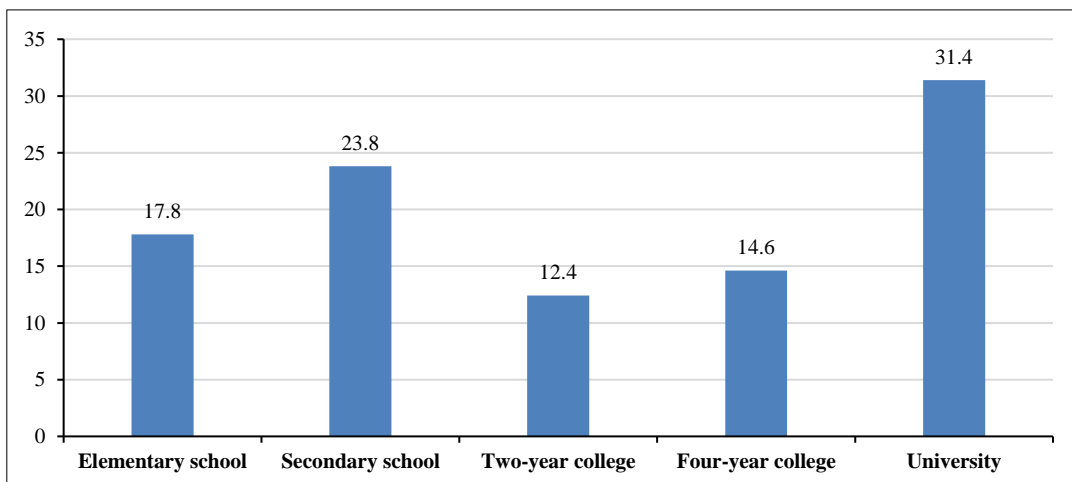 the responses are consistent and do not vary significantly. All three items have a mean value lower than 3, showing that data is skewed on the left side of the 5-point Likert scale used for the study. This implies that the participants chose low rating points (disagree or strongly disagree) as their responses. Overall, this indicates that the teaching and administrative staff possesses a low technological self-efficacy regarding the use of educational and pedagogical technologies in educational organizations.

Table 1. The results of the descriptive statistics for the construct of self-efficacy

Self-efficacy (SE)	Min	Max	Mean	SD
I believe that I am fully competent in using advanced educational and pedagogical technologies	1.00	4.00	2.0424	1.15021
I can easily integrate advanced educational and pedagogical technologies in my lesson planning/administrative tasks	1.00	4.00	2.9407	1.15686
I feel confident of using advanced educational and pedagogical technologies without any need for guidance or support	2.00	4.00	2.5000	0.80331

Table 2 presents the results of the descriptive statistics for the construct of perceived ease of use of the pedagogical and educational technologies of teaching and administrative staff. The lower value of the standard deviation than the mean item shows that consistent responses have been obtained. Similar to the construct of self-efficacy, the mean value is 3 or lower, which again demonstrates the skewness of the data toward the lower values of the scale (disagree or strongly disagree). This shows that the teaching and administrative staff does not find it easy to use the pedagogical and educational technologies in their daily tasks, which translates to a low perceived ease of use of such technologies.

Table 2. The results of the descriptive statistics for the construct of perceived ease of use of the pedagogical and educational technologies of teaching and administrative staff

Perceived ease of use (PEOU)	Min	Max	Mean	SD
I find it extremely easy to complete my teaching/administrative tasks using educational and pedagogical technologies	1.00	4.00	2.9831	1.12457
I believe it is very easy to remember how to perform my tasks and conduct my work with advanced educational and pedagogical technologies	1.00	5.00	3.0011	0.99295
I believe that I have an intuitive sense of how to operate the pedagogical and educational technologies	1.00	3.00	2.1017	1.17226

Table 3 presents the results of the descriptive statistics for the construct of the perceived usefulness of the pedagogical and educational technologies of teaching and administrative staff. The responses are found to be consistent given the lower value of the standard deviation and higher mean value. In contrast to the results for the constructs of self-efficacy and the perceived ease of use, the mean value of the perceived usefulness is between 3.9 to 4.2, which means that the participants marked higher rating points (agree at 4 or strongly agree at 5). This implies that the teaching and administrative staff agrees with the usefulness of the pedagogical and educational technologies in the educational organization. Despite their low self-efficacy and the perception regarding ease of use, they do believe that the pedagogical and educational technologies can be useful for overall education, can enhance the effectiveness of the tasks and produce better outcomes than the conventional teaching or administration methods. Thus, the perceived usefulness is high for adopting pedagogical and educational technologies in educational organizations.

Table 3. The results of the descriptive statistics for the construct of the perceived usefulness of the pedagogical and educational technologies of teaching and administrative staff

Perceived usefulness (PU)	Min	Max	Mean	SD
The use of pedagogical and educational technologies can enable me to do my teaching/administrative tasks in a much better manner	1.00	5.00	3.7712	1.20831
I believe that pedagogical and educational technologies can enhance overall productivity by simplifying the work and making it efficient	1.00	5.00	3.9915	1.15836
I believe that the use of pedagogical and educational technologies produces better outcomes than the traditional teaching/administration style	1.00	5.00	3.5763	1.28872

Table 4 presents the results of the psychological response of the teaching and administrative staff to the adoption of pedagogical and educational technologies. It can be seen that the survey produced varying results for the items pertaining to negative and positive psychological responses of the staff. The items for negative emotions, anxiety, stress, and discomfort, have greater mean values (> 4), showing skewness on the right side, compared to the items for positive emotions, inspiration and happiness (< 3.5), showing skewness on the left side. This shows that the incorporation of pedagogical and educational technologies in the educational organizations has been characterized by

negative psychological responses involving negative emotions on the part of the teaching and the administrative staff. Thus, the teaching and the administrative staff experience psychological discomfort, stress and anxiety during such a change in their educational organizations involving a technological transformation.

Table 4. The results of the psychological response of the teaching and administrative staff to the adoption of pedagogical and educational technologies

Psychological responses of the teaching and administrative staff (PR)	Min	Max	Mean	SD
I feel very anxious when using pedagogical and educational technologies in my teaching	2.00	5.00	4.5415	0.16723
I become very stressed as the use of complex pedagogical and educational technologies adds to my overall work stress	1.00	5.00	4.0001	0.90872
The use of pedagogical and educational technologies adds to my discomfort and anxiety	2.00	5.00	4.3456	1.15673
I feel inspired by the use of different pedagogical and educational technologies	1.00	4.00	3.3876	1.89634
I feel happy to use different pedagogical and educational technologies	1.00	3.00	3.0987	0.89762

Lastly, Table 5 presents the results for the Effectiveness of pedagogical and educational technologies as perceived by the teaching and administrative staff in the educational organizations. The results show that the means values are between 2.5 to 3.6, which means that the data are skewed toward the lower values of the scale or neutrality. These results showed that the teaching and administrative staff in educational organizations could not realize the effectiveness and true potential of the pedagogical and educational technologies.

Table 5. The results for the effectiveness of pedagogical and educational technologies as perceived by the teaching and administrative staff in the educational organizations

Effectiveness of pedagogical and educational technologies (EPET)	Min	Max	Mean	SD
I actively use pedagogical and educational technologies for lesson planning/administrative tasks/classroom	1.00	5.00	4.0424	1.15021
I feel that the use of pedagogical and educational technologies has increased overall productivity and efficiency	1.00	5.00	3.9407	1.15686
My use of pedagogical and educational technologies has benefitted the students to a large extent	2.00	5.00	4.5000	0.80331
I actively use pedagogical and educational technologies for the provision of personalized learning/personalised administrative assistance	2.00	5.00	4.5000	0.80331
The use of pedagogical and educational technologies has made my tasks more effective	2.00	5.00	4.5000	0.80331

4-3- Correlation and Hypothesis Testing

Table 6 presents the correlations among the variables. For the sake of simplicity, only for the variables of psychological response (PR), items of only negative emotions were taken for the analysis to determine if the lower SE, PEOU, or PU leads to higher negative emotions and ultimately low EPET.

Table 6. Correlations among the variables

		SE	PEOU	PU	PR	EPET
			Correlations			
SE	Pearson Correlation	1	0.549**	0.675**	-0.685**	0.656**
	Sig. (2-tailed)		0.034	0.000	0.000	0.000
	N	500	500	500	500	500
PEOU	Pearson Correlation	0.549**	1	0.397**	-0.534**	0.656**
	Sig. (2-tailed)	0.034		0.001	0.000	0.000
	N	150	150	150	150	150
PU	Pearson Correlation	0.675**	0.397**	1	-0.513**	0.443**
	Sig. (2-tailed)	0.000	0.001		0.559	0.000
	N	500	500	500	500	500
PR	Pearson Correlation	-0.685**	-0.534**	-0.513**	1	-0.803**
	Sig. (2-tailed)	0.000	0.000	0.559		0.000
	N	500	500	500	500	500
EPET	Pearson Correlation	0.656**	0.656**	0.443**	-0.803**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	500	500	500	500	500

** The correlation is significant at the 0.01 level (2-tailed).

Table 6 shows a significant correlation among all the variables (at $p < 0.05$ and $-1 < r > 1$) except for PU and PR at a p-value of .559 (> significance level of 0.05). This shows that the perceived usefulness and psychological response of the teaching and administrative staff are not correlated. This implies that a negative psychological response can be experienced by the staff despite being aware of the usefulness of educational and pedagogical technologies in the educational organization. Thus, even if the staff believes in the usefulness of such technology, it can still experience anxiety, stress, and discomfort during the change process. Thus, hypothesis *H4* is rejected.

However, it is worth no note that a negative correlation exists between PR and the other three variables (SE, PEOU and EPET) owing to negative *r* values demonstrating inverse relationships. This implies that a decrease in self-efficacy and perceived ease of use increases the negative psychological response while the increase in the former two would reduce the negative psychological response to the incorporation of pedagogical and educational technologies. Similarly, a rise in negative psychological responses can reduce the effectiveness of pedagogical and educational technologies and vice versa in educational organizations. Thus, hypotheses *H1, H2,* and *H3* are accepted.

5- Discussion

The results of the study present the mediating role of the psychological response of the teaching and administrative staff between their technological self-efficacy and perceived ease of use and the overall effectiveness of the pedagogical and educational technologies. The results of the correlation and the descriptive statistics are aligned and supportive of each other. As per descriptive statistics, participants have demonstrated low self-efficacy and perceived ease of use and a high score on the negative psychological responses, while they also demonstrated high perceived usefulness despite lower self-efficacy and perceived ease of use. This shows that the lower technological self-efficacy of the teaching and administrative staff and lower perceived ease of use regarding the technology leads to negative psychological responses on the part of the staff. This psychological constitution of the staff members owing to the lagging development of self-efficacy and perceived ease of use indicators, which in combination triggers two forces of general structural resistance to change which ultimately hinders the effectiveness of pedagogical and educational technologies in the educational organization. Also, despite having a high perception of their usefulness, the staff would experience anxiety and stress when such technologies are introduced. This implies that educating the staff regarding the potential benefits and the positive implications (usefulness) of the pedagogical and educational technologies for the organization cannot be deemed sufficient. Rather, the focus should be on developing their competence (self-efficacy and ability to use with ease) over the new technologies to manage their psychological responses effectively.

In terms of theoretical support, findings support the argument of the stimulus-organism-response theory, showing that the stimulus (technological transformation) may trigger the psychological response of the individual by triggering their internal feelings and emotions [14]. Thus, the findings suggest that the introduction of pedagogical and educational technologies in the educational organization may cause the staff to experience anxiety and stress. This agrees with the findings of Joseph et al. (2021) [16], who suggested that the digital transformation of the education system can cause stress and anxiety on the part of the teachers as the incorporated technologies bring additional demands for them. These findings also support the assertions of the technological self-efficacy concept, in which self-confidence and belief in one's ability to use technology influence their attitude toward technology [17]. Thus, the negative emotions of teachers are due to their lack of competence and confidence in their ability to effectively use pedagogical and educational technologies. Lastly, the findings partially support the argument of the Technology Acceptance Model, as perceived usefulness is irrelevant to the psychological experience of the teaching and administrative staff during such a technological change process, while perceived ease of use was found to be a major influencing factor. Thus, the perception of the staff regarding the ease of use leads to anxiety that is negatively associated with attitudes toward the technology [21–23].

All in all, the negative psychological response of the teaching and administrative staff owing to low self-efficacy and perceived ease of use negatively affects the effectiveness of the educational and pedagogical technology. These conclusions are supported by Dalesman et al. (2013) [37], who suggested that it is reasonable to assume that stress also induces inflammatory processes in the brain, reducing both short-term and long-term memory. Furthermore, as per Kirby et al. (2013) [38], momentary situations of brief stress stimulate the emergence of new neurons in the hippocampus that affect learning, memory, and ultimately performance. Lastly, in the case of cross-teaching ties, the situation of conflict between a low-efficient staff member and a colleague with a higher level of efficiency is natural, which, in turn, affects the quality of the learning process. This translates into low comparative self-efficacy as the staff member might consider them less technologically competent, having lower self-efficacy and perceived ease of use than a colleague. Concurrently, the more effective colleague is more likely to consciously incorporate coping mechanisms in the form of a coping style that is not inherent to the individual, the permanent maintenance of which leads to the effects of chronic stress, with a consequent decrease in performance and a possible reversal of the "attitude toward digital services [39, 40]. Thus, considering these findings, it can be contended that due to the negative psychological experiences of the teaching and administrative staff in terms of stress and anxiety, the effectiveness of educational and pedagogical technology is compromised owing to the compromised learning abilities of staff.

Using the sample to represent a large population, the study suggested that there exists a negative attitude of the teaching and administrative staff of the educational organization toward the use of technology owing to low self-efficacy and perceived ease of use. Thus, it is deduced that the effectiveness of pedagogical and educational technologies used by administrative and teaching staff can be increased by increasing their technological competence, which would enable them to have higher technological self-efficacy and use technology with greater ease. This is supported by the findings of Yeh et al. (2019) [41]; the most qualitative way to achieve high levels of self-efficacy is the experience of "mastery. This experience can be defined as the experience of personal success. Successful completion of complex tasks helps build self-confidence. Therefore, the psychological response of the teaching and administrative staff serves as a mediator between their technological competence (self-efficacy and perceived ease of use) and the overall effectiveness of the pedagogical and educational technologies.

As per Wang & Li (2019) [42], the technological stress experienced by teachers can be reduced with the provision of adequate technical knowledge to them, which enables them to understand how these technologies work. This is supported by Fernández-Batanero et al. (2021) [43], who state that the incorporation of technologies in the educational environment poses challenges for the teachers as they do not consider themselves "competent" and find the new technologies complex and difficult to work with. This suggests that the technological self-efficacy and perception of ease of use can be positively influenced by the provision of knowledge and development of the competence of the teaching and administrative staff in the educational organization, which can positively influence the psychological experience of the staff during the technological change process. This will ultimately increase the effectiveness of the pedagogical and educational technologies used by the administrative and teaching staff of an educational organization. In this regard, it is asserted that the staff in educational institutes should be involved in collaborative projects and the development of adequate intervention and change strategies. It is important to develop effective technology integration programs that enhance the confidence of the teachers and positively influence their attitudes. This enables them to improve their understanding of technology in the context of education [44].

As administrative and teaching staff can have different levels of experience that directly influence the effectiveness of pedagogical and educational technologies, technological education courses shall be more contextualized with a technology integration approach. Also, well-designed programs and appropriate training can enable the staff to develop a positive outlook on the technology and demonstrate effective integration of pedagogical and educational technologies in the classrooms and various administrative practices [45]. The administrative and teaching staff must be encouraged to be better prepared and aware of the social aspects and environments of technological integration in the educational context. To achieve this, educational organizations need to incorporate this concern into their in-service training and staff development programs. It is important to provide continued assistance, training sessions, webinars, courses, and leadership support to manage the responses and experiences of the administrative and teaching staff during the technological change process.

6- Conclusions

6-1- Summary of the Key Findings

This article investigated the psychology of change management in an educational environment. In particular, the researchers attempted to gauge the psychological experience of the administrative and teaching staff during the technological change process involving the incorporation of pedagogical and educational technologies and how the effectiveness of such technologies can be increased. The findings of the study present the psychological response of the administrative and teaching staff as the antecedent of the effectiveness of pedagogical and educational technologies and a mediator between self-efficacy, perceived ease of use, and the effectiveness of the technology. The research draws on stimulus-organism-response theory, technological self-efficacy, and a technological acceptance model and concluded that the staffs in educational organizations possess low technological self-efficacy and perceive a low ease of use of technology that triggers negative psychological responses such as anxiety, stress, and discomfort, which ultimately hinder their ability to realize the effectiveness and full potential of the pedagogical and educational technologies. Furthermore, the study highlighted that despite having a high perception and awareness regarding the usefulness and benefits of such technologies, the teachers would still feel stress and anxiety that could only be managed by developing their competence (self-efficacy and ability to use the technology with ease).

6-2- Research Implications

The general features of managerial psychology described above are also entirely inherent in any other sphere of activity. However, it is in the educational sphere that the negative characteristics are amplified by the generational and technological gap. The findings of this article present useful implications for educationists and practitioners. The findings also suggest that there exists a huge gap in the technological competence of the teachers and the administrative employees in educational organizations that affects the psychological well-being of the staff, causing

them to feel stressed and anxious about any type of technological change. In this regard, it is imperative to develop well-designed training and learning programs for the staff. The research also recommends that educational organizations should hold monthly meetings, such as Learning Action Cells, to supervise the progress and development of their staff pertinent to advanced digital technologies. Also, follow-up studies must be conducted to delineate the further development of the staff while maintaining their psychological well-being into account as it is the major antecedent for the effectiveness of pedagogical and educational technologies.

6-3- Limitations and Recommendations for Future Research

The authors intend to acknowledge the known limitations of this study. This study does not consider the organization of the learning process, as well as the implementation of knowledge control procedures. Also, the psychology of the learning process and the effectiveness of the use of specific service links for the organization of the learning process are not considered. The study also did not consider the differences in the psychological responses of the teachers across different levels of education. Rather, it is a unified term; the educational organization has been used for all educational levels (elementary school, secondary school, college, and university). Future researchers who may be interested in conducting an investigation in a similar subject area may undertake a comparative study of the staff or a thorough investigation into the procedures and coping mechanisms for managing the psychological responses of the staff during a technological change in the educational organization.

7- Declarations

7-1- Author Contributions

Conceptualization, M.E.K.; methodology, M.E.K.; validation, S.V.F.; formal analysis, G.T.M.; investigation, G.T.M. and N.S.S.; resources, O.A.P.; data curation, S.S.D. and A.A.A.A.; writing—original draft preparation, R.A.A.; writing—review and editing, V.V.P.; visualization, O.A.G.; supervision, M.E.K.; project administration, M.E.K. All authors have read and agreed to the published version of the manuscript.

7-2- Data Availability Statement

The data presented in this study are available in the article.

7-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7-4- Institutional Review Board Statement

Not applicable.

7-5- Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

7-6- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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Appendix I: Questionnaire

Please select the option that best describes your gender

- Male
- Female

Please select the option that best describes your functional area

- Teaching Staff
- Administrative Staff

Please select the option that best describes the educational organization that you work for:

- Elementary school
- Secondary school
- Two-year college
- Four-year college
- University

Codes: SD = Strongly Agree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

	Self-Efficacy	SD	D	N	A	SA
1	I believe that I am fully competent in using advanced educational and pedagogical technologies	1	2	3	4	5
2	I can easily integrate advanced educational and pedagogical technologies in my lesson planning/administrative tasks	1	2	3	4	5
3	I feel confident of using advanced educational and pedagogical technologies without any need for guidance or support	1	2	3	4	5
s	**Perceived ease of use (PEOU)**	SD	D	N	A	SA
5	I find it extremely easy to complete my teaching/administrative tasks using educational and pedagogical technologies	1	2	3	4	5
5	I believe it is very easy to remember how to perform my tasks and conduct my work with advanced educational and pedagogical technologies	1	2	3	4	5
6	I believe that I have an intuitive sense of how to operate the pedagogical and educational technologies	1	2	3	4	5
	Perceived usefulness (PU)	SD	D	N	A	SA
7	The use of pedagogical and educational technologies can enable me to do my teaching/administrative tasks in a much better manner	1	2	3	4	5
8	I believe that pedagogical and educational technologies can enhance overall productivity by simplifying the work and making it efficient	1	2	3	4	5
9	I believe that the use of pedagogical and educational technologies produces better outcomes than the traditional teaching/administration style	1	2	3	4	5
	Psychological responses of the teaching and administrative staff (PR)	SD	D	N	A	SA
10	I feel very anxious when using pedagogical and educational technologies in my teaching	1	2	3	4	5
11	I become very stressed as the use of complex pedagogical and educational technologies adds to my overall work stress	1	2	3	4	5
12	The use of pedagogical and educational technologies adds to my discomfort and anxiety	1	2	3	4	5
13	I feel inspired by the use of different pedagogical and educational technologies	1	2	3	4	5
14	I feel happy to use different pedagogical and educational technologies	1	2	3	4	5
	Effectiveness of pedagogical and educational technologies (EPET)	SD	D	N	A	SA
15	I actively use pedagogical and educational technologies for lesson planning/administrative tasks/classroom	1	2	3	4	5
16	I feel that the use of pedagogical and educational technologies has increased overall productivity and efficiency	1	2	3	4	5
17	My use of pedagogical and educational technologies has benefitted the students to a large extent	1	2	3	4	5
18	I actively use pedagogical and educational technologies for the provision of personalized learning/personalised administrative assistance	1	2	3	4	5
19	The use of pedagogical and educational technologies has made my tasks more effective	1	2	3	4	5