****IMPACT OF DIGITAL TRANSFORMATION ON BUSINESS EDUCATION: A COMPARATIVE**** ****STUDY OF TRADITIONAL AND ONLINE LEARNING APPROACHES IN NIGERIA****

Musa SK¹\* and Auwalu I²

¹Department of Accounting Education, School of Secondary Education (business), Federal

College of Education (Tech) Bichi-Kano, Nigeria

²International Center of Excellence for Rural Finance and Entrepreneurship, Ahmadu Bello

University, Zaria-Nigeria

**Abstract:** The development of digital technology has transformed how firms work, resulting in a dramatic shift in the skills and knowledge required for success in today's business climate. Consequently, business education has had to adapt to these developments to remain relevant. In Nigeria, the conventional face-to-face method of learning has been the predominant mode of instruction in business education. However, as digital technology has been more widely used, online learning has become an appealing option. The impact of digital transformation on business education has been a highly debated topic in recent times, particularly in developing countries like Nigeria. Thus, this study aims to compare the traditional and online learning approaches in order to understand the effects of digital transformation on business education in Nigeria. A sample of 351 online and traditional learning environment students was surveyed using purposive sampling. The study used structural equation modeling (SEM) and multi-group analysis (MGA) for data analysis. The result shows that the direct relationship analysis revealed a significant positive impact of digital transformation on business education indicating that the adoption of digital technologies significantly enhances educational outcomes. Furthermore, the MGA results, which compared path coefficients between online and traditional groups, showed a small difference suggesting a consistent impact of digital transformation across both learning modalities. These findings show the importance of integrating digital transformation strategies in educational institutions to improve the quality of business education universally, regardless of the learning environment. This study provides valuable insights for educational policymakers and administrators, advocating for continued investment in digital technologies to foster improved educational experiences and outcomes.

**Keywords:** Digital transformation, Business education, traditional learning, online learning

# Introduction

As the market evolves, Nigeria's business education sector has faced pressure to change from being classroom-based, teacher-centered, and paper-driven to an online student-centered approach. The global demand, combined with technological advancements, has resulted in increased online learning in the business education sector. However, some studies revealed that, no research has been conducted to determine its impact on traditional classroom-based learning (Ahamed & Siddiqui, 2021; Altuwairesh, 2021; Bin Dahmash, 2021; Ma et al., 2023). Given the potential benefits of online learning, it is essential to understand how it compares to traditional learning and how it may be most effectively used to improve people's education and skills (Means et al., 2013) in developing nations like Nigeria. This set the background of the primary aim of this research. Perhaps to compare and assess the traditional and online learning approaches in business education, in terms of effectiveness, quality, and deliverability.

The development of digital technology in education has opened up a variety of intriguing possibilities (Alemán de la Garza et al., 2019), one of which is the potential for widespread access to high-quality education to provide greater levels of learning to a large number of people at reduced costs (Collins & Halverson, 2018; Laurillard & Kennedy, 2017). Historically, business education has been viewed as just catering to the industrialized world. However, the skills taught in business degrees are globally transferable (Heffernan & Pimpa, 2019), and the emergence of developing countries that keep modifying the field such as Nigeria increases demand for these abilities.

The literature reported that, the changes brought about by the use of digital technology in every sector of human society are referred to as digital transformations (Strømmen-Bakhtiar, 2020). Thus, today, it applies to the entire process of business education, from the initial phase of change to the end of innovation in the classroom (Sevillano-Monje et al., 2022). Similarly, business education is that component of education that prepares students for entry into and progress in jobs within the business, as well as to handle their own business affairs and act intelligently as customers and citizens in a business economy (Giacalone, 2004; Willcocks et al., 2017). However, recognizing the deficiencies in Nigeria’s educational system, planners saw the necessity to incorporate technical education courses, including business education, into the New National Education Policy (Okoroma, 2006; Oviawe et al., 2017).

Moreover, one of the most profound social and economic consequences of the digital revolution has been the ability to offer citizens with access to education and training that would otherwise be unavailable to them (Manda & Ben Dhaou, 2019). Nigeria is a developing country that has had a history of political instability and corruption. As a result of this, foreign students have been reluctant to come and study in Nigeria, and government support for a range of educational initiatives has been cut off. As a result, some of Nigeria's best educators and students have left for Western countries. However, the best way to address this social issue is to use e-learning to provide foreign students with access to Nigeria-based courses in their home country, as well as a cost-effective method of training and development for Nigerians who can no longer afford to study the same courses in Western countries.

Similarly, since digital learning has grown substantially in advanced countries, there are now online courses that are either run by western universities and available to international students, or courses that have been specifically customized for foreign markets. This has created competition for traditional education providers in Nigeria, as they can now offer higher education to the masses at a rate comparable to what they would pay for conventional classroom resources. Given the numerous problems in Nigerian education and the fact that e-learning has been said to have a "leveling" effect for nations with significant differences in educational quality, the study set to answer the following research questions: what is the impact of digital transformation on business education? Is there significant difference between traditional and online learning approaches in their effect on business education? The research is critical for Nigeria at this time and age, given the lessons learned from the COVID-19 pandemic, as well as for its future educational prospects.

The study is designed to achieve the following objectives:

* To determine the effect of digital transformation on business education
* To compare the effect of traditional and online learning methods in Nigeria tertiary institutions

# Literature Review

To evaluate the impact of digital transformation on business education, a comparison of traditional and modern learning approaches is required. This will allow the researchers to determine the extent of the change and whether it benefits the student. Thus, scholars suggests the use of case study to explain teaching methodologies. For example, Wang & Tsay (2023) opined that the case study method is a key strength of traditional teaching. This is a comprehensive investigation of an event, decision, incident, policy, or strategy that frequently focuses on a real situation with real people, which is difficult to teach in a classroom (Armstrong, 2020; Armstrong & Baron, 2002). Previously, case studies were created and presented to students to interpret. Nowadays, students can access audio and video case studies online or in class. This richer media allows students to learn from case studies more efficiently and meet variety of learning styles. However, the case study is an excellent teaching tool for learning business challenges and decision scenarios. Thus, the transition from paper to online might be viewed as an evolution rather than a revolution, but it does reflect the changes that digital transformation is bringing to business education (Bonfield et al., 2020).

This section presents an in-depth review of the literature on digital transformation in business education, examining both traditional and online learning methodologies. The section's main objective is to provide an understanding of the term digital transformation and its implications for the chosen context. In its broadest sense, digital transformation refers to the changes brought about by the use of digital technology in all parts of human society (Akour & Alenezi, 2022; Vial, 2021). For the purpose of this study, it is defined as the study of how the widespread adoption of digital approaches and technology has radically changed education worldwide. Digital transformation in business education aims to bridge the gap between how students are taught and how they want to study (West, 2012). Using innovative teaching technologies in a subject that is frequently regarded to as being taught in traditional way helps to engage students by putting theory into practice (Bender, 2023).

Digital Transformation

According to scholars, digital transformation is the application of modern technology to improve processes in all areas of human society (Morze & Strutynska, 2021). Thus, it broadly refers to the changes that come with the use of digital technology in all facets of human society. To business education students, it entails understanding about the future corporate environment, as new technologies and processes are the driving force behind global economic transformation (Horváth & Szabó, 2019). However, it cannot be underscored that "all aspects of human society" include the actual teaching, communication with students, and evaluation procedures. Digital transformation is one of the most extensively researched topics in information systems (IS) and organizational science literature (Mikalef & Parmiggiani, 2022). Similarly, digital transformation has been proven to be effective in increasing the overall quality of education for students, either by facilitating existing teaching processes or by developing new ways to learn (Gürbüz, 2021).

Business Education

Business education is both for and about business. Business education is a part of the overall educational program that equips the recipient with the knowledge, skills, understanding, and attitude required to perform well in the business world as a producer or consumer of goods and services (Ajisafe et al., 2015). Business education within the context of general orientation for adequate knowledge of business activity (Edokpolor & Egbri, 2017). Similarly, Nwosu & Okoro (2019) opined that business education is the phase of education that prepares students to teach business courses. Business education is an important component of vocational education, which is taught at both the secondary and higher levels of education. Moreover, business education aims to prepare graduates to satisfy the needs of a rapidly growing society.

Traditional Learning Approaches in Business Education

Traditional learning practices are the most popular method of teaching in third-world countries like Nigeria. Even though higher education is the key to success in Nigeria, where there are over 200 million people, the growing demand for higher education is not completely supported by infrastructure and government policy. Thus, only students in the middle and upper economic classes, as well as those living in cities, have better access to higher education.

Literature reported that, traditional learning involves direct contact between teacher and student, with no use of technologies such as computers and the internet (Malık & Khurshed, 2011). Thus, the course materials are delivered to students directly in the classroom by the teacher. Even when a student engages in independent study, the materials are still drawn from lectures and books. Similarly, the traditional learning method has multiple benefits, including better interaction between teacher and student and among students (Sun & Wu, 2016). Because of the direct face-to-face encounters, this strategy is also particularly practical for complicated skills and areas that require extensive instruction, such as craftsmanship and performing arts. However, the traditional learning approach is expensive, and the shortage of space in the classroom forces the school management to split the students into two or more sessions (Berrett, 2012; Lang, 2021). Moreover, interactions between teacher and student have some restrictions in terms of location and timing. If one of them is unable to attend, the entire teaching and learning process fails (Simonson et al., 2019).

Online Learning Approaches in Business Education

Previous studies confirmed that, a wide range of online learning methods and technologies can be used. At the most basic level, these range from static resources that simply replicate the distribution of paper-based content to interactive resources and communication tools, and, more recently, simulation and virtual reality environments. Morgan (2005) proposed an influential typology model that portrays the progression of online learning over six generations. This starts with basic internet tools and sequential content and ends with virtual campuses and learning communities. It is proposed that most traditional and non-selective forms of online learning supplement the use of the former resources, whereas today's and future students represent a market that is accustomed to advanced and interactive environments and is best served by selective and networked learning.

Digital transformation in educational organizations is complicated and requires significant change. It requires a strategic vision, a thorough understanding of potential rewards and challenges, as well as the willingness and ability to undertake change (Warner & Wäger, 2019). The objective, driven by student and market demand, is to improve the effectiveness and efficiency of teaching and learning. In today's atmosphere of decreasing public financing and growing market competition, educational institutions must become more market-focused, customer-centric, and efficient (Yuliansyah et al., 2021). Similarly, the swift pace of technological change and globalization of competitiveness necessitates the development of students with novel skills and capabilities. Many traditional teaching approaches are no longer sufficient to meet student demands and achieve these aims in tertiary institutions and private education providers specializing in business education (de Waal & Maritz, 2022; Varghese, 2004). Online learning is an essential sector with the potential to meet student needs, increase teaching quality and efficiency, and differentiate the organization above its competitors (Pucciarelli & Kaplan, 2016). The current study focused on higher education and the current context of online learning, with the assumption that students are mature and motivated learners.

The application of online learning in business education as part of digital transformation represents a significant and disruptive capability. However, distance learning has changed dramatically over the last decade, and it is now comparable with the best traditional approaches (Gunawardena & McIsaac, 2013). Thus, it is increasingly seen as an alternative to traditional learning, rather than second best. Nevertheless, the pace of digital transformation in terms of pedagogical innovation is inconsistent and there is still great potential to be accomplished (Collins & Halverson, 2018). Elements of quality teaching and knowledge transmission have been moved to the online environment (Benedek, 2021), and the discussion has shifted from traditional vs online to what constitutes best practice in online teaching and how the two modes can complement one another.

Hypothesis Development

Digital transformation and business education

According to the literature, digital transformation has a significant impact on how people live, work, and treat one another. The digital revolution has no precedent in our history due to its size, scope, and complexity (Schwab, 2017). In general, digital disruption has the potential to reshape businesses (Franco, 2018). The strategic influence and role of digital technologies have been investigated and assessed in the existing literature (Ancillai et al., 2023; Hanelt et al., 2021; Khin & Ho, 2019). However, there is little awareness of their potential for business education courses; how these courses incorporate innovations in technology is generally scarce or unexplored (Mian et al., 2020). This gap has strategic implications in Nigerian tertiary institutions where business education learning methodologies are used to achieve technology-intensive projects, business ideas, and solutions developed and implemented by university students. Similarly, digitalization in the Business Education programs will help students develop the ICT skills, intellectual abilities, and competences required for the formation of a business enterprise, as well as make them marketable in the workforce (Siddoo et al., 2017; Suarta & Suwintana, 2021).

Literature revealed that, to prepare students for success in today's business environment, business education must adapt to digital transformation (Collins & Halverson, 2018). Thus, business education programs should use a variety of digital tools such as desktop conferencing, email, online programs like video conferencing, web CT and Blackboard in their instructional activities to impart the necessary knowledge to students for self-reliance after graduation (Chaiko et al., 2020; Žemaitis, 2022). The literature also supported that digital transformation compliance with Business Education provides a unique opportunity for participation in the rising digital business world and shifting dynamics of business ecosystems (Rogers, 2016). Similarly, many scholars are of the opinion that digital transformation supports business education (Drieschner et al., 2019; Lesinskis et al., 2023; Löffler et al., 2019; Oliveira & De Souza, 2022).

Additionally, the literature revealed that, digital transformation has an impact on three fundamental areas: learning **processes,** technology, and management (Wahyuni & Tjala, 2023). Experience has shown that during the pandemic, learning processes in schools required the use of digital technology to mitigate the breakdown in direct contact (Haleem et al., 2022), as the primary global strategy for combating the spread of COVID-19 was social distance (Khalifa et al., 2020). Thus, the process involved in the teaching and learning business education in tertiary institutions is of strategic importance (Ukata et al., 2017). Many European and American countries, as well as big economies in Asia and the Middle East, committed to give effective teaching and learning approaches through the process of digital technology (Arezki et al., 2019; Selwyn, 2012).

**Technology** means infrastructural facilities related to digital technology used to organize learning in schools (Ahmed, 2015). Many new generation institutions use technology-based learning methods that are more user-friendly since they attract and motivate students more than the traditional approach. However, support for infrastructure such as computer labs, gadgets, and internet networks are supplied by both schools and teachers (Jegede, 2019). Similarly, many business education learning facilities are commonly technology-based (Somsuk et al., 2012). Thus, technology has been identified in the previous literature to significantly support business education courses (Kumar et al., 2019; Maresch et al., 2016; Whitaker et al., 2016).

While **management** refers to school management standards. When the scope of school management becomes so broad, it will only be able to manage personal and digital competences. However, management and business education are inextricably linked in an ever-changing business world (Brown & Rich, 2020). Effective management of the university system has a significant impact on offering an outstanding business education learning approach (Whitaker et al., 2016). Management in a school system or comparable organization is an activity that consists of a distinct process that is primarily concerned with the vital task of goal achievement (Ezeugbor, 2014). Thus, every academic and non-academic activity must be accomplished in a standard setting (Mehra et al., 2023). Therefore, as institutions strive to shift from traditional to online approaches, notably in the field of business education, a good management standard must be established (Hénard et al., 2012; Pucciarelli & Kaplan, 2016). Based on the proceeding discussion, the study proposed the following hypotheses:

H1: Digital transformation significantly affects business education in Nigeria

Traditional and Online Learning Approaches

Because of several peculiar problems, Nigeria and many other developing countries in Africa frequently use traditional learning methods. Investigation shows that, the digital transformation advances slowly, as the growth of internet infrastructure, access, and connectivity is also poor and epileptic (Ajah & Chigozie-Okwum, 2019; Edoho, 2013). Similarly, traditional eye-to-eye classes provide instructors with excellent opportunities to develop a more personal relationship with their students (Cain et al., 2018; Kan, 2011). However, innovation is increasingly being consolidated in the classroom. In traditional learning approaches, the instructor determines the format of the lesson and the division of time (Boettcher & Conrad, 2021). Titthasiri (2013) opined that, traditional learning components include a blackboard, books, an instructor, and pupils in a classroom setting.

On the other hand, previous studies indicates that, distance education facilities have increasingly been identified as a way of providing access to knowledge (Bušelić, 2012; Gunawardena & McIsaac, 2013; Simonson et al., 2019), globally. According to Jiménez-Crespo (2015), the widespread usage of information technology and the increasing popularity of the Internet/World Wide Web have resulted in the identification of opportunities for transforming distance learning activity into a more advanced online environment. Moreover, the COVID-19 pandemic had significant changes in various sectors worldeide. For example, all face-to-face learning activities had to be replaced by digital communication media, resulting in online learning (Mpungose, 2020; Stoian et al., 2022), particularly in Europe, America and large economies in Asia and the Middle East. Thus, the scenario did inspire schools and teachers to search for learning models and methods that enhance distance learning (Anthony Jnr & Noel, 2021). In Nigeria and many African countries learning and research activities were suspended for about a session during the COVID-19 pandemic.

Traditional and online learning facilities both have advantages and disadvantages. Without a doubt, there is an increasing interest in online training (Sadeghi, 2019). Perhaps traditional classrooms provide a few favorable social perspectives that can be lost in some internet-based virtual learning conditions (Pallavi et al., 2022). According to some recent studies, student can manage time and attend online courses when it is most convenient, whether it is early in the day, late evening, or at night (Yeo et al., 2023; Zavgorodniaia et al., 2021). Again, the online learning approach involves multiple stages, such as Pedagogue, which provides intelligent contents. However, traditional eye-to-eye classes provide teachers with excellent opportunities to build a more cordial relationship with their students (Cain et al., 2018).

Research Q2: Is there significant difference between traditional and online learning approaches in their effect on business education?

Theoretical Review

Cognitivism Theory

The development of behaviorism led to the emergence of cognitivism. The literature reported that Plato and Descartes were the first philosophers to develop cognitive behavior and knowledge. According to Alessa & Hussein (2023) learning is the process of connecting symbols in a meaningful and remembering manner. Similarly, studies focus on the mental processes that enable symbol linkage (Salomon, 2012). According to the theory, students’ thoughts facilitate their learning (Bender, 2023). Teachers encourage students to ask questions and think aloud so that they may understand how their method of thinking works and apply their knowledge to get better learning outcomes (Tofade et al., 2013). Similarly, the teacher facilitates learning by leveraging the learner's data processing system (Kim et al., 2014).

However, as technology takes center stage in global teaching and learning, the TPACK Model emerges (Padmavathi, 2017). The TPACT model is a framework that involves three technical areas: technological pedagogical content knowledge (Kontkanen, 2018; Par, 2022). The premise describes how they collaborate to enhance students' enthusiasm to learn and make knowledge more accessible to them. It is a framework which allows teachers evaluate how their knowledge domains cross in order to effectively teach students using technology. Most of the facilities found in the laboratories for teaching and learning business education are technology aided-materials. Hence, they are appropriate tools for facilitating, attracting, and making business education more accessible and easier to learn.

Cognitivism theory supports the relationship between digital transformation and business education by focusing on the enhancement of mental processes through digital tools that promote active learning, critical thinking, and problem-solving. Digital transformation in business education integrates technologies such as interactive simulations, virtual reality, and data analytics, which align with cognitivist principles by engaging students in immersive, experiential learning (Hsu & Wu, 2023; Steele et al., 2020). These tools facilitate deeper understanding and retention of complex business concepts by enabling learners to visualize and manipulate data, collaborate in virtual environments, and receive immediate feedback (Daspit & D’Souza, 2012). As a result, the cognitive development of students is accelerated, making them better prepared to apply theoretical knowledge (Daspit & D’Souza, 2012) to practical business challenges in an increasingly digital world.

Conceptual Model

Based on the literature reviewed and hypothesis developed, the study proposed a conceptual model in figure 1. The model shows the relationship between digital transformation as an independent variable with three dimensions (processes, technology and management) and business education as one-dimension variable.



Figure 1: Proposed conceptual model

# Materials and Methods

In this research, a quantitative research strategy is selected to study the research question and for this reason, research is based on positivism assumptions of ontological and epistemological philosophies. So, to confirm the causal or correlational relationships between dependent and independent variables, a research design is required which helps in achieving results of causal relationships and can help in functional testing of brand propositions or theory. To identify the effects of digital trends on the education system, a compare and contrast study with future studies is required and for this reason, a multivariate or two-way design is preferred (Burns & Bush 2006). This research design can help to identify the causal relationships or differences between variables measured over time.

The study also employed a purposive sampling method, focusing on a sample group that meets the requirements for the research. The study areas are National Open University (Kano study center) and Ahmadu Bello University Zaria. Both universities were accessible for the researchers and thus made for a convenient sample group. As online learning is becoming increasingly popular, the nature of it allows students to have flexible study hours. Similarly, e-mail surveys and physical distribution of the research instrument were used in data collection. The study employed three research assistants for data collection and entry. The students’ population for both online and traditional learning are estimated to be above hundred thousand. Therefore, based on Krejcie & Morgan (1970) Table, a sample size of 382 is adequate for a population above 75,000. Therefore, 382 is taken as a sample size for this study.

However, 10% was added to take care of non-response and missing values, as Israel (1992) recommended. Thus, the sample size is 420 for data collection. With this, equal number of 210 questionnaires were distributed to each group. The educational levels of the students cut across bachelor, masters, and PhD degree levels. A logical error can be made assuming that the level of degree has an effect on their use of digital resources, hence equal representation of different education levels in both traditional and online learning was very important. This led to the sampling to be a mixture of stratified and quota sampling techniques. Out of 420 questionnaires distributed, 373 were returned comprising 175 from online students and 198 from traditional students. After screening, 8 questionnaires were found to be not validly filled from the first category, leaving 167 for analysis. Similarly, 14 were excluded from the traditional students’ questionnaires for being invalid, leaving 184 for analysis. Therefore, the total valid questionnaire for analysis is 351. The technique used for data analysis is Partial least Square Multi Group Analysis (PLS-MGA) to see if there is a significant difference in the impact of digital transformation on business education between online and traditional learning approaches.

Measurement of Variables

The study measures digital transformation adapted from Wahyuni & Tjala (2023) consisting of process (PRC), technology (TECH) and management (MGT) with four items each. The business education is one-dimension construct adapted from Alstete & Beutell (2004) with ten items. The responses were coded on a 5-point Likert scale, with responses ranging from (1) strongly agree to (5) strongly disagree. Further, their validity was impliedly confirmed because previous studies used the questionnaires extensively.

# Result and Discussion

PLS-SEM Path Modelling

Path models in structural equation modeling (SEM) visually depict variables and their hypothesized relationships using diagrams, a concept detailed by (Hair et al., 2011). The PLS-SEM path model comprises two main components: the measurement model (outer model) and the structural model (inner model), as explained by Hair et al. (2014) and Henseler et al. (2009). The measurement model, also known as the outer model, includes indicators and their associations with latent variables. Hair et al. (2014) emphasized that PLS-SEM is more effective in parameter estimation than Covariance Based Structural Equation Modeling (CB-SEM), enhancing statistical robustness. It highlights the superiority of PLS-SEM as a statistical tool for parameter estimation. Evaluating the structural model (inner model) assesses the predictive capability of the model. Common assessment criteria in PLS-SEM analysis include the coefficient of determination (R² values) and the significance level of path coefficients, as noted by Wong (2013) and Hair et al. (2014).

Assessment of the measurement model

To evaluate the measurement model in this study, the researcher assessed the reliability of individual items for each construct and examined the internal consistency reliability, also known as structure reliability. This process included evaluating both discriminant validity and convergence validity for each reflective construct, as described by Henseler et al. (2009). Hair (2017) suggested that an external loading ranging from 0.40 to 0.70 is considered reliable and acceptable. They recommended removing an item only if it would enhance the Average Variance Extracted (AVE) or the Composite reliability of the constructs.

Likewise, the study employed the PLS algorithm Geladi & Kowalski (1986) to evaluate individual item reliability and other aspects of the measurement model, as depicted in Figure 2. The item or factor reliability of constructs was assessed using the outer loadings of each construct's indicators (Duarte & Raposo, 2010; Hair et al., 2012; Hulland, 1999). Based on this rule, three items were deleted form digital transformation construct (PRC2, PRC3 and PRC4). Therefore, the results show that the loadings of all indicators are within the acceptable range.



Figure 2: Measurement Model

Table ‎I:Measurement model: Reliability and Convergent validity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Construct | Item | Loadings | Cronbach Alpha | Composite reliability | Average Variance Extracted |
| Bus Educ | BE1 | 0.655 | 0.940 | 0.949 | 0.655 |
|  | BE2 | 0.681 |   |   |   |
|  | BE3 | 0.711 |   |   |   |
|  | BE4 | 0.787 |   |   |   |
|  | BE5 | 0.898 |  |  |  |
|  | BE6 | 0.895 |  |  |  |
|  | BE7 | 0.905 |  |  |  |
|  | BE8 | 0.855 |  |  |  |
|  | BE9 | 0.880 |  |  |  |
|  | BE10 | 0.774 |  |  |  |
| Dig Trans | PRC1 | 0.747 | 0.921 | 0.925 | 0.582 |
|  | MGT1 | 0.594 |  |  |  |
|  | MGT2 | 0665 |  |  |  |
|  | MGT3 | 0.713 |  |  |  |
|  | MGT4 | 0.654 |  |  |  |
|  | TECH1 | 0.886 |  |  |  |
|  | TECH2 | 0.900 |   |   |   |
|  | TECH3 | 0.790 |   |   |   |
|  | TECH4 | 0.852 |  |  |  |

Source: Researchers 2024

From table I, the researchers deleted three items from process dimension of digital transformation (PRC2, PRC3 and PRC4) because their loadings were less than the acceptable threshold of 0.50. The composite reliability and Cronbach's alpha values were used to assess the internal consistency of the reflective structure (between 0 and 1), with more significant values ​​indicating higher reliability. The composite reliability and Cronbach's alpha values appear to be above 0.50 and therefore considered reliable. Finally, the AVE values for all the constructs were greater than 0.50 and met the convergent validity minimum threshold of 0.50.

In the same vein, the Fornell-Larcker criterion was used to assess the discriminant validity.

Table II: Discriminant Validity- Fornell-Larcker Criteria

|  |  |  |
| --- | --- | --- |
|  | BUSINESS EDUCATION | DIGITAL TRANSFORMATION |
| BUSINESS EDUCATION | 0.881 |  |
| DIGITAL TRANSFORMATION | 0.709 | 0.763 |

Source: Researchers 2024

Table II shows the results of the Fornell-Lacker criteria for the latent constructs. The Fornell-Larcker criteria are used to assess discriminant validity in structural equation modeling. This criterion suggests that for adequate discriminant validity, the square root of the AVE for each construct should be greater than the correlation between the construct and any other construct in the model. To meet the Fornell-Larcker criteria, the square root of the AVE of each construct should be higher than the correlation between the constructs. The square root of the AVE for Business Education is 0.881. This value is an indicator of how much variance in Business Education is captured by its own indicators relative to the variance due to measurement error.

However, the square root of the AVE for Digital Transformation is 0.763. This reflects the amount of variance in Digital Transformation captured by its own indicators compared to measurement error. The correlation between Business Education and Digital Transformation is 0.809. This value indicates the extent to which these two constructs are related to each other. The constructs meet the Fornell-Larcker criteria because their square root of AVE (0.881 and 0.763) is greater than its correlation with Digital Transformation (0.709).

Structural model

After meeting the requirements of the measurement model, the first step in evaluating the structural model involves examining the theoretical relationships. Following the recommendations of Hair et al. (2017) and Henseler et al. (2009), the structural model evaluates the significance of path coefficients for direct relationships. Table III displays the results used to test the hypotheses.

Table III: Bootstrapping results of structural model

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  Hypotheses Relationships | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (|O/STDEV|) | P Values | Decision |
| Digital transf. -> Bus Education | 0.881 | 0.882 | 0.013 | 66.038 | 0.000 | Supported |

Source: Researchers 2024

The result in table III is also shown in figure 3:



Figure 3: Structural model

The bootstrapping result in table III and figure 3 shows a positive and significant relationship between digital transformation and business education with Beta value 0.882 and P-value 0,000. The Beta value represents the strength and direction of the relationship between digital transformation and business education. A Beta value of 0.882 indicates a strong positive relationship, meaning that as digital transformation increases, business education also increases. The high value suggests that digital transformation has a substantial impact on business education. Similarly, the P-value (0.000) indicates the statistical significance of the relationship. It shows that the relationship between digital transformation and business education is highly significant. In other words, the probability that this relationship is due to random chance is extremely low. This finding corroborates previous studies (Kumar et al., 2019; Maresch et al., 2016; Whitaker et al., 2016).

*Effect size (ƒ²) and Predictive relevance (Q²)*

The general criterion for evaluating the ƒ² value, which indicates the effect size of an exogenous construct on an endogenous latent variable, is 0.02 for small, 0.15 for medium, and 0.35 for large effects (Selya et al., 2012). However, Aguinis et al. (2005) have noted that the average effect size for moderation tests is only 0.009. Therefore, Fritz et al. (2016) suggested more realistic standards for effect sizes: 0.005 for small, 0.01 for medium, and 0.025 for large effects. Therefore, for this study, the ƒ² value of 3.467 is considered to be large.

Table 1V: Predictive Relevance of the Model

|  |  |  |  |
| --- | --- | --- | --- |
|  Variables | SSO | SSE | Q² (=1-SSE/SSO) |
| BUSINESS EDUCATION | 3510.000 | 1763.748 | 0.498 |
| DIGITAL TRANSFORMATION | 3159.000 | 3159.000 |   |

Source: Researchers 2024

Additionally, from table IV, the predictive relevance (Q²) of the external latent variables was examined using cross-validated redundancy criteria to reflect the endogenous latent variables. The results show a value of 0.498 which is greater than 0, and thus meets the requirement.

Table V: Coefficient of determination for direct relationship (R-square)

|  |  |
| --- | --- |
| Construct |  R-square |
| Business education |  0.776 |

Source: Researchers 2024

Moreover, the assessment of R-square values, or the coefficient of determination, evaluates the amount of variance explained by the exogenous constructs in the endogenous constructs. According to Chin (2010), R² values of 0.67 are considered substantial, 0.33 are moderate, and 0.19 are weak. For this study, the R² values of 0.776 is considered substantial as shown in table V. This means that digital transformation explained the variation in business education by 77.6% while the remaining 22.4% are factors not covered by the current study.

Multi-group Analysis Results

According to Hair et al. (2017), multi-group analysis in SEM involves testing for measurement invariance across groups to verify if the measurement model (e.g., factor loadings, item intercepts) is consistent across different groups. This assessment ensures that the constructs being measured have equivalent meanings and structures across groups, enabling meaningful comparisons. Additionally, Kline (2015) mentions that multi-group analysis can be used to investigate structural invariance, which examines whether the structural paths (e.g., regression coefficients) are equivalent across groups. This analysis helps researchers determine if the relationships between variables remain consistent across different groups, providing insights into potential group differences or similarities. Overall, multi-group analysis in SEM is a valuable tool for evaluating the robustness and generalizability of structural models across diverse groups, enhancing the understanding of variable relationships in various contexts. Table IV presents the results of the multi-group analysis conducted.

Table VI: Multi-group Analysis Results

|  |  |  |  |
| --- | --- | --- | --- |
|  Relationships | Path Coefficients-diff (Online - Traditional) | p-Value original 1-tailed (Online vs Traditional) | p-Value new (ONLINE vs TRADITIONAL) |
| DIGITAL TRANSFORMATION -> BUSINESS EDUCATION | 0.026 | 0.245 | **0.490** |

Source: Researchers 2024

From table VI, it can be seen that the path coefficient difference between Online and Traditional is 0.026. This value represents the difference in path coefficients between the online and traditional groups. A difference of 0.026 indicates a small difference in the strength of the relationship between Digital Transformation and Business Education when comparing online to traditional groups. A p-value of 0.245 indicates that the difference in path coefficients between the online and traditional groups is not statistically significant. In other words, there is not enough evidence to suggest that the relationship between Digital Transformation and Business Education is different between the online and traditional groups. Finally, a p-value of 0.490 also indicates that the difference in path coefficients between the online and traditional groups is not statistically significant. Similarly, this suggests that there is no significant difference in the relationship between Digital Transformation and Business Education between the online and traditional groups using the new test.

# Discussion and implications

The findings from the study highlight the significant direct relationship between Digital Transformation and Business Education. The high Beta value of 0.882 with a highly significant p-value of 0.000 indicates the positive impact digital transformation initiatives have on enhancing business education outcomes. This implies that as institutions adopt digital technologies, the quality and effectiveness of business education improve significantly. Such a robust relationship demonstrates that stakeholders in educational institutions should prioritize digital transformation strategies to leverage technology for better learning experiences and outcomes.

Additionally, the multi-group analysis (MGA) findings provide additional insights by comparing the strength of the relationship between Digital Transformation and Business Education across online and traditional learning environments. The small difference in path coefficients (0.026) coupled with the non-significant p-values (0.245 and 0.490) suggests that the impact of digital transformation on business education is consistent across both groups. This consistency implies that the benefits of digital transformation are universally applicable, regardless of whether the learning environment is online or traditional. It highlights the versatility and broad applicability of digital technologies in enhancing business education, which suggests that investments in digital transformation are likely to yield positive results across different teaching and learning contexts.

These findings have important implications for educational policymakers and administrators. The strong direct relationship between Digital Transformation and Business Education underscores the need for continued investment in digital technologies and infrastructure. As the MGA results indicate no significant difference between online and traditional settings, educational institutions can confidently integrate digital transformation strategies across all learning environments. This can lead to a more unified and cohesive approach to improving business education, ensuring that students receive high-quality education regardless of the modality. Furthermore, these findings can guide future research to explore specific digital transformation practices that are most effective in different contexts to further enhance the quality of business education globally.

# Conclusion

The study’s findings demonstrate a significant and positive direct relationship between Digital Transformation and Business Education, as evidenced by a high Beta value and a highly significant p-value. Thus, the study concludes that the integration of digital technologies substantially enhances the quality and effectiveness of business education. Such a strong correlation points to the importance of digital transformation initiatives within educational institutions. Therefore, to achieve better educational outcomes, institutions should prioritize and invest in digital transformation strategies, leveraging technology to improve teaching and learning processes.

Furthermore, the study concludes that the impact of digital transformation on business education is consistent across both online and traditional learning environments. The negligible difference in path coefficients and the non-significant p-values indicate that the benefits of digital transformation are universal, regardless of the modality of education. This implies that educational institutions can implement digital transformation strategies with confidence that they will be effective in both online and traditional settings. These conclusions provide a strong foundation for educational policymakers and administrators to develop and support comprehensive digital transformation initiatives, ensuring high-quality business education across diverse learning environments.

Limitations and Suggestions for Future Research

One limitation of this study is the potential variability in the implementation and quality of digital transformation initiatives across different educational institutions. While the study provides a general assessment of the impact of digital transformation on business education, it does not account for specific differences in technology adoption, faculty expertise, and student engagement, which could influence the effectiveness of these initiatives. Additionally, the study primarily relies on quantitative data, which may not fully capture the detailed experiences and perspectives of students and educators involved in digital transformation processes. Another limitation is the cross-sectional nature of the study, which captures a snapshot in time rather than examining the long-term effects of digital transformation on business education. As digital technologies and educational practices evolve rapidly, the findings may not fully reflect ongoing changes and trends in the field. Furthermore, the study's focus on business education may limit the generalizability of the results to other disciplines, where the impact of digital transformation could vary significantly.

Therefore, future research should consider longitudinal studies to examine the long-term impact of digital transformation on business education. This approach would provide deeper insights into how digital initiatives affect educational outcomes over time and allow for the assessment of sustained benefits or potential challenges. Additionally, incorporating qualitative methods such as interviews and focus groups with students, educators, and administrators could enrich the understanding of the experiences and perceptions related to digital transformation. Moreover, future studies could explore other specific variables such as different technologies, pedagogical approaches, and support systems that are most effective in enhancing business education.

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# Declaration of Interest Statement

No potential conflict of interest was reported by the authors.

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