NEXUS
International Journal of Science and Education

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

Modeling the Constructs of Accelerating Digital Transformation in the Basic Education

Achilles Charles G. Grandeza, PhD

Abstract. This article examined the key drivers in accelerating the digital transformation of education. A model was developed to assess which constructs influence the acceleration of digital transformation in basic education, and factor analysis was undertaken on all of the model's components. Then, Principal Component Analysis (PCA) was used to determine the number of emerging factors depending on the eigenvalue. With 200 respondents, an Exploratory Factor Analysis (EFA) was utilized to do a factor analysis on the obtained dimensions. After utilizing Confirmatory Factor Analysis (CFA) with 315 respondents to confirm the factors and ensure a good fit, Covariance-based structural equation modeling (CB-SEM) was performed to examine the relationships between the factors. The findings suggested that for education to be relevant and competitive in the future these factors need to be developed: Organizational Structure, Digital Leadership, Antifragility Culture, Digital Technology, Digital Pedagogy 4.0, Technological Capability, and Attitude Towards Technology. In addition, the construct with the most impact on the outputs of the model was digital technology. Consequently, the organizational structure of basic education must be aligned with both the unique structure of digital transformation and the culture by adopting new philosophical concepts. The department should aid in the acquisition of technology and ensure that its technology remains 4.0-relevant for educational purposes. Instead of relying solely on their power and bureaucratic influence, leaders should broaden their knowledge and application of digital technologies in order to make informed decisions in the field. Additionally, the department should consider drafting policies that support the growth and acceleration of digital transformation.

KEY WORDS

1. digital transformation 2. basic education 3. education 4.0 4. digital technology capability 5. technology based pedagogy 6. technology culture

Date Received: September 05, 2024 — Date Reviewed: October 10, 2024 — Date Published: November 10, 2024

1. Introduction

The convergence of digital technology and education is inevitable; soon, a portion of the education of our nation's youth will be conducted utilizing various digital technologies. Digital transformation (DX) is defined as a process in which digital technologies cause disruptions, eliciting strategic responses from organizations that seek to alter their value creation paths while managing structural changes and organizational barriers that influence the positive and negative outcomes of the process (Vial, 2019) and for fundamental changes to occur, integrating digital technologies into any field is an ongoing process (Medina, 2017). According to numerous global indexes (Soumitra et al., 2021), the Philippines ranks 100th out of 132 nations in terms of ICT infrastructure and 87th in terms of ICT access, resulting in a shortage of digital technologies and communication infrastructure. In terms of pupil-to-teacher ratio, the Philippines ranks 105th out of 132 nations, adding to the difficulties in the education system. Several indices indicate that the country's ICT infrastructure, which includes education, is still deficient, which could lead to a sluggish digital transformation in basic education. Digital transformation in education is not about replacing everything; rather, it is about enhancing technology, teaching pedagogies, and processes. We can also view it as an extension and amplifier of traditional education that transcends temporal and spatial boundaries (Greenhow et al., 2016) since it is the merging of physical and digital systems, as with Industry 4.0 and Education 4.0. (Bonfield et al., 2020). Unquestionably, digital transformation has permeated nearly every aspect of human life (Bhattarai Maharjan, 2020). Several social factors, technological aspects, and economic, political, and environmental trends are undergoing digital transformation, and with the added difficulty of the COVID19 pandemic, we have the education trends (EDUCAUSE (Association), 2021). Despite claims that digital transformation has been extensively studied (Navaridas-Nalda et al., 2020), digital transformation is still a relatively new phenomenon, (Broekhuizen, 2021). The majority of these studies are in information systems, marketing, and management. Therefore, there is a need for further research into accommodating the numerous, diverse education sector stakeholders. According to the diffusion of innovation theory (Benoit Rogers, 1964), the majority of students are now born into a digital world, whereas the majority of administrators are digital migrants. Therefore, educational administrators and program specialists must be prepared for this transformation and possess the skills necessary to manage it (Balyer Öz, 2018). However, digital transformation in Philippine basic education is not yet mature. Nevertheless, although the Filipino culture places a high value on education (B. Garcia, 2017), the Unified Theory of Acceptance and Use of Technology may be essential for modeling the factors influencing the acceleration of digital transformation in basic education. This unified technology acceptance model by (Venkatesh et al., 2003) is a powerful model to properly present a helpful educational technology and reduce the probability that an undeniably valuable educational technology could help educate students in this digitally transformed world denied acceptance and be deemed useless. Furthermore, developing this model will indisputably help improve how educational leaders decide on the suitable technologies that could help transform education digitally, and the organization can say that it is digitally transformed. With the added difficulty of the pandemic COVID-19, now is the time to consider adopting new technologies in education. There is a need to accept technologies that could aid the digital transformation of education, and information management research should better recognize children, their digitalized everyday lives, and their basic education as significant areas of concern (Iivari et al., 2020). However, the problem is when policymakers do not understand a presented technology, they reject it. It was mentioned by (Taherdoost, 2019) that when the factors that affect the acceptance of technology are identified, it would be easier for innovators to design technologies that would have a lesser probability of being rejected, these policies and decision-makers must be presented with a technology concentrating on its ease of use rather than offering more on the usefulness of technology as argued by (van der Heijden, 2004). For example, in the Department of Education, a teacher is always asked for a copy of their appointments in transacting. There is no need to ask for this if they have a shared

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

database between offices or a mild application of blockchain technology as a novel digital institutional infrastructure. They don't have an updated list of their teachers per school, and they have to request from the school when it should have a record in their database. Their procurement process of digital goods is not established resulting in teachers spending on their own. There is no digital transparency board where teachers and stakeholders can view the accountabilities that needs balance. To combat the isolation caused by the pandemic, it is more important than ever to embrace and improve digital solutions inside the educational system. When determining and evaluating digital technology services that could expedite the digital transformation in education, educational leaders and instructors must use a more data-centric approach and model discussed in this study.

2. Review of Related Literature

A transformative experience is disrupting the delivery of education. The disruption by COVID-19 requires researchers to identify barriers and challenges which schools face in transforming education (García-Morales et al., 2021). The (United Nations. Department of Economic and Social Affairs, 2020) survey shows that Philippines has underdeveloped infrastructure. Therefore, a fully functioning online learning management system is not possible for the Department of Education. A crisis shouldn't drive transformation (Mhlanga Moloi, 2020) but rather a controllable, researched factor. Digitization differs from digital transformation. It simply encodes analog information into a digital format. Digital transformation changes relationships among people, technology, pedagogies, and functions in education and society (Broekhuizen, 2021). Digital transformation combines technologies to improve business models, processes, and customer experiences in all industries, including education. To prepare students with desirable skills and knowledge, the education sector must adopt digital opportunities and transform (Morakanyane et al., 2020). One of the significant high points of digital transformation for IT is that it highlights its direct and indirect impact on the organizational structure, processes, information flow, and adaptability. It focuses on a strong technological foundation and alignment with businesses (Li et al., 2018). Potentially, knowledge of possible digital inequalities is highly crucial in this regard (International Telecommunications Union, 2021). "Digital transformation" is a buzzword used by business media to describe the disruptive impact of digital technology on organizations and their potential need to reinvent themselves in order to survive and succeed in the digital environment (Nambisan et al., 2019). The change is being addressed in the education sector but brings significant effort to the digital skills needed by the workforce (Zain, 2021). Digital Technology Utilization Culture: Due to its connection with technology adoption and attitude, culture is a central factor in accelerating the role of digital transformation.

(Abraham, 2014) stated that technology stems from people's culture. In 1979, the first Walkman was created to meet the need for portable music without disturbing others. Development comes from a culture respecting individual space, which indeed shows that technology uptake is a matter of culture. If people cannot integrate technology, they will adapt it to suit them. Mobile phones were invented in Japan because they share knowledge. Thus, digital transformation has to have perceived applicability. Culture is vital, and thus technology is culture-based. On the other hand, technology can also impact culture (Vishwakarma, n.d.). Social degradation has created ethical and moral issues-a term coined as "netiquette" to balance the need for a proper digital transformation model. According to Pineda (2014), cultural factors have an impact on the perception and

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

use of technology and therefore should drive the usage of technology. Digital technology should be designed according to what the culture has in store and how the culture might affect its use; in other words, researchers, engineers, designers, and programmers of digital technology should base their designing according to needs and cultural needs. Culture is important in digital transformation, with specific values identified as key (Tuukkanen et al., 2022). A cultural change is required to promote the development of education in digitalization and transformation (Burchardt Maisch, 2019). Leadership Enabling Digital Transformation. According to (Venkatesh Davis, 2000), social influence is the drive for technology adoption as social pressure or norms. The moderating variables of this influence were later defined to comprise gender, age, voluntariness, and experience (Venkatesh Zhang, 2010). Leadership plays the most significant role in social pressure within education; (Navaridas-Nalda et al., 2020) identified that principals push the digital culture transformation.

The study of social influence is necessary to understand the use of digital technology because human beings are inherently social.

A construct adopted by (Zahid Haji Din, 2019) in e-government services adoption was trust. Social influence is a significant predictor of relational values. Most human beings, irrespective of age, need social contact and belongingness. This conforms to Park's (2009) study in which social influence in TAM2 predicted the intention to use specific e-learning materials. Ajzen (1991) stated that in predicting behaviors, social influence from subjective norms is crucial as society creates pressure, support, and can shape personal values. Today, social influence occurs in both physical and cyber surroundings. According to Carrasco Miller (2006), the activity of being social depends not only on personal attributes but also on social network composition, information, and communication technology interactions. (Manca et al., 2019) proved that social influence and interaction exert a significant impact on new technology adoption, especially in the pro-environmental transport. As defined by (Carrasco Miller, 2006) and cited by (Manca et al., 2019), the ”strength of the tie” impacts social influence as not everyone is valued equally. As social beings, man will be political and associate with leaders for his survival. A pyramid existed ever since man emerged; even animals had a type of political scale for order (Scheidel, 2017). Developing these digital technologies will, without fail, go through a political system for its approval. Politics and institutions are playing catch-up due to rapid technological advancements (Thiele, 2020). However, the issue is not with technology itself but rather with political variables and leaders that are preventing better technologies from being developed and deployed in support of digital transformation. An acceptance decision model of technology is imperative by a leader's interest and ideology. Digital transformation does not have an established model, which further creates a leadership-related issue. Leaders and their tech advisers may struggle to assess the value and usability of technology during hardships. This can make the best solution depend more on decision-makers than on the solution itself. According to Ajibade et al. (2017), public servants and leaders should be made to understand the need to embrace objective models. Falloon (2020) suggested that teachers understand key competencies in order to work efficiently, securely, and ethically in a transformed digital learning environment. This is the importance for preparing young people to use digital resources safely and effectively in their future classrooms. However, the risk of credibility causes caution in using digital technologies (Enskat et al., 2017). Technology helps in designing pedagogies for students with disabilities (Mize et al., 2020) and enhances the confidence of teachers to teach more effec-

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tively among pre-service teachers and practicing teachers (Hur et al., 2020). Relative advantage is the degree to which a product seems superior to any existing one (Benoit Rogers, 1964). This explains that if digital technology is perceived to be better, then its adoption will depend on the decision of an individual person, especially when offering a performance better than time spent, cost incurred, and efforts made.

As Templeton and Byrd (2003) claim, ease of use relates to the relative advantage of technology, and applying diffusion of innovation theory helps the organizations manage process reengineering and system implementation. This is proved by Olson and Xiao (1996), who obtained that relative advantage provides increased output potential through time dialysis. Other studies resorted to external indicators to enhance the relative advantage of products, services, and practices. For example, (Chan et al., 2019) looked at how social capital impacts relative advantage and found that it moderates the relationship between relative advantage and an interactive electronics channel in banking. Digital Technology Capability The innate or acquired technological capabilities are essential variables that can predict which digital technologies are likely to be adopted. There are people who are naturally brilliant at adopting technology. Learning and technical capabilities were pointed out as key to predict the adoption of web-based procurement tool by (Zahay Handfield, 2004). In contrast, (Martínez-Román Romero, 2017) argued that education and training is more influential in technology adoption than technical skills. E-services developers need to focus on how digital technologies improve lives, regardless of age or digital citizenship (Nikou et al., 2020). Technical support and anxiety reduction are important preconditions for successful technology implementation (Adenuga et al., 2019). Capability refers to the ability of a firm to react to incremental and disruptive technology.

(Garrison, 2009) Technology-response and technology-sensing capabilities are critical for ”early technology adoption, which produces superior outputs for opportunistic companies”. Technology impacts ability and the acquisition of ability involves money; therefore, socioeconomic backgrounds are relevant to problem analysis. Socioeconomic backgrounds are relevant in adopting e-services, technologies, and ideas. Researchers often realize that financial capital and educational background are prominent antecedents for behavioral intention. (Mwirigi et al., 2009) have found that socio-economic factors highly determine the adoption of technology for future benefits. (Mittal Mehar, 2016) suggested that, despite the advantages, the adoption of modern information and communication technology depends on factors such as age and education. The study by (Tambotoh et al., 2015) supports (Mittal Mehar, 2016), where socio-economic factors, social influence, and facilitating conditions affect the acceptance of technology. In countries with high human capital like the Philippines, investment in education is important to developmental socio-economy (Bucciarelli et al., 2010). Technology adoption arises from very highly trained human capital, which indicates high socio-economic status. Attitude Towards Technology All this happens due to external factors acting on our beliefs, but the actual behavioural intention to adopt technology depends upon its utility and ease of use (Venkatesh et al., 2003; Venkatesh Davis, 2000; Venkatesh Zhang, 2010). Beliefs, attitudes, and habits of mind drive the digital transformation in education as teachers aim for personalized digital learning (Blundell et al., 2020). In adopting technology, attitudes towards digital citizenship must be considered (Benoit Rogers, 1964; Buente, 2015). Inequality exists in the real and the virtual worlds. Thus, improving digital education-goal 4, inclusion-goals 5,8,10, and connectivity-goal 9, is paramount (Nations, 2015; THE 17 GOALS — Sustainable Develop-

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

ment, n.d.). (Buente, 2015) observed that digital citizenship resulted in electoral participation inequality in the United States as less participation was seen from digital migrants compared to digital natives, thus indicating that technology adoption in digital migrants is hard.

The digital migrants do not readily embrace the technology due to fear and danger and a lack of technical skills (Searson et al., 2015). Digital transformation forms a negative attitude. However, these problems are being overcome through digital literacy (Saputra Siddiq, 2020), which is now a compulsory course in Philippine senior high schools. Studies further explored the adoption of electronic services. The predictors of usage intent considered were perceived usefulness and ease of use. M. K. O. Lee et al. (2005) extended the technology acceptance model with a motivational aspect by including perceived enjoyment as the predictor of internet-based learning. The results indicated that perceived usefulness and enjoyment directly affected the intention to use digital technologies. (Huang et al., 2006) discovered that when the motivation for learning is viewed as an external factor, perceived ease of use and usefulness have a positive effect on attitudes toward using digital technologies. Organizational Structure Market-creating innovations driving economic growth, as noted by (C. M. Christensen et al., 2019), are like seeds that can't thrive in poor organizational soil. He added that quality institutions provide the best growth conditions. This causes structural plateauing in educational organizations, hence defeating the motivation of teachers to strive and bring forth ideas or innovations as they cannot find means to proceed forward with their careers. The Department of Education, like the private sector, waits for digital technology to mature before applying it. This results in increased costs and damage as well, making it lag behind. According to (Mustafa Kamal Alsudairi, 2009), shortfalls in IT-skilled personnel attract expensive outsourcing services from the private sector, which is often concerning with regards to privacy. Data collection is unstandardized; the central office just requests students' scholastic aptitude in specific areas, leaving data collection methods to the instructors. Currently, the Department of Education lacks standard software for viewing or downloading grades and general scholastic aptitude queries. Digital technologies have a deep impact on the internal operations of an organization. For an organization to stay ahead, it needs to transform and then respond to these changes (Kretschmer Khashabi, 2020). Hinings et al. (2018) argue for the new institutional arrangement for successful digital transformation, including a crowd-based platform for the collection of data, digital infrastructure for setting standards in innovation, and modular building blocks towards rapid development in digital innovation.

Digital building blocks illustrate the way innovation can be brought together for new patterns, thus bettering the possibility of change. Education 4.0 is already widespread in the educational environment. As technology continues to advance, instructors need to find the heart of education 4.0, engaging in reflection on necessary changes in pedagogies (Bonfield et al., 2020). Media advancement has changed how we interact with other people, communicate, teach, and learn. The rise of telecommunications, video-sharing sites such as YouTube, and social media has dramatically changed how students organize their learning (Parrish, 2016). Therefore, optimizing pedagogy and efficiency will boost student activity and quality education, the goal of the department of education (Yusifova, 2020). Children in basic education need creative skills not sufficiently provided by the current system (Androutsos Brinia, 2019). Educators also require support to create instruction that meets 21st-century standards. Digital transformation is essential to achieve these goals. Overview of Technology Adoption and its The-

ISSN 3028-1261
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ory With Digital Transformation. According to (Benoit Rogers, 1964), technology adoption varies with one's adopter category; innovators require no advertising since they take risks and create new ideas. They may be early adopters who embrace change without needing information.

They may be in the early majority; they adopt ideas before most people with minimal evidence. In the negative spectrum of the digital divide, the late majority is sceptical about change and waits to see technology succeed for most before it is adopted. At the other end are laggards who cling to tradition, need proof and require pressure before they adopt. The end of the range would be more from the public and riskier, especially if it's tied with government leaders, as punishment for not embracing the technology could come ahead of the necessary adoptions. When building technology or e-services, the two elements of division and variety must be taken care of to ensure users can perform all their daily transactions by seamlessly transitioning, allowing them to fully embrace the technology, thus accelerating digital transformation in education. Other external factors in the theory are political inclination, social influence, system characteristics, and IT experience, which can also be accounted for in the study.

2.1. Theoretical and Conceptual Framework —As observed in the proposed model, the researcher believed that leadership drives the majority of decisions, particularly in bureaucratic organizations such as the Department of Education. The majority of decisions will reach a point where a top decision-maker must consider his political leanings; therefore, the author will include leadership traits as a factor affecting the determination of digital transformation in basic education overall. The researcher also theorizes technology or the availability and utilization of technology as one of the main drivers of accelerating the digital transformation model as mentioned in the review of related literature. The term technology relative advantage means that if the innovation is easily seen as a better technology than the existing technology in terms of interactivity and façade of the technology even if they have not used it yet, looks to be a promising variable that would affect attitude which will, in turn, affect the whole model. Organization structure together with its practice is also added in this model due to the pyramidic structure of the department of education which is theorized to have a significant effect on the pedagogy of teachers. Finally, culture is added to the model since it is the most popular scapegoat of discussions when it comes to problems arising in the department whether teachers, non-teaching personnel, and even supervisors are asked always made mention that there is a culture in the department that will affect the teachers' capability, pedagogy and attitude. This model will result in a better understanding of the key issues encompassing accelerants of digital transformation in basic education.

3. Methodology

3.1. Research Design—This study used a quantitative research design since the researcher aims to objectively test theories (Creswell Creswell, 2018) in a postpositivist view, and report the results in a structured, specific test for validity and reliability through statistical methods (Creswell Creswell, 2018; Kumar, 2011) which will make the research more objective. The objective of quantitative research is radically distinct from the objective of qualitative research, which is to get a deeper knowledge of a situation or event. When conducting

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

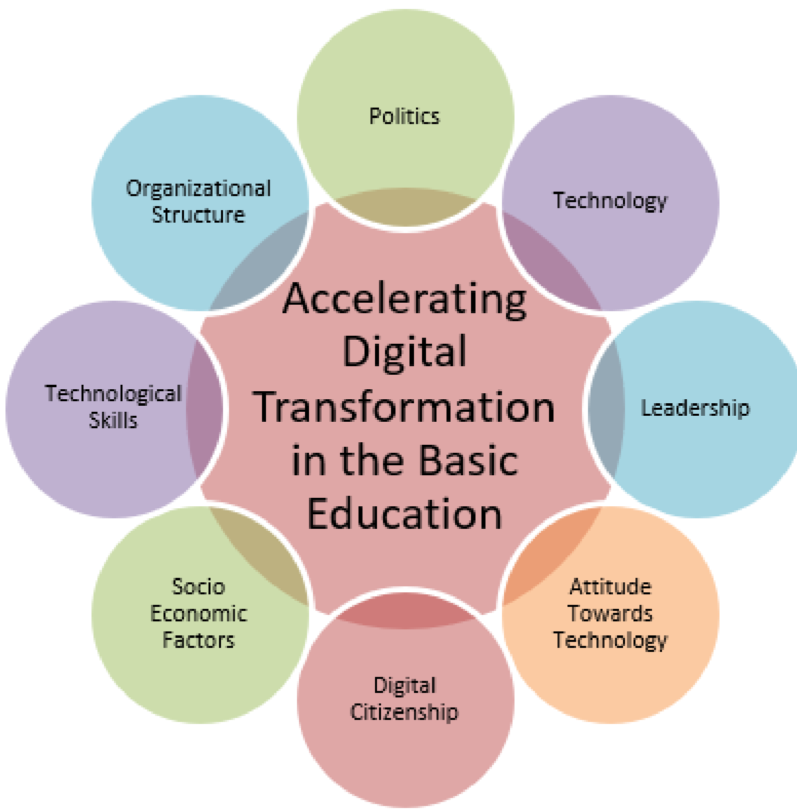

Fig. 1. The Conceptual Framework of the Study

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

quantitative research projects, researchers aim to characterize existing events, establish links between variables, and sometimes explain the causal linkages between variables wherein in this study causal linkages will be established through structural equation modeling (SEM). The researcher utilized a researcher-made questionnaire based on thorough literature review and subject the gathered data to exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and full structure (SEM) to develop a model for accelerating digital transformation in basic education.

3.2. Research Respondents—The main source of data to utilized in this study was primary data from the results of the researcher-made questionnaire from the five hundred fifteen (515) respondents in the Department of Education. A total of (200) responses from the teachers of the department will be gathered for the exploratory factor analysis (EFA) and another (315) will be gathered once the factors have been identified for the Confirmatory factor analysis (CFA) and full structural equation modeling (SEM).

3.3. Research Instrument—As mentioned in the previous sections above, the study will utilize a researcher-made questionnaire in gathering data. The questions will be based on the literature from the earlier models and literature. In the first part of the questionnaire, a profiling of the respondents will be done. The second part will consist of the fifty (52) statements. The teachers were asked to indicate the extent to which they agreed or disagreed with each statement, using a Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). To test the hypotheses, the individual influence of each construct was studied with the conceptual model. The rating for their perception on what accelerates the digital transformation in basic education are presented in table 1.

The reliability of the survey was tested using Cronbach's Alpha and Composite reliability test using the formula for CR after pilot testing to guarantee the internal consistency of each construct in the instrument.

Convergent Validity and Discriminant validity was measured using the master validity test of AMOS and a ready-made excel file to compute the figure.

Table 1. Scale Descriptions and Interpretations

Scale	Description	Descriptive Interpretation
6	Strongly Agree	The item described means that the respondent strongly agrees to the given statement.
5	Moderately Agree	The item described means that the respondent agrees to a certain extent to the given statement.
4	Slightly Agree	The item described means that the respondent marginally agrees with the idea in the statement.
3	Slightly Disagree	The item described means that the respondent marginally disagrees with the idea in the statement.
2	Moderately Disagree	The item described means that the respondent disagrees to a certain extent with the given statement.
1	Strongly Disagree	The item described means that the respondent strongly disagrees with the given statement.

3.4. Data Gathering Procedure—

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

The researcher used simple random sampling since the researcher knows the varied positions in the department, and concerning the number of respondents, the researcher opted to fix the samples to 200 for EFA and 315 for CFA (Fabrigar Wegener, 2012) recommended that a sample of 200 will suffice under moderately good conditions with regards to communalities and compared to using the rule of thumbs such as ten samples per variable would be highly flawed. The procedure in sampling is considered to be a 2-stage process. The first stage only involved the 200 respondents which answered the first draft of the instruments and was subjected to EFA. After the results of the EFA, the instrument was arranged according to the discovered factors and was administered to 315 respondents for CFA processing. This multi-stage sampling was done since according to (Finch, 2020) and (Fabrigar et al., 1999; Fabrigar Wegener, 2012; Van Prooijen Van der Kloot, 2001) using the data from EFA to CFA defeats the purpose of fitting and will most like fit.

As mentioned earlier, a knowledge gap exists since there is no actual study made in the locality of the Davao Region, which also leads to a population gap and various methodological gaps. The gaps were found through an extensive literature and model search, as well as first-hand experience in introducing electronic technology advancements through different innovations supported by a multitude of division memorandum orders. The concept paper was then presented through an online public forum organized by the graduate school of a highly reputable university in the Philippines. Several suggestions were given wherein the nominated chairman suggested that political, cultural, and economic variables be placed in the model and other fields to look at, which then led to the first three chapters of this paper. Added measures will be written after the proposal to the committee based on their valuable and well-thought recommendations. After the research proposal, the researcher was asked to focus the study on the Department of Education along with the agreed topic of modeling the constructs of accelerating digital transformation in basic education. With extensive literature search and questions from high positioned personnel from the Department of education including school heads, education program supervisors, and school division superintendents, a 52-item survey questionnaire was made. Requesting permission from the regional director of the Department of Education in the Davao Region was part of the data collection procedure; once permission was given, a letter was sent to various schools division superintendents. After the signing of permission, the researcher used social media to inform possible respondents of the study, a google form was made to facilitate the online responses of the respondents, furthermore, printed copies of the survey were also secured. It is also noted that while the collection of data using printed copies and face to face giving of links during seminars, protocols to combat COVID-19 were observed as stated in the response letter of the DepEd Regional office and varied divisions in the region.

3.5. Data Analysis—The study was quantitative in design, using exploratory factor analysis as an option to identify the constructs that will serve as the external factors affecting (indirectly or directly) based on eigenvalue and parallel analysis (Fabrigar Wegener, 2012). Exploratory factor analysis (EFA) is a multivariate statistical method that has become a vital instrument for the creation and validation of psychological theories and assessments (Watkins, 2018). Various assumptions like the Kaiser-Meyer-Olkin's test to test whether the samples are adequate to become factorable and Bartlett's test of sphericity to examine the null hypothesis that the original correlation matrix is an identity matrix or simply the data has at least one significant correlation between two of the items as

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

evidenced with a p-value of .000 will be strictly observed. Principal components analysis was used to identify the number of factors based on the components with an eigenvalue of more than 1. After EFA, discovered factors was subjected to internal consistency reliability through Cronbach's Alpha. After the reliability of the constructs were established the model was subjected to confirmatory factor analysis (CFA) to develop an overall measurement of the proposed model theory wherein a requirement of four or above constructs that are proved to be unidimensional and with three or above indicators. Further, measuring the model validity or model fitting through Chi-square, comparative fit index (CFI), Tucker-Lewis Index (TLI), Root mean square error of approximation (RMSEA), and more, will be done through AMOS. This step in the procedure is vital since EFA is good if the links between the observed and latent variables are unknown or uncertain. After the measurement models were created, the researcher then proceeded to the analysis of the full structure which was generated using AMOS. In the full structure, the researcher arranged the factors based on how the theory described the casual relationship would possibly be and the same model validity or model fitting standards was used to ensure that the model was valid and that the model fits the data. After the construction of the model through full SEM certain reliability and validity tests was done. Convergent validity examines how certain we are that a construct's indicators accurately assess it. It's commonly measured with the average variance extracted (AVE), which illustrates how much variance a construct gets from its indicators versus how much variance comes from measurement error. Fornell Larcker (1981) recommend that this mean-variance be more than 0.5, implying that the indicators account for 50% of the variance in the construct. Cronbach's alpha was used to examine the scale's reliability and validity, and the composite reliability index and average variance was calculated (AVE). Given the number of items used in the measuring scale, Cronbach's alpha values below 0.7 can be considered acceptable (Hair et al., 1999)

4. Results and Discussion

4.1. The Constructs of Accelerating Digital Transformation in The Basic Education—The first objective of this study was to determine the constructs of accelerating digital transformation in the basic education. This led to the development of a 52-item questionnaire based on a review of relevant literature, which was then subjected to Cronbach's Alpha reliability assessment. Then, a survey of two hundred (200) teachers, workers, leaders, and supervisors in basic education in the Davao Region was done. An exploratory factor analysis (EFA) was performed using principal component analysis (PCA) to determine the number of factors in the study in orthogonal varimax rotation. The minimum factor loading criteria were set to 0.40. Through employing Exploratory Factor Analysis, the analysis on Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity provided a result of 0.956 and a chi-square of 9469.694 and significance value of $p < .001$. This means that the sampling adequacy is marvelous, with reference to Kaiser (1974), where accordingly, accepting values higher than 0.5 are barely acceptable and that this should mean that there is a need to collect more data. Values of KMO of about 0.90 to 1.00 is "marvelous", while 0.80 to 0.89 is "meritorious". An important step involved weighing the overall significance of the correlation matrix through Bartlett's Test of Sphericity, which provides a measure of the statistical probability that the correlation matrix has significant correlations among some of its components. It tests the null hypothesis that the initial correlation matrix is an

ISSN 3028-1261
10.5281/zenodo.14211033/NIJSE.2024

identity matrix or that the data have at least one meaningful correlation between two variables. The value of Bartlett's test is 0.000, which is less than the significance value of 0.001 (Field, 2013), confirming that the sample is appropriate for use in the study and that factor analysis is an adequate treatment for the investigation.

Table 2. KMO and Bartlett's Test

Measure	**Value**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.956
Bartlett's Test of Sphericity	
Approx. Chi-Square	9469.694
df	1326
Sig.	.000

Table 3. Latent Roots Criterion

Factor	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	21.31	40.981	40.981	21.31	40.981	40.981
2	1.913	3.679	44.66	1.913	3.679	44.66
3	1.42	2.731	47.391	1.42	2.731	47.391
4	1.354	2.604	49.994	1.354	2.604	49.994
5	1.293	2.486	52.48	1.293	2.486	52.48
6	1.145	2.203	54.683	1.145	2.203	54.683
7	1.092	2.101	56.784	1.092	2.101	56.784

Note. Extraction Method: Principal Component Analysis.

The above is a result of analyzing eigenvalues from randomly generated correlation matrices. These can be then compared with eigenvalues extracted from the researcher's dataset. The number of factors to retain will be the number of eigenvalues (generated from the researcher's dataset) that are larger than the corresponding random eigenvalues (Horn 1965). Total variance explained shows the result by identifying the value of the eigenvalues of the factors and the variance of each factor. Results of the latent root criterion in Table 3 reveal the seven explored factors can be extracted from the set of items submitted for factor analysis. These seven dimensions or factor structures explain 56.78% of the variations in the data.

The Catell scree test depicts the components as the X axis and the corresponding eigenvalues as the Y-axis. As one advances to the right, toward later components, the eigenvalues diminish. When the descent pauses and the curve produces an elbow toward less steep decline, Cattell's scree test says to drop all further components after the one commencing the elbow (Bartholomew, et. al., 2008). (Bartholomew, et. al., 2008). While the rotated component matrix shows us where the items belong in their factoring. The figure above shows the scree plot for EFA where there it is shown that there are seven factors due to the eigenvalue exceeding 1 in each component.

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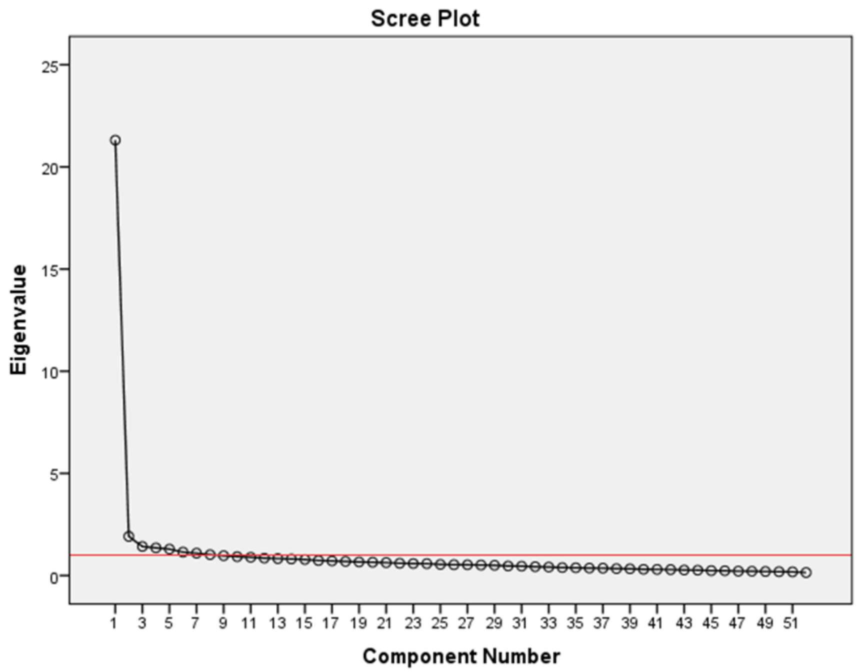

Fig. 2. Scree Plot for Exploratory Factor Analysis

Table 4. Factor Correlations

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Factor 1	1.000	0.130	0.036	0.049	0.083	0.098	0.063
Factor 2	0.130	1.000	0.059	0.036	0.074	0.034	0.086
Factor 3	0.036	0.059	1.000	0.093	0.071	0.100	0.024
Factor 4	0.049	0.036	0.093	1.000	0.063	0.054	0.028
Factor 5	0.083	0.074	0.071	0.063	1.000	0.059	0.082
Factor 6	0.098	0.034	0.100	0.054	0.059	1.000	0.040
Factor 7	0.063	0.086	0.024	0.028	0.082	0.040	1.000

Rotated Component Matrix. The data were subjected to principal component analysis in order to determine the factor structure. De Coster (2000), mentioned that principal component analysis (PCA) is employed to determine whether certain items measure common factors. In addition, factor rotation simplifies the rows and columns of the factor matrix and maximizes a variable's loading on a single factor in order to facilitate interpretation (Hair, et al., 2006). An orthogonal rotation (VARIMAX) and an oblique rotation (OBLIMIN) are normally used to explain the computed factor matrix. In this research, VARIMAX rotation technique was used and produced a clearer structure in terms of the content validity of the factors. Coefficient of the factor analysis is set at +0.40. The 52 items loaded into the seven factor structures or attributes. The dimensions, or the extracted factors, are then labelled accordingly to the nature of each of the items in one structure, namely: (1) Psychological (2) Strategic, (3) Adaptive (4) Egg-Crate Isolation. Presented in table is the result of the factor correlations showing the

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10.5281/zenodo.14211033/NIJSE.2024

magnitude of correlation among the seven extracted factors. This table was used as basis in selecting the rotation method to avoid split loading of the identified items. Since there are no factors that were found to be correlated highly (.32) as used by (Tabachnick Fidell, 2013), the use of varimax was used in rotating the matrix.

4.2. Organization Structure for Digital Transformation—The first factor discovered based on EFA analysis consists of nine (9) items, which collectively capture the idea that an organizational structure must be developed to accommodate digital transformation, this is in consonance with the findings of (C. M. Christensen et al., 2019) where he acknowledged the importance of a transformed organization structure to enable transformation if an organization wants to remain digitally competitive as rejoined by (Kretschmer Khashabi, 2020) . The following items belonging to this factor are: Organizational structure is geared towards transformation (S4, 0.477) , Organizational changes are motivated by innovative process models driven by technology (S16, 0.594), The idea of digitization in the business model is incorporated by the department (S28, 0.648), The organization accepts the fact that improving the education experience using digital technologies is the way forward (S32, 0.651), The organization promotes learning to learn skills to teachers, leaders, staff, and students (S41, 0.683), Digital and physical technologies for universal education are integrated into the organization (S42, 0.609), The department is re-organized into an educational institution where the development of digitally transformational technologies is welcomed (procurement, budgeting, etc) (S45, 0.580), Hard skills and soft skills in digital technology are embedded in the Vision and Mission of basic education (S49, 0.560), and Organizational processes are upgraded and directed towards digital hard and soft skills (S50,0.553). According to (Hinings et al., 2018) varied yet smooth organization changes should be employed in digitally transforming an organization, which includes the development of a crowd based data gathering to avoid power based decision making, digital institutional infrastructure to ease the flow of digital processes, and make the organization structure digitally modular to accept changes easily and avoid bureaucratic processes.

4.3. Digital Technology Utilization in Education—With seven (7) indicators, this factor entails that there is a need for digital technology utilization to accelerate digital transformation. While these technologies undeniably increase confidence as mentioned by (Mize et al., 2020) and help in achieving outputs that are otherwise difficult to achieve without its use (Chan et al., 2019; Hur et al., 2020) caution must always be observed (Enskat et al., 2017). The indicators are: The department acquires the latest technologies when it comes to teaching and processing data(S7), The department utilizes existing technologies being applied in the private sector (S10), The department's E-services make processes easier for the teachers and stakeholders (S26), The department's physical and digital technologies are developed for the simplification of tasks (S40), The department continuously enhances its physical technological capacities (S8), The department utilizes software that makes the job of teachers/staff easier (ex. Online grading system, websites,) (S9), The department learns to equip leaders, teachers, staff, and students with the necessary skills needed to create a cohesive, inclusive, and productive society based on technology and technological skills (S18).

4.4. Digital Pedagogy 4.0 in Basic Education—Accordingly, digital pedagogy 4.0 in this research is coined due to the following fourteen (14) statements which are as follows: Innovative methods of teaching encourage students to take charge of their learning motivated by their

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learned digital skills (S19, 0.550), The approach of teachers toward the evolution of pedagogy was inspired by the transformation of technology changes (S20, 0.534), Teachers adapt innovative assessment methods (S31, 0.633), Teachers move to problem-based learning rather than focusing on the competencies (S29, 0.499), Pedagogy integrated with technology and policy occurs (S6), Teachers, leaders, and staff consider changes in pedagogy as acceptable (S15, 0.587), Pedagogy is pitched towards arming students with hard and soft skills driven by technological advancements that enable them to create a positive change in society (S23, 0.558), There is autonomy for teachers to innovate practices and pedagogy in the classroom (S33, 0.596), Augmented reality is incorporated into the teaching and learning process (S34, 0.592), Educational software (learning management system) becomes a part of the education process (S35, 0.572), Students are taught the needed computational thinking (S37, 0.592), Pedagogy is based on action-oriented learning (S38, 0.597), Methods of teaching are driven toward playful learning using digital and physical technologies (S39, 0.631), and The teachers utilize digital technologies for personal and collective teaching and learning (S43, 0.534). These statements are supported by the finding of (Bonfield et al., 2020) wherein he stated that approaches to teaching must change and that is together with the change in technology, furthermore, the implication of improving pedagogy through technology was found to increase efficiency of teachers (Yusifova, 2020).

4.5. Digital Leadership as Enabler of Digital Transformation—With reference to (Navaridas-Nalda et al., 2020; Venkatesh et al., 2003; Venkatesh Zhang, 2010; Zahid Haji Din, 2019) studies, the factor digital leadership is devised, since also seven (7) statements were found to support these, namely: Leaders move away from the traditional method of transmitting knowledge and provide autonomy to teachers in how they integrate digital technology in their classes (S46, 0.600), Leaders are willing to change their philosophy toward a technology-driven society rather than vested interests and motives (S24, 0.604), Policies developed to support the individual autonomous innovation of teachers in their pedagogies (S51, 0.564), Policies are aimed at simplifying the acquisition of digital and physical technologies for education (S52, 0.585), Organization requalifies leaders in the gleaming of education 4.0 (S17, 0.537), Policies are driven toward the utilization of digital technologies (S36, 0.639), Leaders are aware of the real advancements and changes in technology, students, and grounded situations (S5, 0.534).

4.6. Attitude Towards Technology—Anchored in the original model of (Davis, 1989; Venkatesh et al., 2003; Venkatesh Davis, 2000, 2000; Venkatesh Zhang, 2010) wherein they stated that attitude towards technology affects the acceptance of technology, this factor is hereby also found in this research due to the following statements: Attitude towards change is exemplary (S2, 0. 656), It is in the habit of the department to abolish tasks that are not needed (S11, 0.546), Changes in how things are done in the department are always in the thought process of the teachers and staff (s13, 0.580), Teachers, leaders, and staff consider changes in technology and method good (S14, 0.694), The attitude of stakeholders and students is transformed to align their learning and output through innovation (S25, 0.492), and The attitude of everyone in the organization is grounded on 21st – Century skills rather than placing human subjects of politics in education (S47, 0.723).

4.7. Digital Technological Capability of Educators in Basic Education—For this dimension, the result entails that digital technological capabilities enhances the acceleration of digital transformation in basic education as with the finds of (Martínez-Román Romero, 2017;

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Zahay Handfield, 2004) wherein they found that technological capabilities also enhances the attitude of people to adapt and use technology however some are just really adept technologically that is why (Nikou et al., 2020) noted that while there are technological advancements training must be given to minimize anxiety towards technology change. The finding of the mentioned studies coincide with the results of this factor with the statements: We integrate digital solutions into our everyday lives (S3, 0.554), Digital skills from top to bottom of the department are upgraded and required (S22, 0.526), Students are equipped with soft skills that could be useful in solving their problems and future trials (S30, 0.653), Training and requalifying in terms of digital technologies and pedagogies is made a requirement not just for teachers but as well as the leaders and (S48, 0.664).

4.8. Culture of Antifragility as Culture Beyond Resiliency—With the following statements to be mentioned, it is clear that a culture of antifragility is needed in the acceleration of digital transformation, since it has been known that teachers at almost all levels are quite resilient in psychological and emotional terms as mentioned by (Day, 2018) which was also supported by (Nuri Tezer, 2018), however in the context of developing countries the teachers and personnel has gone beyond resiliency and robustness hence the factor culture of antifragility is used in this study supported by the finding of (Wosnitza et al., 2018) and statements: Culture of acceptance and utilization of technology changes (S1, 0.594), The culture of technology utilization in the Department of Education is being practiced not just by the digital native teachers but as well as the digital migrants (S27, 0.612), Promotion of innovative approaches driven by technology and not mandate-based approaches are applied by teachers (S44, 0.578), and The young teachers/staff are the ones being sent to seminars/-training/workshops/webinars about the usage of technology (S12, 0.562

The communality of the scale, which indicates the amount of variance in each dimension, was also assessed to ensure acceptable levels of explanation. The results show that almost all communalities were over 0.50 except for four (4) questions coded as ORG 1 with .477, TECH 6 with .493, PED 4 with .499, and ATT 5 with .492. Finally, the factor solution derived from this analysis yielded seven factors for the scale, which accounted for 56.78 percent of the variation in the data. Nonetheless, in this initial EFA, four items which are TECH 6: "The department utilizes software that makes the job of teachers/staff easier (ex. Online grading system, websites.", PED 4: "Teachers move to problem-based learning rather than focusing on the competencies.", PED 10: Educational software (learning management system) becomes a part of the education process.", and CAPA 1: "We integrate digital solutions into our everyday lives". failed to load on any dimension significantly. Some items are loaded onto a factor other than its underlying factor. However, these were not removed since their communalities are quite high and will be removed in the future using confirmatory factor analysis later in the study.

4.9. Model for Accelerating Digital Transformation in the Basic Education—In order to proceed with the data analysis, a null/working model was initially developed. The working model demonstrates the flow of linkages and interactions among variables studied in the research. These latent factors were encoded as Organization for Organization Structure for Digital Transformation, Technology for Digital Technology Utilization, Pedagogy for Digital Pedagogy 4.0, Leadership for Digital Leadership, Attitude for Attitude Towards Technology, Capability for Digital Technological Capabilities, and Culture for Antifragility Culture. The Model for Accelerating Digital Transformation in Basic Education specification was derived from the null/working model using the licensed

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version of AMOS 18. Confirmatory Factor Analysis (CFA) was computed using AMOS to test the measurement model. As part of confirmatory factor analysis, factor loadings were assessed for each item, seven items from (Organization) were removed due to low factor loadings (<.50) and high residual covariance, three items from (Technology), one from (Pedagogy), three from (Leadership), and one from (Culture). The model fit measures were used to assess the model's overall goodness of fit(CMIN/df, GFI, CFI, TLI, SRMR, and RMSEA), and all values were within their respective common acceptance levels (Ullman, 2001; Hu and Bentler, 1998, Bentler, 1990). The seven-factor model (Organization, technology, Pedagogy, leadership, attitude, capability, and culture) yielded good fit (Fit Indices) for the data: CMIN/df =1.481 , GFI = , CFI = .951 , TLI = .944 , SRMR = .037 , and RMSEA= .039.

Table 5. Model Fitting Table

Fit Indices	**Recommended Value**	**Source**	**Obtained Value**
P	$< .05$	Bagozzo and Yi (1988)	0.000
CMIN/df	< 5	Less than 2 (Ullman, 2001) to 5 (Schumacker & Lomax, 2004)	1.481
Comparative Fit Index (CFI)	$> .9$	Bentler (1990)	0.951
Tucker-Lewis Index (TLI)	$> .9$	Bentler (1990)	0.944
Goodness of Fit Index (GFI)	$> .9$	Hair et al. (2010)	0.880
SRMR	$< .08$	Hu & Bentler (1998)	0.037
RMSEA	$< .08$	Hu & Bentler (1998)	0.039

Table 6. Fornell-Larcker Criterion

	ATTITUDE	**CAPABILITY**	**CULTURE**	**LEADERSHIP**	**ORGANIZATION**	**PEDAGOGY**	**TECHNOLOGY**
ATTITUDE	0.744						
CAPABILITY	0.546	0.758					
CULTURE	0.581	0.598	0.746				
LEADERSHIP	0.578	0.619	0.667	0.758			
ORGANIZATION	0.556	0.717	0.672	0.680	0.772		
PEDAGOGY	0.610	0.751	0.725	0.716	0.794	0.732	
TECHNOLOGY	0.604	0.755	0.653	0.662	0.756	0.822	0.757

Construct Reliability was assessed using Cronbach's Alpha and Composite Reliability. Cronbach Alpha for each construct in the study was found over the required limit of .70 (Nun-

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nally and Bernstein, 1994). Composite reliabilities ranged from 0.745 to .874, above the 0.70 benchmarks (Hair et a1., 2010). Hence, construct reliability was established for each construct in the study

Convergent validity of scale items was estimated using Average Variance extracted (Fornell Larcker,1981). The average variance-extracted values were somewhat below the threshold value of 0.50 (Fornell Larcker,1981). However, since the Composite reliability was well over the required value it can be concluded that all constructs were valid. Therefore, the scales used for the present study have the required convergent validity

Table 7. Heterotrait-Monotrait Ratio Table

	ATTITUDE	CAPABILITY	CULTURE	LEADERSHIP	ORGANIZATION	PEDAGOGY	TECHNOLOGY
ATTITUDE							
CAPABILITY	0.730						
CULTURE	0.741	0.782					
LEADERSHIP	0.761	0.820	0.859				
ORGANIZATION	0.710	0.904	0.838	0.857			
PEDAGOGY	0.756	0.923	0.876	0.880	0.931		
TECHNOLOGY	0.751	0.929	0.792	0.814	0.887	0.939	

Discriminant validity in the study was assessed using Fornell and Larcker Criterion and Heterotrait- Monotrait (HTMT) Ratio. According to Fornell and Larcker criterion, discriminant validity is established when the square root of AVE for a construct is greater than its correlation with the other constructs in the study. However, Fornell and Larcker criterion has recently been criticized and a new method to assess the discriminant validity that is HTMT ratio is increasingly utilized. In the present study, discriminant validity is in general established using Fornell and Larcker criterion except for pedagogy. However, when assessed using HTMT ratio, almost ratios were less than the required limit of .85 to .90 (Henseler et 211., 2015). Hence, discriminant validity was established. The results of discriminant validity are presented in (Heterotrait-Monotrait Ratio Table).

4.10. Full Structural Equation Modeling— After confirming that the measurement models had adequate fit a full structural equation model generated through AMOS was used to test the relationships. Hypothesized paths were added to the measurement models. A good-fitting model is accepted if the value of the CMIN/df, the goodness-of-fitt (GFI) indices (Hair et 211., 2010); the Tucker and Lewis (1973) index (TLI); the Confirmatory fit index (CPI) (Bentler, 1990) is ¿ 0.90 (Hair et 511., 2010). In addition, an adequate fitting model was accepted if the AMOS computed value of the standardized root mean square residual (SRMR) < 0.05, and the root mean square error approximation (RMSEA) is below 0.08 and preferably below .05 (Hair et 11]., 2010). The fit indices for the model shown in Table 1 fell

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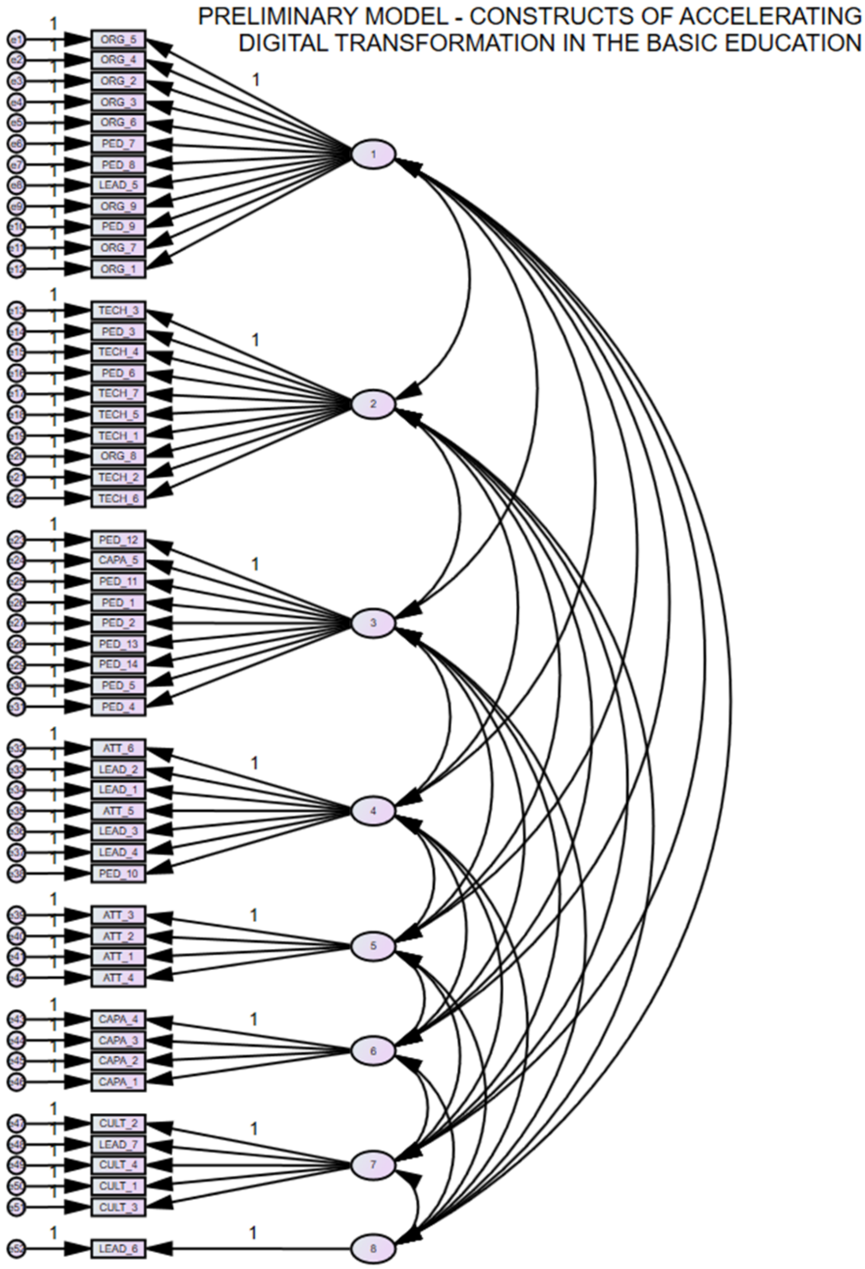

Fig. 3. Initial Confirmatory Model

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Table 8. Model Fitting Table for Confirmatory Factor Analysis

Fit Indices	Recommended Value	Source	Obtained Value
P	$< .05$	Bagozzo and Yi (1988)	0.000
CMIN/df	< 5	Less than 2 (Ullman, 2001) to 5 (Schumacker & Lomax, 2004)	1.465
Comparative Fit Index (CFI)	$> .9$	Bentler (1990)	0.952
Tucker-Lewis Index (TLI)	$> .9$	Bentler (1990)	0.946
Goodness of Fit Index (GFI)	$> .9$	Hair et al. (2010)	0.880
SRMR	$< .08$	Hu & Bentler (1998)	0.036
RMSEA	$< .08$	Hu & Bentler (1998)	0.038

Within the acceptable range: CMIN/df =1.465 the goodness of fit (GFI) = .880 , TLI = .946 , CFI = .952 , SRMR = .036 , and RMSEA = .038 . This is all seen in table 8.

The squared multiple correlations were .93 for capability, this shows that 93% of the variance in Capability is accounted for by technology, Organization, culture, and leadership, while 69% variance in attitude can be attributed to technology, Organization, culture, and leadership with squared multiple correlations of .69, and 96% in the variance of pedagogy is accounted by technology, Organization, culture, and leadership with squared multiple correlations of .96.

The study assessed the impact of the organization, technology, culture, and leadership on attitude, capability, and culture. The impact of the organization on capability was positive but insignificant (β= .333, t = 1.779, p = .075) hence H1 was not supported. The impact of the organization on attitude was negative and insignificant (β= -.224, t = 1.237, p = 0.216) hence H2 was not supported. The impact of the organization on pedagogy was positive and significant (β= .356, t = 2.601, $p < 0.05$) hence H3 was supported.

The impact of the technology on capability was positive and significant (β=.582, t = 4.134, $p < .000$) hence H4 was supported. The impact of the technology on attitude was positive and significant (β= .309, t = 2.416, $p < .05$) hence H5 was supported. The impact of the technology on pedagogy was positive and significant (β=.396, t = 4.002, $p < .000$) hence H6 was supported.

The impact of the culture on capability was negative and insignificant (β= -.136, t = 0.735, p = 0.462) hence H7 was not supported. The impact of the culture on attitude was positive and significant (β=.378, t = 2.026, $p < .05$) hence H8 was supported. The impact of the culture on pedagogy was positive and practically significant (β= .264, t = 1.893, p = .058) hence H9 was supported.

The impact of the leadership on capability was positive but insignificant (β=.079, t = 0.595, p = .552) hence H10 was not supported. The im-

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Table 9. Structural Relationships and Hypothesis Testing

Hypothesized Relationship	Standardized Estimates	t-value	p-value	Decision
organization → capability	0.333	1.779	0.075	Not Supported
technology → attitude	0.309	2.416*	0.016	Supported
culture → pedagogy	0.264	1.893	0.058	Partially Supported
leadership → pedagogy	0.085	0.889	0.374	Not Supported
organization → attitude	-0.224	-1.237	0.216	Not Supported
organization → pedagogy	0.356	2.601*	0.009	Supported
technology → capability	0.582	4.134	***	Supported
technology → pedagogy	0.396	4.002	***	Supported
culture → capability	-0.136	-0.735	0.462	Not Supported
culture → attitude	0.378	2.026*	0.043	Supported
leadership → capability	0.079	0.595	0.552	Not Supported
leadership → attitude	0.345	2.575*	0.001	Supported
R-Square				
capability	0.930			
attitude	0.651			
pedagogy	0.961			
Model Fit	CMIN/df = 1.475, GFI = 0.880, TLI = 0.946, CFI = 0.951, SRMR = 0.036, RMSEA = 0.038			

pact of leadership on attitude was positive and significant (β=.345, t = 2. 575, p < .05) hence H11 was supported. The impact of the leadership on pedagogy was positive but insignificant (β= .085, t = 0.889, p = 0.374) hence H12 was not supported.

4.11. Effects of Organization on Capability, Attitude, and Pedagogy—According to the SEM done in this study the organizational structure of the department of education has no significant direct influence on the capability of its personnel and as well as the pedagogy of teachers. However, the former is a significant factor in the change in the attitude of teachers which could lead to further developments as stated by (Cerit, 2017; Ozyilmaz Cicek, 2015) where he showed that organizational structure change also changes the behavior and teaching of teachers, however, this varies based on the educational stages (Nat. Edu. Min. et al., 2015). The organization's structure plays a vital part in the pedagogy of teaching leading to digital transformation since organizational structure tends to significantly affect the administration's decision on program implantation, cooperation, and goal orientation.

4.12. Effects of Technology on Capability, Attitude, and Pedagogy—Using SEM, the effects of technology integration on attitude concerning the utilization of technology leading to digital transformation were found to be significant, several studies also supported this. It was found by (R. Christensen, 2002) that needs-based technology integration showed a rapid,

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10.5281/zenodo.14211033/NIJSE.2024

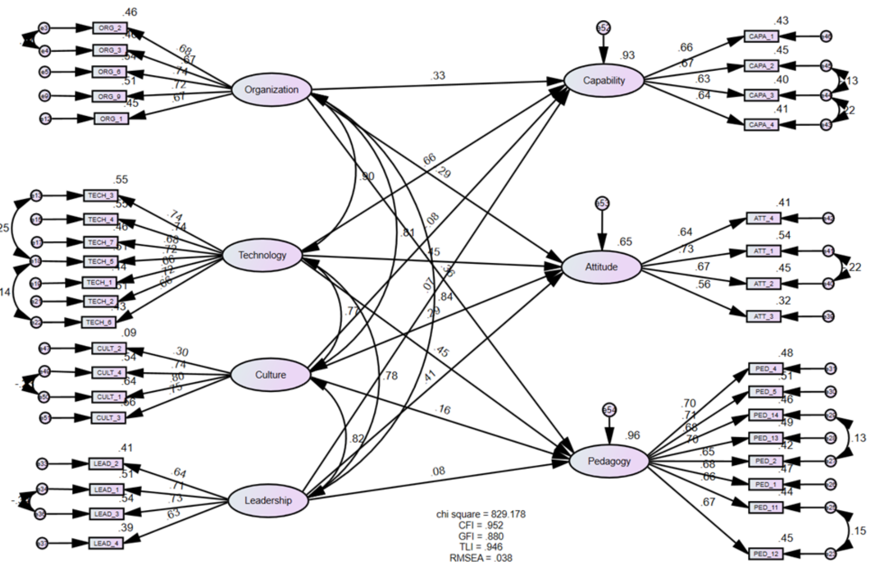

Fig. 4. Final Full Structure

positive effect on teacher attitudes, and showed improvements in terms of computer anxiety wherein anxiety decreases (Novak Wisdom, 2018), perceived importance of computers, and computer enjoyment. In support of this (An, 2018) also had the same result when they integrated technology-based development courses on teachers via an online method which revealed significant changes in participants' perception, attitudes, and self-efficacy wherein all participants agreed at the end of the course that digital games and technologies might be beneficial to students' learning and development of real-world abilities such as higher-order thinking, problem-solving, decision making, and teamwork. After finishing the training, they felt more confident in using digital technology in the classroom. Technology was also found to be a significant driver for pedagogy. It is undeniable that mobile data usage and digital technologies have increased usage during the pandemic (Budiman, 2020), and the adoption of these digital technology pedagogies according to (Meroño et al., 2021) may have an impact on future teachers' digital competence. Given the current social and pedagogical situation, increasing future teachers' digital competency is a critical issue and when analyzing the term "new teaching methods," the primary emphasis is placed on the teacher's capacity to display professionalism in developing the learners' knowledge, abilities, and habits through the use of diverse digital technologies (Yusifova, 2020). The effects of technology in pedagogy not only help during the teaching process but as well as the reflective practice of teachers (Allen et al., 2016) experimented with recording classes and reflecting on what they could have done better during the class. Technology not only benefits teachers but as well as students in terms of satisfaction and performance (Chen Yeh, 2019). Technology has enhanced almost all aspects of life, this includes the human capacity to teach in terms of using digital technology and technology as a whole, in this study it was found that technology has had a significant effect on capability, since the pandemic everyone was reliant on technology especially teachers since this is the only way to cross boundaries between school and work (Enochsson et al., 2020). The views of teachers on enhancing their teaching capabilities through digital transformation have been proven even without the pandemic (Lindstrom et al., 2016; Ozdamli, 2017; Wresch, 2009) and most especially during the pandemic (Budiman, 2020; Enochsson et al., 2020; Nuangchalerm et al., 2021).

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4.13. Effects of Culture on Capability, Attitude, and Pedagogy—SEM showed that culture has a statistically significant influence on attitude which supports the theory of (Pineda, 2014) where he stated that a culturally-responsive human-technology interaction should exist in digital transformation, culture is a pattern of behavior based on (Valaei et al., 2016) wherein he found out that what is perceived as valuable is based on culture and how we value things are based on our attitude. (Morales, 2016) also found out that culture has a positive link to our attitude toward learning things, moreover, (Kaba Osei-Bryson, 2013) studied and found that attitudes in terms of perceived ease of use and usefulness of information and communication technologies are sensitive to cultural influence. When it comes to attitudes to use mobile technology as part of digitization, (Maliki Edwards, 2012) discovered that cultural difference alone influences attitude toward digital technologies. Culture, however, seems to be not a driver for the pedagogy and capability of teachers due to the varied attitudes and grit of teachers.

4.14. Effects of Leadership on Capability, Attitude, and Pedagogy—Leadership plays a vital role in the setting of a workplace environment and as well as the attitude of workers or teachers in a school, (J. Lee et al., 2013; Ozyilmaz Cicek, 2015). It was found that leadership regardless of style has a significant effect on attitude as shown in this study using SEM and this aligns with the study of (Ahmad Mukhtar Yuen Fook, 2020) where the study revealed that leadership styles are positively linked to attitude, and more effective if leadership is ethical (Charoensap et al., 2019). However, leadership has no significant influence over the pedagogy and capability of teachers since in this study it has been found that technology is the greatest driver of capability for teachers and the working personnel under the veil of the department of education. TAM was proposed by (Davis, 1989; Venkatesh Davis, 2000) and later improved to UTAUT by (Venkatesh et al., 2003; Venkatesh Zhang, 2010), in the study, social influence and political influence was included in the construct of leadership with construct reliability of = .814 which emerged as one of the factors of accelerating digital transformation in basic education, supported by the theory of (Carrasco Miller, 2006; Park, 2009; Zahid Haji Din, 2019). Facilitating conditions were also found in the newly emerged factor called organizational structure with high construct reliability of = .897, and the experience was merged in the construct of culture which has construct reliability of = .721, the term relative advantage was incorporated inside the construct of technology which is the utilization of digital technology with construct reliability of a = .876. The term attitude which includes the intention and attitude towards the usage of digital technology were retained as the attitude with construct reliability of = .784, however, utilizing partially TAM and UTAUT in education a construct called pedagogy in this study emerged with construct reliability of = .913, together with the capability of teachers which is the direct utilization of digital technologies had construct reliability of = .751.

5. Summary, Conclusion, and Recommendations

5.1. Summary—The current research had two main objectives. The first objective was to investigate the factors in accelerating the digital transformation of basic education. The second objective was to model the factors in accelerating the digital transformation of basic education and with this, several hypotheses were made based on the flow of the model. Following is

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a discussion of the research findings according to research objectives. the finding reveals that the factors involved in accelerating the digital transformation of basic education in Davao Region are organizational structure that supports the growth and acceleration of digital transformation, digital technology utilization , culture of antifragility, digital leadership that enables DX , digital technological capability, attitude towards technology, and digital pedagogy 4.0. these factors are in the context of the education sector. Using confirmatory factor analysis CFA latent curve analysis in structural equation modeling, these factors were verified. Through the fit indices and other criteria of CFA, it was found that the seven (7) factor model fitted with the results of EFA. Furthermore, the confirmed factors were then subjected to a full structural equation modeling which is covariance based using AMOS since it was also the objective of the study to find out the relationship and its causal relationships, it was found that technology had a statistically significant effect on the teachers' attitude towards technology, digital technology capability, and digital pedagogy, it was also found that culture practically affects the digital pedagogy of teachers as well as their attitude towards technology. The analysis also revealed that the organization structure of the department had a significant effect on the digital pedagogy of the teachers and leadership significantly influences the attitude of teachers towards technology.

5.2. Conclusion—The researcher concluded, based on the findings, that reforms in the Department should begin with the following factors in order to break the department's plateau so that digital transformation in basic education would be accelerated and the struggle towards it would cease. The current study contributed to an understanding of accelerating digital transformation in basic education by demonstrating the effects of organizational structure, technology, culture, and leadership on capability, attitude, and pedagogy, finding that it is the utilization of technology that affects capability, attitude, and pedagogy the most in the model provided in this study. In addition, the study has demonstrated that the model created using SEM shows good reliability and predictive validity and should be used in the future to check if the department has achieved a high level of digital transformation. The model and data could also be the basis for machine learning using the data as both training and test data using linear regression and random forest in a machine learning code. Furthermore, the research contributed to knowledge in the field of teaching pedagogy and attitude because it confirms the effect of organizational structure, technology, culture, and leadership on pedagogy and attitude by showing the relationship between the variables and showing that the four variables explain a great variance in capability teaching pedagogy and attitude.

5.3. Recommendations—After evaluating the variables involved in accelerating the digital transformation in basic education and discovering that, with the exception of technology, the majority of the variables can be modified with nothing but practice, the researcher humbly provides the following recommendations based on the findings of the study.

Policy Recommendations

(1) Policy or order in technology and the purchase of appropriate technology should be a top priority in digitally changing basic education in order to increase instructors' digital pedagogical

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abilities, personnel's attitude towards digital technology, and teachers' digital competency. This includes standards for the acquisition of not only physical technologies, but also the software systems utilized by other advanced nations, including but not limited to the request and acquisition of digital commodities. (Grammarly, Statistical Softwares, Premium Communication Softwares, other productivity softwares in all operating systems)

(2) The organizational structure must be reevaluated so that it is less bureaucratic and pyramidal, and it must be connected with an innovative digital institutional structure. To make the organization more modular and better able to accept and respond to change, industry specialists in digital institutional reformation, crowd-based data handling, and blockchain technology should be consulted.

Program Reform and Redirection

(1) Developers of educational technology should connect their resources with the requirements of education 4.0, such as augmented reality, gamification, crowd-based learning, blockchain technology, and other digital technologies that broaden the pedagogy of teachers and the learning of students.

(2) Culture should be re-evaluated and altered through diffusion (teacher exchange program), developing philosophical concepts, and technological advancements. 3. Develop leaders' understanding and application of digital technology, and retrain them to reconcile old-school leadership with digital transformation-driven leadership. Wherein other countries offer proper trainings and degree in masters and doctorate level in specific to digital transformation.

Research Recommendation

(1) Conduct research that includes other variables, such as teacher or staff position, socioeconomic background, education, and other emergent variables.

(2) Apply the instrument in this study to know where an institution stands in terms of digital transformation.

(3) Apply the data in a machine learning code using 80% of the data as training data and remaining 20% as test data using comparison of linear regression and random forest.

(4) Use the model and data for a PCA using machine learning.

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