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Towards Digitalization in Early Childhood Education: Pre-Service Teachers' Acceptance of Using Digital Storytelling, Comics, and Infographics in Saudi Arabia

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Abstract: Despite the promise of digital technology to enhance the teaching–learning process, integrating it into early childhood education remains a challenge. Recent literature shows that novice teachers do not fully utilize the potential of digital technology to promote student learning. Therefore, this study aims to investigate early childhood pre-service teachers' intentions to use three digital technology applications—Digital storytelling, digital comics, and digital infographics—As teaching tools, which critically contribute to their acceptance into and actual use in their future classrooms. A descriptive correlational approach was used to investigate the factors affecting the use intentions of pre-service teachers through the technological acceptance model (TAM). This research study seeks to contribute to the literature on digital technology integration in early childhood education in general and in the Saudi Arabian early childhood context in particular. The study results showed that how pre-service teachers perceived the ease of use of the three digital applications was significantly the major predictor of their attitudes toward using them. The study also found that pre-service teachers' attitudes were significantly the major predictors of their behavioral intentions to use digital storytelling and comics in their future classrooms. However, attitude and perceived usefulness were equally valid predictors of pre-service teachers' intentions to use infographics with young children. Important implications for training and teacher education programs were suggested by the findings.

Keywords: digital technology; pre-service teachers; early childhood; technology acceptance; TAM; Saudi Arabia

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1. Introduction

The Fourth Industrial Revolution has prompted rapid change toward digital transformation in all fields, especially education. As a result, integrating digital technologies into the teaching and learning process has become essential and a requisite for all K–12 levels. In the context of early childhood education, many empirical studies have highlighted the significance of utilizing digital technologies because of their positive impact on learning outcomes [1]. Recently, interest in employing digital technologies in early childhood classrooms has increased considerably, particularly since the COVID-19 pandemic [2]. The global COVID-19 pandemic has highlighted the need for teachers to be equipped to employ a range of digital technology applications to improve children's learning at home and in school [3]. However, many recent studies have highlighted that early childhood teachers' use of digital technologies is rare and has not been given adequate attention in light of the digital transformations the world is witnessing [4–6]. Even prior to the pandemic, the use of digital technologies as teaching tools was rare in early childhood education [7].

Early childhood education in Saudi Arabia has received considerable attention lately [8]. The Kingdom's Vision 2030 emphasized the development of education oriented toward digital transformation at all levels of K–12 education [9]. This has aligned with international trends toward preparing a promising generation with skills belonging to the digital future [10]. Preparing our children with the necessary digital skills has risen to the top

of our national concerns, and this can be achieved by qualifying prospective teachers in early childhood in the optimal use of digital technologies in their future classrooms. In the context of Saudi early childhood education, teachers lack the sufficient background to design, develop, and employ digital technologies in their classes [11]. This issue became more prominent during the COVID-19 pandemic, when teachers in Saudi Arabia found themselves forced to create and implement digital technologies in the instruction and assessment process to teach from a distance [12,13]. Now that the pandemic has ended and traditional classroom settings have returned, will kindergarten teachers intend to use digital technologies to enhance learning in their classrooms? Recent empirical research shows that pre-service teachers' beliefs and intentions impact classroom technology integration [14]. Few studies have examined the factors affecting early childhood pre-service teachers' intentions to integrate digital technologies [3], particularly in the Saudi context. As a result, it is timely to investigate these factors, as recommended by many studies [7,15].

Therefore, the objective of this study was to answer a key research question: what are the factors that affect teachers' intentions to use digital technologies in the process of educating students in early childhood? Accordingly, the technological acceptance model (TAM) was utilized to examine the factors affecting Saudi pre-service early childhood teachers' intentions to integrate three forms of digital technologies (digital storytelling, digital comics, and digital infographics) in their future teaching practices. These factors include perceived usefulness, perceived ease of use, and teachers' attitudes toward utilizing digital technologies. In this study, early childhood education in Saudi Arabia refers to all educational institutions for children from 3 to 5 years old at the pre-school level and 6–8 years old at the primary level. This study intends to add to the literature on digital technology integration in early childhood, as the results may contribute to understanding these factors, and thus, take them into account when designing and implementing pre-service teacher preparation programs.

2. Literature Review

2.1. Digital Technology Integration in Early Childhood Education

Despite the promise of digital technology to provide children with extra skills and foster creativity [16], integrating it into early childhood education remains difficult [4,6]. The current lack of technology in early childhood education is a reason for concern, as stated by Romero-Tena et al. [7], and teachers appear to be hesitant to attempt to integrate digital technology into their lessons [2,17,18]. Research shows that novice teachers do not fully utilize the potential of digital technology in their pedagogical practices to promote student learning [3,19]. The reason might be the emphasis of early childhood education on hands-on, experience-based learning or play-based learning [6,20–22]. For example, Gjelaj et al. [14] investigated pre-school teachers' perspectives on the use of technology-based learning in the classroom and found that most pre-school teachers had a strong preference for children engaging in real-time activities that foster children's psychomotor abilities.

Another reason might be the low level of teachers' digital competency [23], which is attributed to the poor qualifications received by pre-service teachers in their preparation programs [5]. Many studies have indicated a lack of pre-service teacher preparation programs that include digital technologies and training on how to utilize them in practical teaching [24,25]. Xie et al. [22] argued that early childhood teachers, on average, experience less professional development related to technology and have a higher rate of turnover. Many recent studies conducted around the globe support these claims. For example, Salem [17] showed that early childhood educators in Egypt lacked an understanding of the importance of creating and integrating digital technology into their teaching and learning activities. A recent systematic literature review was conducted by Luo et al. [1] to assess the attitudes of Chinese teachers towards integrating digital technology in their classrooms. The findings imply that Chinese early childhood teachers are not equipped to use digital technology effectively in their teaching practices. Taghizadeh and Yourdshahi [15] studied the attitudes, knowledge, and usage abilities of early childhood English teachers in Iran

trying to integrate technology into language classrooms and found that many of them were not given the technological training to integrate digital tools into teaching language for young learners. Comparable findings were obtained by Alelaimat et al. [3], who discovered that many beginning teachers in Jordan's early childhood classrooms lacked the technological expertise and abilities necessary to effectively use digital media and technology in their lessons. Another study conducted by Romero Tena et al. [7] surveyed 477 early childhood educators in Spain to learn more about their usage of technology in the classroom. They found that teachers did not use these tools regularly to assist students' learning; rather, they used them for administrative purposes.

2.2. The Context of Early Childhood Education in Saudi Arabia

The integration of digital technologies in the field of early childhood education in Saudi Arabia is considered limited [9,11], despite the emphasis and reinforcement by the Ministry of Education on the need to elevate the role of digital technologies in improving the learning outcomes of young Saudi children [8]. This is due to several factors, such as technological resources and school infrastructure and support [19]. The most important of these is the digital knowledge and competence of early childhood teachers, which begins with the competence of pre-service teachers and their appropriate qualifications for their profession in the future.

Several studies have investigated early childhood teachers' digital technology integration in Saudi Arabia. For example, a study by Alasimi [26] investigated early childhood teachers' attitudes towards technology adoption in classrooms. The study's results indicated positive attitudes among teachers towards using technology in classrooms. It showed that teachers' confidence and use of technology outside of the classroom have the potential to influence their attitudes towards adopting technology in the future. The study highlighted that pre-service training and ongoing professional development to support successful technology adoption among early childhood teachers is of great importance. Another study by Alsuwidan [27] examined teachers' perceptions of technology integration in their early childhood classrooms in Saudi Arabia. The study results showed that most teachers valued technology integration in the teaching–learning process and emphasized that a lack of training and professional development and teachers' attitudes were major obstacles to their adoption of technology in their classrooms. In addition, a recent study by Alghamdi et al. [19] explored the technology readiness and practices of pre-service kindergarten teachers in Saudi Arabia. Despite the emergence of a positive level of readiness to integrate digital technologies among Saudi kindergarten teachers, only a few expressed their willingness to apply them practically in classrooms. According to the findings of this study, teacher preparation programs have a significant influence on pre-service teachers who are striving to integrate digital technology into their professional practices. Their study implies that it is necessary to refocus teacher preparation programs in Saudi Arabia on the use of digital technology in pedagogical practice.

To become an early childhood teacher in Saudi Arabia, a student teacher must complete the early childhood bachelor's program over a period of four academic years. Seventy percent of the courses they study are in early childhood science, while thirty percent are in the general educational field (e.g., educational psychology, special education, physical education, educational leadership). Only two to three courses in educational technology are compulsory, and these courses provide only basic theoretical knowledge of digital technologies in the learning environment, along with their practical applications in teaching and learning. Accordingly, there is not enough focus on educational technology courses within these programs [24], especially those that are specific to early childhood education and aimed at training on practical practices. Therefore, pre-service teachers graduate from the program as early childhood teachers lacking sufficient knowledge and competencies to appropriately design and develop digital technologies. They also lack the appropriate qualifications to employ them optimally in early childhood classes.

2.3. Pre-Service Teachers in Early Childhood Education

Teacher education plays a major and essential role in developing the next generation's technology skills and confidence [23,28]. For this reason, pre-service early childhood instructors must feel secure and competent in building young children's digital skills [25]. In regard to technology utilization, pre-service teachers' beliefs are critical in predicting their classroom decisions and actions [29]. Several factors may influence the views and opinions of pre-service early childhood educators concerning the integration of digital technology in their classrooms. Research indicates that attitudes are a crucial factor affecting pre-service teachers' use of digital technology [1]. There is a direct link between the attitudes of pre-service teachers toward digital media and how those media are understood and utilized as a component of learning in early childhood settings [6]. Moreover, favorable teacher attitudes correlate with the quality of technological integration [22,30].

Another factor is how pre-service teachers perceive the potential of using digital technology for teaching and learning practices. Several studies, such as those by Alkhayat et al. [2] and Xie et al. [22], have shown that early childhood pre-service teachers are expected to employ digital technology in their future classrooms due to its perceived usefulness in achieving learning outcomes and promoting learning performance. In addition, pre-service teachers' perceptions of digital technologies as simple to integrate affected their decisions to implement these tools in their future classrooms. The following section introduces the three digital applications that are the focus of this study: digital storytelling, comics, and infographics. Each section explains the definition of the digital technology and its potential use in early childhood education.

2.4. Digital Storytelling in Early Childhood

In recent years, digital storytelling has grown in popularity and is increasingly being used in education [31,32]. As technology has evolved, creating digital storytelling has become easier thanks to a number of digital tools (e.g., Storyboard, Storyline, PowToon). Digital storytelling refers to the process of producing a story that combines oral narration with multimedia components, including visual and audial elements (graphics, text, images, sound, music, and animation) that are stored in a digital format and can be played on digital devices [33]. Digital storytelling has many advantages over traditional storytelling [34]. Digital storytelling multimedia's features have the potential to improve students' learning achievements [31,35], increase their motivation, improve their learning commitment and engagement, develop their learning interest [36,37], and enhance their digital literacy [38].

In terms of pre-service teachers' perceptions of digital storytelling, Gürsoy [39] indicated that the creation of digital storytelling had positively affected the 21st-century skills of pre-service teachers. In addition, Anilan et al. [40] reported that pre-service teachers emphasized the advantages of integrating digital storytelling into their teaching practices and that digital storytelling would be beneficial for their professional careers. Even though digital storytelling is one of the digital tools recently favored for education [41], teachers are not adequately trained to design and implement digital storytelling in their teaching practices [11]. Teacher education programs need to prepare pre-service teachers adequately for their future profession [42]. To do so, pre-service teachers' perspectives, attitudes, and needs when using digital storytelling in the classroom should be taken into account in teacher preparation programs [18,43].

2.5. Digital Comics in Early Childhood

Educational digital comics are becoming increasingly popular in the field of education and are strongly supported across all disciplines. Digital comics are a type of digital storytelling in which a sequence of static pictures is merged with texts in a narrative style and used as a teaching and learning tool [44]. Several studies have found that utilizing digital comics as a teaching tool improves the teaching and learning process [45], especially in early childhood education [46]. Comics may help children comprehend complicated and abstract topics, making learning easier and more effective [38,47]. According to Danh

and Hoi [48], using digital comics as learning aids improves translation skills, cultural awareness, and motivation. Syarah et al. [49] studied the effectiveness of digital comics with children aged 6–8 years old and found that they prefer digital comics over paper books. Likewise, Sidiropoulou et al. [46] studied how comics affect pre-schoolers' oral text production and found that comics helped them and improved their performance. Another study conducted by Istiq'faroh and Mustadi [50] revealed that digital comics improved primary children's creativity and writing skills.

Despite the pedagogical and practical potential of using digital comics in education, digital comics are currently underutilized in the early childhood educational context [46]. Akcanca [51] surveyed 129 pre-service teachers regarding the design and usage of digital comics in scientific teaching and indicated that pre-service teachers had difficulties creating visual and graphical components due to technological inadequacies. Therefore, it is crucial that early childhood teachers be introduced to digital comics prior to entering the profession and during their undergraduate studies.

2.6. Digital Infographics in Early Childhood

The results of many studies have shown that the brain processes graphic information 60,000 times faster than text information, 90% of the information transmitted to the brain is visual information, and 40% of people respond better to graphic information than to text information [52]. Infographics is a form of visual representation that introduces complex data, information, and concepts into images and graphics that can be clearly and interestingly understood, thus, improving learner cognition. Additionally, digital infographics help students develop logical systems, interpret nonverbal texts, and increase cognitive curiosity [53], making them distinctive in teaching and learning [54]. Teachers may easily design educational infographics by utilizing several applications, such as Canva, Piktochart, Easel.ly, and Infogram, to enhance students' learning.

Several studies have examined infographics' impact on early childhood learning. For example, Odewumi and Bello [55] examined the effect of using digital infographics on learning letters and found that young children achieved better learning outcomes. They recommended that pre-school instructors should be trained to integrate infographics into teaching and learning. Another study by Kalimbetova and Ilesbay [53] found that children in Nigeria became more engaged when they independently extracted and evaluated knowledge using infographics. Likewise, Kostas [56] investigated the use of infographics in refugee children's classes at public schools in Athens, Greece, and reported positive feedback from the children in terms of their understanding and learning accomplishment. Bahjat [57] investigated the effect of using digital infographics to build the visual, cognitive, and language skills of kindergarten children and found significant improvement in these skills. The study recommended designing kindergarten curricula by including infographic texts and the necessity of training teachers using them. As a result, it can be determined that visualizing information through infographics can serve as an effective learning tool in teaching young learners [53]. The integration of such an effective tool in teaching practices, however, depends on teachers' knowledge and ability to design and implement infographics in their classrooms. Research suggests that pre-service teachers in early childhood lack an awareness of the importance of and have an insufficient level of competency in utilizing infographics for teaching and learning [56,57]. Therefore, understanding the factors that influence pre-service teachers' perceptions of the acceptance and use of digital infographics in early childhood education is essential.

3. Theoretical Framework and Hypotheses

The TAM model, established by Davis et al. [58], is one of the most popular frameworks for understanding individuals' acceptance of using or adopting technologies. The TAM model consists of four main factors: The perceived usefulness of technology (PU), the perceived ease of technology use (PEU), attitude toward using technology (AU), and behavioral intention to use technology (IU). According to the TAM model, the IU of

individuals to use technology influences them to accept or reject the adoption of such technology in the future [59]. According to the TAM, PEU, PU, and AU are the three factors that significantly predict the IU of individuals to use technology, predicting 40–50% of individuals' technological acceptance [60].

In the context of technology integration in K–12 education, the TAM model is commonly used to investigate pre-service and in-service teachers' perceptions toward technology adoption in the learning environment [22]. Therefore, PU in this study is defined as the extent to which pre-service teachers feel that using a specific technology application would improve their teaching performance and children's learning outcomes, while PEU refers to the extent to which pre-service teachers feel that using digital technologies would be effort-free in their teaching practices [58]. The PEU factor, according to the TAM model, is determined to be a significant predictor of PU as well as pre-service teachers' AU toward using digital technologies [58]. Both PU and PEU have a positive effect on pre-service teachers' AU, which predicts their IU to use and integrate digital technologies, and this influences actual usage in their future classrooms [61]. AU is defined as pre-service teachers' opinions of digital technology integration potential and utility for teaching and learning [42].

By utilizing the TAM model, this study aims to determine what leads early childhood pre-service teachers to accept or reject the integration of digital technologies (digital storytelling, digital comics, and digital infographics) in their future teaching. Therefore, based on the TAM model, three research models were proposed: a digital storytelling model (Figure 1), a digital comics model (Figure 2), and a digital infographic model (Figure 3). Accordingly, five hypotheses were established for each model, as follows.

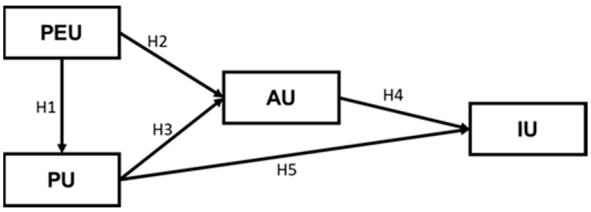

Figure 1. Digital storytelling proposed model.

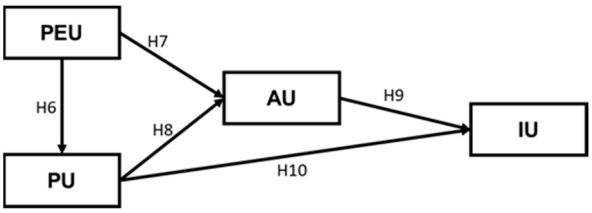

Figure 2. Digital comics proposed model.

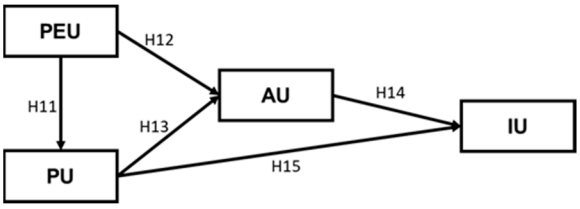

Figure 3. Digital infographic proposed model.

H1: *PU of digital storytelling is predicted by PEU.*

H2: *AU toward digital storytelling is predicted by PEU.*

H3: *AU toward digital storytelling is predicted by PU.*

H4: *IU to use digital storytelling is predicted by AU.*

H5: *IU to use digital storytelling is predicted by PU.*

H6: *PU of digital comics is predicted by PEU.*

H7: *AU toward digital comics is predicted by PEU.*

H8: *AU toward digital comics is predicted by PU.*

H9: *IU to use digital comics is predicted by AU.*

H10: *IU to use digital comics is predicted by PU.*

H11: *PU of digital infographics is predicted by PEU.*

H12: *AU toward digital infographics is predicted by PEU.*

H13: *AU toward digital infographics is predicted by PU.*

H14: *IU to use digital infographics is predicted by AU.*

H15: *IU to use digital infographics is predicted by PU.*

4. Method

A quantitative approach using a descriptive correlational design was employed in this study to explore the factors affecting early childhood pre-service teachers' intentions to use three forms of digital technologies—Digital storytelling, digital comics, and digital infographics—In their future professions.

4.1. Context and Sample

Data were collected from a random sample of 102 pre-service teachers in early childhood education in Al-Hasa, Saudi Arabia. The sample consisted of female postgraduate pre-service teachers who had recently graduated from the Bachelor's Program in Early Childhood and joined the Master's Program in Early Childhood at King Faisal University. At the time of collecting the data, the pre-service teacher participants had not yet had any teaching experience in the educational field. The participants were enrolled in a required course named "Educational Technology Applications in Early Childhood" in their Master's Program. Within this course and for 10 weeks, the participants were required to complete three assignments, consisting of designing, implementing, and reflecting on three digital applications (digital storytelling, digital comics, and digital infographics) for early childhood education using the instructional design approach (analysis, design, development, and evaluation). The analysis step included determining the topic, explaining its significance, and formulating the general objectives and learning outcomes. The design step involved preparing the visual scenario that describes the interfaces, media elements, links, and navigation. The development step encompassed the actual production of the digital technology medium using one of the open-source applications. The evaluation step included actual use and reflection from the field. As the participants were pre-service teachers, this step involved each team presenting their final product and discussing their perspectives regarding its possible utilization in teaching young children and its associated pedagogies and difficulties.

The stages of the assignment process within the course were as follows. First, the four instructional design steps (analysis, design, development, and evaluation) were explained in detail within the first four weeks of the course. Pre-service teachers were provided with examples and all procedures were discussed. Second, the participants were provided with a list of open-source programs that they could use for the design and production processes. The participants were not limited to the given list of open-source applications; they were free to adopt any other application they found suitable for completing the task. Third, the participants were divided into groups of three to complete these three assignments, which constituted the practical aspect of the course and accounted for more than half the weight of their final grades. The participants were asked to design and produce their three digital

technologies for any of the K–8 levels around one or more of the following topics: The cyberbullying of children, sexual harassment awareness in children, and the preservation of environmental resources. Fourth, the teams were asked to complete one instructional design task every week and then present it in class the following week. Accordingly, they were given feedback by the instructor and their peers. Fifth, the teams amended their designs and proceeded to the second step, and so on, until all steps of the instructional design process were completed. Upon reaching the production and development stage for their digital technology applications (digital storytelling, digital comics, and digital infographics), part of the work was completed in the computer lab so that the course instructor could provide supervision, follow-up, advice on production skills, support, and immediate feedback. Sixth, the final projects were assessed according to the following nine criteria:

- Clarity of learning objectives.
- Design quality (fonts, colors, sequences, consistency, and attractiveness).
- Inclusion of content related to the subject.
- Validity of the written and spoken language.
- Inclusion of clear images and graphics.
- Inclusion of appropriate and clear audio.
- Navigation and links.
- Creativity.
- Teamwork.

Figures 4–6 show a sample of the digital storytelling, digital comics, and digital infographics that the pre-service teacher participants designed and produced for this course.

Figure 4. Examples of pre-service teachers' digital storytelling designs.

Figure 5. Examples of pre-service teachers' digital comics designs.

Figure 6. Examples of pre-service teachers' digital infographic designs.

4.2. Instrument

A pre-existing TAM survey questionnaire was adopted from Davis et al. [58] and implemented in this study to measure early childhood pre-service teachers' perceptions of the four constructs proposed in the TAM model (shown in Figure 1), including PEU (5 items), PU (5 items), AU (4 items), and IU to use digital technologies (4 items). A total of 18 items were tested by a 5-point Likert scale (from 1: strongly disagree to 5: strongly agree). To achieve the objective of this study, the intentions of pre-service teachers to integrate the three digital applications were examined. Three forms of the survey questionnaire were distributed accordingly, with one survey questionnaire for each digital application (see Table 1).

Table 1. TAM survey questionnaire adapted from Davis et al. [58].

Constructs		Items
Perceived usefulness (PU)	(1)	Using (digital storytelling/digital comics/digital infographics) will improve my teaching performance.
	(2)	Using (digital storytelling/digital comics/digital infographics) will increase my productivity as teacher.
	(3)	Using (digital storytelling/digital comics/digital infographics) will facilitate teaching concepts and skills to children.
	(4)	I found (digital storytelling/digital comics/digital infographics) useful for teaching children's concepts and skills.
	(5)	I believe that employing (digital storytelling/digital comics/digital infographics) is useful in improving children's learning outcomes.

Table 1. *Cont.*

Constructs		Items
Perceived ease of use (PEU)	(1)	Designing and employing (digital storytelling/digital comics/digital infographics) was easy and understandable for me.
	(2)	I found it easy to teach concepts and skills to children using (digital storytelling/digital comics/digital infographics).
	(3)	It is easy for me to become skilled in designing and employing (digital storytelling/digital comics/digital infographics) for children.
	(4)	I found it easy to achieve learning outcomes using (digital storytelling/digital comics/digital infographics).
	(5)	I found (digital storytelling/digital comics/digital infographics) to be easy to use.
Attitude towards using (AU)	(1)	It would be a good idea to employ (digital storytelling/digital comics/digital infographics) in teaching children.
	(2)	Using (digital storytelling/digital comics/digital infographics) will make learning more interesting.
	(3)	I think teaching with (digital storytelling/digital comics/digital infographics) is valuable.
	(4)	I think it is a trend to use (digital storytelling/digital comics/digital infographics) in educating children.
Intention to use (IU)	(1)	I would love to use (digital storytelling, digital comics, and digital infographics) in my future teaching.
	(2)	I intend to use (digital storytelling/digital comics/digital infographics) in my future teaching.
	(3)	I plan to use (digital storytelling/digital comics/digital infographics) in my future teaching.
	(4)	I think using (digital storytelling/digital comics/digital infographics) will enhance my teaching process in the future.

4.3. Data Collection and Analysis

After an ethical approval number (KFU-REC-2022-JAN-EA000349) was obtained from the Research Ethical Committee (REC) at King Faisal University (KFU), data were collected over the two semesters of the 2022 academic year from pre-service teachers enrolled in the Master's Program in Early Childhood at KFU in Al-Ahsa, Saudi Arabia. After the participating pre-service teachers completed their design and production assignments, the questionnaire related to the digital technology application in this assignment was distributed to them electronically via the university learning management system (Blackboard). The participants' agreements to submit their responses to the three questionnaires were protected by informed consent, which ensured their privacy and confidentiality. The three questionnaires were available online for two weeks for the participants to voluntarily agree to complete and submit. A total of 102 participants agreed and completed the survey. The appropriate sample size was determined by multiplying the number of variables by 20. As a result, the number of variables in the TAM model was $4 \times 20 = 80$ participants. Therefore, a sample of 102 was more than sufficient to perform the statistical analysis [62]. The collected data were imported and tabulated using SPSS version 26.

For all three proposed models, all relationships among the variables were examined using a regression analysis. Table 1 represents the dependent and independent variables for all 15 hypotheses. The data were analyzed using two steps. First, reliability was tested by Cronbach's alpha, then statistical correlations were measured using Pearson's correlations, and the variables' means and standard deviations. Second, three regression models were created, and their goodness of fit was established. To examine the coefficients and relationships between the variables, R^2, F-test, and the *t*-tests were tested. To confirm the 15 hypotheses, 1 simple linear regression followed by 2 multiple linear regressions were tested for each of the three regression models. Table 2 illustrates a total of 3 simple regressions (H1, H6, H11) and 6 multiple linear regressions (H2–H5, H7–H10, H12–H15) that are conducted in this study analysis.

Table 2. Dependent and independent variables of all hypotheses.

Digital Technology	Hypotheses (H)	Dependent Variables (DV)	Independent Variables (IV)	Regression
Digital storytelling	H1	PU	PEU	Simple
	H2	AU	PEU	Multiple
	H3	AU	PU	
	H4	IU	AU	Multiple
	H5	IU	PU	
Digital comics	H6	PU	PEU	Simple
	H7	AU	PEU	Multiple
	H8	AU	PU	
	H9	IU	AU	Multiple
	H10	IU	PU	
Digital infographics	H11	PU	PEU	Simple
	H12	AU	PEU	Multiple
	H13	AU	PU	
	H14	IU	AU	Multiple
	H15	IU	PU	

For each of the three models, the assumptions of multiple linear regression according to Abdel Hamid [62]—Linearity, independence, homoscedasticity, and normality—Were evaluated and verified using the Kolmogorov–Smirnov test. Multi-collinearity was also evaluated by tolerance statistics, VIF (the variance inflation factor), and correlation coefficient between independent variables; the VIF did not exceed 3 for any model. A *p*-value of less than or equal to 0.01 indicated significance in all tests.

5. Findings

5.1. Instrument's Reliability and Validity

Only one version of the TAM survey questionnaire was administrated to a pilot sample of 100 (which was not included in the study sample), so that all 18 sentences refer to the three digital technologies combined. The internal consistency of all items within the four variables was verified by Cronbach's alpha coefficient (as shown in Table 3). Each of the four variables achieved a good ($0.8 \leq \alpha$) or excellent ($0.9 \leq \alpha$) level of internal consistency [63]. To ensure content validity, the wording of the questionnaire items was slightly modified to address the content of this study and revised by three referees (experts in educational technology). In addition, the survey questionnaire was tested in the field with five early childhood pre-service teachers who were not included in the study sample. Referees' and field-tested modifications were included in the final questionnaire. Table 3 also shows that the corrected item-total correlation of all variables' items was statistically significant at the level of 0.01, which indicates the validity of all survey items [62].

Table 3. Reliability and validity measures.

Variables	Items	Mean	Standard Deviation	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
PEU	PEU1	4.33	0.71	0.720 *	0.863	0.886
	PEU2	4.27	0.83	0.649 *	0.881	
	PEU3	4.47	0.73	0.650 *	0.878	
	PEU4	4.40	0.72	0.801 *	0.845	
	PEU5	4.20	0.81	0.822 *	0.838	
PU	PU1	4.17	0.79	0.658 *	0.918	0.902
	PU2	4.07	0.87	0.816 *	0.866	
	PU3	4.07	0.83	0.765 *	0.878	
	PU4	3.80	0.92	0.784 *	0.874	
	PU5	3.87	0.86	0.861 *	0.856	
AU	AU1	4.43	0.77	0.796 *	0.692	0.819
	AU2	4.60	0.72	0.790 *	0.700	
	AU3	4.40	0.62	0.617 *	0.839	
	AU4	4.47	0.78	0.836 *	0.826	
IU	IU1	4.27	0.87	0.841 *	0.939	0.946
	IU2	4.33	0.88	0.944 *	0.908	
	IU3	4.33	0.84	0.906 *	0.922	
	IU4	4.00	0.80	0.854 *	0.950	

* Correlation is significant at 0.01 level.

5.2. Regression Analysis

For each of the regression models, the analysis was conducted in three steps. First, correlations between variables were verified using Pearson's correlation coefficient. Second, one simple linear regression was measured, followed by two multiple linear regressions of the proposed model.

5.2.1. Regression Analysis of the Digital Storytelling Model

Table 4 shows that all correlations between every pair of dependent and independent variables were statistically significant and positive. There was a significant positive relationship between PEU and PU (H1: r = 0.565, p = 0.0001); PEU and AU (H2: r = 0.817, p = 0.0001); PU and AU (H3: r = 0.635, p = 0.0001); AU and IU (H4: r = 0.731, p = 0.0001); and PU and IU (H5: r = 0.491, p = 0.0001).

Table 4. Correlation analysis of the digital storytelling model.

H	DV	IV	Pearson Correlation	Sig
H1	PU	PEU	0.565 **	0.0001
H2	AU	PEU	0.817 **	0.0001
H3		PU	0.635 **	0.0001
H4	IU	AU	0.731 **	0.0001
H5		PU	0.491 **	0.0001

** Correlation is significant at the 0.01 level (two-tailed).

To test the first hypothesis (H1), a simple linear regression with the enter method was conducted to distinguish PU from PEU (shown in Table 5). The model explained a

statistically significant amount of variance in PU, F (1, 50) = 23.41, $p = 0.0001$, and $R^2 = 0.319$. PEU was a significant predictor of PU, Beta = 0.565, t = 4.839, $p = 0.0001$. This means that an increase in one PEU score corresponded, on average, to an increase in the PU score of 0.764 points, B = 0.764. The regression equation is presented as "predicted PU = 3.924 + 0.764 (PEU)." This result indicates that pre-service early childhood teachers' PU is positively and significantly influenced by their PEU of digital storytelling in teaching practices (H1 is confirmed).

Table 5. Simple linear regression analysis of the digital storytelling model.

						Coefficients		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	3.924	3.583		1.095	0.279	0.319		
PEU	0.764	0.158	0.565	4.839	0.000 *		1.000	1.000

Dependent variable: PU, * *p*-value significant at 0.05 level.

The first multiple linear regression with the enter method was performed to predict AU from PEU and PU to test the second and third hypotheses (H2 and H3). Table 6 shows that the model explained a statistically significant amount of variance in AU, F (2, 49) = 60.57, $p = 0.0001$, and $R^2 = 0.712$. PEU was a significant predictor of AU, Beta = 0.673, t = 7.242, $p = 0.0001$. This means that an increase in one PEU score corresponded, on average, to an increase in AU score of 0.527 points, B = 0.527. PU was also a significant predictor of AU, Beta = 0.256, t = 2.751, $p = 0.008$, which means that for each extra point of PU, the AU score increased by 0.148 points, B = 0.148. The regression equation is presented as "predicted AU = 3.164 + 0.527 (PEU) + 0.148 (PU)." Accordingly, there was enough evidence to support both Hypotheses 2 and 3. This means that pre-service early childhood teachers' AU toward using digital storytelling in teaching children is significantly affected by both their PEU and PU of this digital technology. However, the results revealed that PEU (0.673) had a larger effect on their AU than PU (0.256).

Table 6. First multiple linear regression analysis of digital storytelling model.

						Coefficients		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	3.164	1.379		2.294	0.026	0.712		
PEU	0.527	0.073	0.673	7.242	0.000 *		0.681	1.468
PU	0.148	0.054	0.256	2.751	0.008*		0.681	1.468

Dependent variable: AU, * *p*-value significant at 0.05 level.

To confirm the fourth and fifth hypotheses (H4 and H5), a second multiple linear regression with the enter method was conducted to predict IU from AU and PU. The results in Table 7 show that the model explained a statistically significant amount of variance in IU, F (2, 49) = 28.24, $p = 0.0001$, $R^2 = 0.535$. AU was a significant predictor of IU, Beta = 0.703, t = 5.572, $p = 0.0001$. This means that an increase in one AU score corresponded, on average, to an increase in IU score of 0.898 points, B = 0.898. However, PU was not a significant predictor of IU. The regression model is represented as "predicted IU = 0.849 + 0.898 (AU) + 0.033 (PU)." This result signifies that the early childhood pre-service teachers IU to use or integrate digital storytelling is mainly influenced by their AU toward integrating this digital technology tool into their teaching practices.

Table 7. Second multiple linear regression analysis of the digital storytelling model.

Model	Coefficients							
	B	Std. Error	Beta	t	Sig	R^2	Collinearity Statistics	
							Tolerance	VIF
(Constant)	0.849	2.278		0.373	0.711	0.535		
AU	0.898	0.161	0.703	5.572	0.000 *		0.596	1.677
PU	0.033	0.093	0.045	0.354	0.725		0.596	1.677

Dependent variable: IU, * *p*-value significant at 0.05 level.

A summary of all regression results (path analysis) is presented in Figure 7.

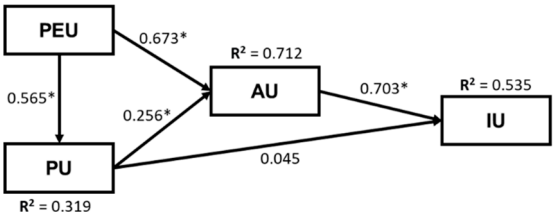

Figure 7. Summary of coefficient result of digital storytelling model (* *p*-value < 0.05).

5.2.2. Regression Analysis of the Digital Comics Model

In the digital comics model, all correlations between every pair of dependent and independent variables were statistically significant and positive. Table 8 shows that there is a significant positive relationship between PEU and PU (H6: r = 0.731, *p* = 0.0001); PEU and AU (H7: r = 0.899, *p* = 0.0001); PU and AU (H8: r = 0.729, *p* = 0.0001); AU and IU (H9: r = 0.87, *p* = 0.0001); and PU and IU (H10: r = 0.640, *p* = 0.0001).

Table 8. Correlation analysis of the digital comics model.

H	DV	IV	Pearson Correlation	Sig
H6	PU	PEU	0.731 **	0.0001
H7	AU	PEU	0.899 **	0.0001
H8		PU	0.729 **	0.0001
H9	IU	AU	0.874 **	0.0001
H10		PU	0.640 **	0.0001

** Correlation is significant at the 0.01 level (two-tailed).

To test H6 in the digital comics model, a simple linear regression with the enter method was used to predict PU from PEU. The results in Table 9 showed a statistically significant amount of variance in PU, F (1, 50) = 57.29, *p* = 0.0001, R^2 = 0.534, and PEU was a significant predictor of PU, Beta = 0.731, t = 7.569, *p* = 0.0001. This means that an increase in one PEU score corresponded, on average, to an increase in the PU score of 0.755 points, B = 0.755. The regression equation was "predicted PU = 4.912 + 0.755 (PEU)." This result indicates that pre-service early childhood teachers' PEU is a significant predictor of their PU of digital comics in teaching practices. Thus, H6 is confirmed.

Table 9. Simple linear regression analysis of the digital comics model.

Coefficients								
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	4.912	1.997		2.460	0.017	0.534		
PEU	0.755	0.100	0.731	7.569	0.000 *		1.000	1.000

Dependent variable: PU, * *p*-value significant at 0.05 level.

The first multiple linear regression in the digital comics model with the enter method was performed to predict AU from PEU and PU to test H7 and H8. Table 10 shows that the model explained a statistically significant amount of variance in AU, F (2, 49) = 111.56, $p = 0.0001$, $R^2 = 0.820$. PEU was a significant predictor of AU, Beta = 0.786, t = 8.852, $p = 0.0001$. An increase in one PEU score corresponded, on average, to an increase in the AU score of 0.641 points, B = 0.641. However, PU was not a significant predictor of AU. The regression equation was "predicted AU = 1.335 + 0.641 (PEU) + 0.122 (PU)." Accordingly, there was enough evidence to support H7 but not H8. This means that pre-service early childhood teachers' AU toward using digital comics in teaching children is significantly affected by their PEU (0.786) in teaching practices but not their PU.

Table 10. First multiple linear regression analysis of the digital comics model.

Coefficients								
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	1.335	1.048		1.274	0.209	0.820		
PEU	0.641	0.072	0.786	8.852	0.000 *		0.466	2.146
PU	0.122	0.070	0.155	1.745	0.087		0.466	2.146

Dependent variable: AU, * *p*-value significant at 0.05 level.

To confirm H9 and H10, a second multiple linear regression with the enter method was conducted to predict IU from AU and PU. The results in Table 11 show that the model explained a statistically significant amount of variance in IU, F (2, 49) = 79.47, $p = 0.0001$, $R^2 = 0.764$. AU was a significant predictor of IU, Beta = 0.871, t = 8.590, $p = 0.0001$. An increase in one AU score corresponded, on average, to an increase in the IU score of 1.087 points, B = 1.087. However, PU was not a significant predictor of IU. The regression equation was "predicted IU = −2.217 + 1.087 (AU) + 0.004 (PU)." This result shows that the IU of early childhood pre-service teachers to use digital comics is mainly and greatly influenced by their AU toward integrating this digital technology tool into their teaching practices. Therefore, this result confirms H9 but not H10.

Table 11. Second multiple linear regression analysis of the digital comics model.

Coefficients								
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	−2.217	1.514		−1.464	0.150	0.764		
AU	1.087	0.127	0.871	8.590	0.000 *		0.468	2.137
PU	0.004	0.100	0.004	0.041	0.967		0.468	2.137

Dependent variable: IU, * *p*-value significant at 0.05 level.

A summary of all regression results (path analysis) is presented in Figure 8.

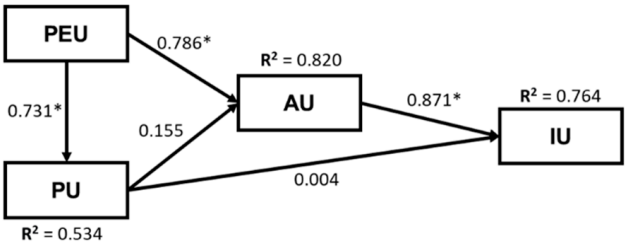

Figure 8. Summary of coefficient results of digital comics model (* *p*-value < 0.05).

5.2.3. Regression Analysis of the Digital Infographics Model

In the digital infographics model, all correlations between every pair of dependent and independent variables were statistically significant and positive. Table 12 shows that there is a significant positive relationship between PEU and PU (H11: r = 0.523, *p* = 0.0001); PEU and AU (H12: r = 0.743, *p* = 0.0001); PU and AU (H13: r = 0.531, *p* = 0.0001); AU and IU (H14: r = 0.740, *p* = 0.0001); and PU and IU (H15: r = 0.750, *p* = 0.0001).

Table 12. Correlation analysis of the digital infographics model.

H	DV	IV	Pearson Correlation	Sig
H11	PU	PEU	0.523 **	0.0001
H12	AU	PEU	0.743 **	0.0001
H13		PU	0.531 **	0.0001
H14	IU	AU	0.740 **	0.0001
H15		PU	0.750 **	0.0001

** Correlation is significant at the 0.01 level (two-tailed).

To test H11 in the digital infographics model, a simple linear regression with the enter method was used to predict PU from PEU. The results in Table 13 show a statistically significant amount of variance in PU, F (1, 50) 18.87, *p* = 0.0001, R^2 = 0.274. PEU was a significant predictor of PU, Beta = 0.523, t = 4.344, *p* = 0.0001. This means that an increase in one PEU score corresponded, on average, to an increase in the PU score of 0.557 points, B = 0.557. The regression equation was "predicted PU = 7.870 + 0.557 (PEU)." This result indicates that pre-service early childhood teachers' PEU is a significant predictor of their PU of digital infographics in teaching practices. Thus, H11 is confirmed.

Table 13. Simple linear regression analysis of the digital infographics model.

						Coefficients		
Model	B	Std. Error	Beta	t	Sig	R^2	Collinearity Statistics	
							Tolerance	VIF
(Constant)	7.870	2.807		2.804	0.007	0.274		
PEU	0.557	0.128	0.523	4.344	0.000 *		1.000	1.000

Dependent variable: PU, * *p*-value significant at 0.05 level.

The first multiple linear regression in the digital comics model with the enter method was performed to predict AU from PEU and PU to test H12 and H13. Table 14 shows that the model explained a statistically significant amount of variance in AU, F (2, 49) = 33.79, *p* = 0.0001, R^2 = 0.580. PEU was a significant predictor of AU, Beta = 0.641, t = 5.895, *p* = 0.0001. This means that an increase in one PEU score corresponded, on average, to an increase in the AU score of 0.452 points, B = 0.452. However, PU was not a significant predictor of AU. The regression equation was "predicted AU = 5.282 + 0.452 (PEU) + 0.130 (PU)." Accordingly, there was enough evidence to support H12 but not H13. This

means that pre-service early childhood teachers' AU toward using digital infographics is significantly affected by their PEU (0.641) in teaching practices but not their PU.

Table 14. First multiple linear regression analysis of the digital infographics model.

	Coefficients							
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	5.282	1.541		3.429	0.001	0.580		
PEU	0.452	0.077	0.641	5.895	0.000 *		0.726	1.377
PU	0.130	0.072	0.195	1.795	0.079		0.726	1.377

Dependent variable: AU, * *p*-value significant at 0.05 level.

To confirm H14 and H15, a second multiple linear regression with the enter method was conducted to predict IU from AU and PU. The results in Table 15 show that the model explained a statistically significant amount of variance in IU, F (2, 49) = 64.74, $p = 0.0001$, $R^2 = 0.725$. AU was a significant predictor of IU, Beta = 0.475, t = 5.384, $p = 0.0001$. This means that an increase in one AU score corresponded, on average, to an increase in the IU score of 0.649 points, B = 0.649. PU was also a significant predictor of IU, Beta = 0.498, t = 5.640, $p = 0.0001$. This means that for each extra point of PU, the IU score increased by 0.451 points, B = 0.451. The regression equation was "predicted IU = −3.418 + 0.649 (AU) + 0.4514 (PU)." This result shows that both AU and PU significantly and proportionally influence early childhood pre-service teachers' IU digital infographics in their teaching practices. Therefore, this result confirms both H9 and H10.

Table 15. Second multiple linear regression analysis of the digital infographics model.

	Coefficients							
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig**	**R^2**	**Collinearity Statistics**	
							Tolerance	**VIF**
(Constant)	−3.418	1.879		−1.819	0.075	0.725		
AU	0.649	0.121	0.475	5.384	0.000 *		0.718	1.392
PU	0.451	0.080	0.498	5.640	0.000 *		0.718	1.392

Dependent variable: IU, *p-value significant at 0.05 level.

A summary of all regression results (path analysis) is presented in Figure 9.

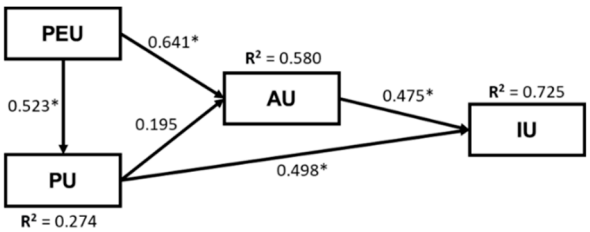

Figure 9. Summary of coefficient result of digital infographics model (* *p*-value < 0.05).

6. Discussion and Implications

The focus of this study was on exploring the factors influencing the intentions of early childhood pre-service teachers to use three digital technology applications in their teaching–learning process. These three digital applications were digital storytelling, digital comics, and digital infographics. The four factors of the TAM model, including PEU, PU,

AU, and IU, conceptualized this investigation. The following section discusses the results obtained in this study and their implications.

The findings of the current study showed that the PU factor was significantly affected by the PEU factor among early childhood pre-service teachers in terms of all three digital applications. This result confirms the TAM literature [58] and other studies investigating pre-service teachers' integration of digital technologies in early childhood [2,22]. Moreover, the PEU factor was found to be significantly the major predictor of pre-service teacher participants' AU toward these three digital technologies. For all three digital applications, the influence of the PU factor on AU did not stand out compared to the PEU factor, whether the effect was slight, as in the case of digital storytelling, or there was no effect, as in the case of digital comics and digital infographics. Although previous studies on the use of digital technologies by teachers have indicated that PU is one of the main factors that greatly influences teachers' AU toward digital technology utilization [42,43], the results of the current study showed the opposite, in that PEU was the biggest predictor of the participants' AU.

This result may be attributed to the fact that early childhood pre-service teachers lacked sufficient knowledge of how to design and produce these digital technologies, as well as how to integrate them in the teaching–learning processes of young children. In other words, for the pre-service teacher participants in this study, the degree of familiarity with using these digital technologies (PEU) had a greater influence on their AU, causing them to accept or reject using those technologies in their future classrooms. This result indicated that early childhood pre-service teachers were not adequately and effectively introduced to and trained in these digital applications during their teacher preparation programs. It is argued in the literature that well-designed professional learning is needed to build early childhood teachers' confidence, technology expertise, and pedagogical skills [25]. Based on this result, this study implies the importance of familiarizing early childhood pre-service teachers with these digital technology applications in their teacher preparation programs. Therefore, the results suggested that teacher education programs in Saudi Arabia should include more technology-related courses centralized around the design and production of various digital technologies in early childhood [3]. It is not only a general course that discusses digital technologies and their ability to support the educational process, as is currently the case in Saudi Arabia [24,64]; rather, the course should be practical, intensive, and focus on the concept of integrated instructional design to produce such digital applications and training in how to employ them effectively and pedagogically in actual teaching practices [11,19,43,65].

Regarding early childhood pre-service teachers' IU to use the three digital applications, the results also showed that participants' AU was the major and only predictor of their future intentions to use both digital storytelling and digital comics in teaching practices, which confirmed many studies [1,6,30]. This means that PEU is an important factor that contributes to raising the AU of early childhood pre-service teachers, thus, raising their IU to use digital storytelling and digital comics in their future profession. This, in turn, implies that early childhood pre-service teachers had no doubt of the usefulness of these two digital applications and their potential for enhancing teaching practices [34,39,45]—Specifically, motivation, engagement, and academic performance [48]. Thus, their AU, which was driven to be PEU, was the major predictor of their IU, rather than PU. However, in terms of using digital infographics, both AU and PU had a similar influence on the participants' IU to use digital infographics in their teaching practices.

A possible explanation for this result may be that digital storytelling and digital comics (as a form of storytelling) in early childhood are very common in contemporary children's literature [31,32,46], so the PU factor did not appear predictive in its effect on the participants' IU. Meanwhile, in the case of digital infographics, the use and employment of digital infographics in educating early childhood students may be new or uncommon, so pre-service teachers may not know or be uncertain of the potential of digital infographics to enhance learning outcomes (PU) for their young students. Thus, the PU factor appeared

similar to the AU factor in predicting the future IU of the participants. This result confirmed other studies indicating that pre-service teachers in early childhood lack an awareness of digital infographics' importance and have an insufficient level of competency in utilizing digital infographics for teaching and learning [56,57]. One important implication of this result is that teacher preparation programs should focus on the educational benefits of utilizing digital infographics of various types to improve learning outcomes in early childhood classes. In particular, many recent studies have emphasized the educational value of integrating digital infographics in early childhood and recommended that teachers should be trained to integrate digital infographics into their teaching practices [53,55].

In summary, the findings of this study suggest the importance of restructuring and building teacher preparation programs in Saudi universities to appropriately equip early childhood pre-service teachers with the necessary confidence and competencies to effectively integrate digital storytelling, digital comics, digital infographics, and other new digital applications into their future teaching practices. Many studies have urged comprehensive and continuous training in the educational potential of these digital resources [7,43,51,65]. That is, early childhood pre-service teachers will graduate with sufficient skills and high confidence in designing, producing, and implementing these digital technologies in their future classes. Beyond that, professional development programs must invest in the skills and competencies of novice teachers and continue training them in integrating innovative digital technologies for early childhood education to stay constantly up-to-date with the evolving digital world.

7. Conclusion and Limitations

This study explored the factors influencing the behavioral intentions of early childhood pre-service teachers to use three digital technology applications: digital storytelling, digital comics, and digital infographics. Therefore, the four factors of the TAM model, including PEU, PU, AU, and IU, were proposed and investigated. To fulfill the study's goal, three research models were suggested—One model for each digital application that consisted of five hypotheses. Each model was individually tested using one simple and two multiple linear regressions to determine which PEU, PU, and AU factors significantly predict pre-service early childhood teachers' IU to use digital storytelling, digital comics, and digital infographics in their future teaching practices. The findings indicated that pre-service teacher participants' PEU was a significant predictor of their AU toward using all three digital applications in the teaching–learning process. This result implies a greater focus on teacher preparation programs to provide more technology-oriented courses for early childhood pre-service teachers. These programs should train pre-service teachers in how to design, produce, and pedagogically integrate these digital technologies into practice in early childhood education. Another finding of this study is that AU was found to be significantly the biggest factor in predicting pre-service teacher participants' IU to use digital storytelling and digital comics, while both AU and PU had similar predictive effects on their IU to use digital infographics in teaching practices. These results suggest that teacher preparation programs should focus on promoting early childhood pre-service teachers' AU toward utilizing these three digital applications in teaching practices, with a particular emphasis on the potential and educational value of using digital infographics to enhance teaching and learning performance.

A number of limitations were found in this study. In terms of the study sample, the participants were selected from pre-service childhood teachers at KFU in Al-Ahsa, Eastern Province. Therefore, there is a limitation in generalizing the results to all Saudi provinces and universities. Accordingly, this study recommends conducting future studies that collect data from a larger and more diverse sample, including various provinces and universities in Saudi Arabia. In terms of methodology, this study relied on the TAM model, with its four factors. There may be other factors that affect the acceptance to use digital technology applications among pre-service teachers in early childhood. Therefore, future studies may investigate other factors that affect the intent to use, such as digital competence and

school support, through an extended TAM model, and use structural equation modeling to examine it. In addition, this study adopted a quantitative method for data collection and analysis, so conducting mixed-method studies in the future will add qualitative data that may contribute to a deeper understanding of the results. Finally, this study was limited in measuring the factors affecting the intention to use three digital applications (digital storytelling, digital comics, and digital infographics). Therefore, we recommend conducting similar future studies to examine the intention to use other digital applications, such as augmented reality, virtual reality, and robotics, among early childhood pre-service teachers.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of the Research Ethics Committee (REC) of King Faisal University (protocol code KFU-REC-2022-JAN-EA000349 and 4/1/2022).

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

Data Availability Statement: Data are not available due to confidentiality concerns.

Conflicts of Interest: The authors declare no conflict of interest.

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