

## Article

# Analysis of Digital Leadership in School Management and Accessibility of Animation-Designed Game-Based Learning for Sustainability of Education for Children with Special Needs

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**Abstract:** With the rapid integration of technology into educational environments during the pandemic period, the teaching processes in classrooms and private education institutions began to be carried out with technology support. Game-based animation learning designs in technology-supported educational environments provide an interesting and motivation-enhancing learning experience in developing students' education skills. In today's educational environments, 2D and 3D animation game designs are the unique technology-supported learning environments in teaching many different skills, behaviors, and concepts to individuals with special needs. Visual designs and animations are one of the technologies necessary to prepare individuals with special needs for an independent life. The accessibility of animation designs for teachers and families has gained significant importance during the COVID-19 pandemic period. Technology education supports the visual, listening, reading, writing, social, and communication skills of individuals with special needs, facilitates their independent life skills, and contributes to their development as a guide. This allows individuals to learn the targeted information more easily, permanently, and quickly. In this context, this study provides information on the use and accessibility of animation technology in special education, offers suggestions for the benefit of visual design and animation, which are among the assistive technologies, and gives insights into how school management is ready for digital education.

**Keywords:** digital education; digital leadership; school management; special education; technology; animation designs; gamification; accessibility

## 1. Introduction

There have been significant structural changes in the transition from the industrial revolution to the information society. Globalization has accelerated, extensive changes have been experienced in the field of technology, information has been put at the center of production, and the hierarchical formation level in organizational structures has decreased. This naturally occurring process is also reflected in leadership models. All of

these experiences have caused leadership to be reshaped [1]. Ref. [2] described leadership as setting goals for social influence and putting in efforts for the maximum realization of these goals. Leadership theories and models were all traditional formations. All of these structures, which were designed without considering today's digital age, became dysfunctional by lagging behind the age, and needed to become more suitable for the digital age and transform into different leadership models. Digital leadership [3] emerges as one of the types of leadership in the digital age. Ref. [4] define digital leadership as "doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem. Digital leadership means thinking differently about business strategy, business models, the IT function, enterprise platforms, mindsets and skill sets, and the workplace".

It has been inevitable that the effects of the change in technology and digitalization will show themselves in education and all areas of life. In the educational context, total quality management and the usage of quality tools have become paramount [5]. School administrators need to lead their teachers and students under their responsibilities in the rapidly changing digital environment [6]. Leaders in schools need to be able to integrate technology to support teaching to prepare for this changing new digital age [7,8].

Schools attended by individuals with special needs should not be considered outside of this structure. As a result of the use of technology in educational environments, the methods that can be used, and the adaptation of the techniques by integrating them with technology, teaching environments are enriched, enabling the creation of learning environments for accessible, high-impact, efficient, and contemporary structures [5,9]. In addition, it is stated that the technological structures used in schools effectively promote independence for individuals with special needs [10].

Special education is for individuals who cannot benefit from the normal education process at the desired level, where special materials, equipment, methods, and techniques are used, as well expert personnel and environments suitable for individual characteristics [11]. It can be defined as all of the educational services that are individually planned, systematically applied, and carefully evaluated, aiming to develop the independence of the student and their participation in the society at the highest level [12].

## 2. Literature Review

A leader is a person guided by values and principles. A leader should have various types of awareness, such as historical, logical distinction, discriminative capacity, and civic engagement, as well as self- and social awareness [13,14]. With the advancements in digital technologies and the increased rate of digitalization in institutions, new kinds of opportunities and challenges are emerging for leadership [15] that are not easily addressed by classical leadership. The decision makers need to have a digital mindset so that the critical capabilities of a digital leader can align with the digital transformation and strategic vision of the institution. Entrepreneurial leadership is one of the most successful and sought-after competences where an understanding of "environmental, organisational and follower-specific contingencies" are paid special attention to for the realization of organizational goals [16]. Leaders become proficient in using digital technologies as a new form of communication and of organizing information [17]. In the era of 4th Industrial Revolution [18], it is no longer business as usual. In the time of the pandemic, crisis management was observed in almost all spheres of life and business. Modern leadership styles can be categorized as autocratic, democratic, transformational, and laissez-faire, whereas post-modern leadership is described as agile, resonant, spiritual, social constructionist, and hybrid [19]. The transformations and the dynamics of leadership were fueled by the COVID-19 global pandemic, giving rise to a new form of performers using digital resources. Ref. [20] report a big leap in the adoption of mobile technology and broadband services. This reinforces certain demands, especially on the part of younger leadership who take internet freedom as a priority. This created a big opportunity for the formal and informal leaders to plan, adopt, and implement suitable digital interventions

that are allowable, acceptable, and mandatory in the workplaces of today [21]. While the internet has become ubiquitous, millennials as digital leaders communicate, coordinate, and collaborate in virtual space using social networking and synchronous real-time video [22].

Accessibility is one of the key elements for the practice of inclusive education. Putting emphasis on the merits of technology is crucial to fostering the quality of education for all. In this respect, recent studies have been conducted to technology-enhanced instruction in special education [23–25]. Studies underline the importance of assistive technologies and animations in special education.

The study of [23] underlines how animations enhance the skills development of children, especially creativity. In addition to this, [24] enlighten the use of technology in special education. In their study, it is revealed that school professionals pay attention to AR or VR to extend their knowledge in order to facilitate education for all. Ref. [25] give insights on the role of mobile game development in the scope of education. This study underlines the importance of mobile applications to enrich the teaching and learning process.

Ref. [26] explain that “a game is a problem-solving activity, approach with a playful attitude”. Ref. [27], in her book *Reality is Broken*, explains that when we strip away the genre differences and all its technological complexities, all games have four defining features—a goal, rules, feedback system, and voluntary participation. Games are feasible and effective learning spaces, supporting the development of transversal knowledge, conceptual understanding, and action-directed learning in a supportive environment [28]. We need to move towards redesigning games to be more inclusive and accessible. For example, the study of [29] underlines that games provide meaningful social interactions to players with deaf blindness. A set of user-driven recommendations for making digital games more accessible to players with diverse sensory abilities is revealed. The COVID-19 pandemic defined the role digital technologies can play in education and their relationships with teacher training, the flexibility of pedagogical processes, and the diversification of strategies and resources [30]. The study of [31] underlines that entertainment video games can be an effective educational tool and beneficial in almost all academic disciplines, particularly foreign language and science. Digital educational games (DEGs) constitute an effective teaching approach, particularly when combined with collaborative learning scenarios. Teachers have a great role [32].

The visual content augments the perception of sight and seeing. The aesthetics play a significant role in the user interface. Digital storytelling is one strategy for promoting game-based learning where the content deals with characters, plot, locations, dialogues and content styles. Such content can be offered in the form of serious learning games, immersive virtual worlds, and e-books. The artistic visualization of the content leaves a better impact in terms of the understanding and comprehension of the content [33]. Visually engaging content supports a variety of pedagogical strategies [34]. Visual instructional design has implications for learner-centeredness as a usability aspect of content, learning efficacy, copyright, accessibility, and the augmenting of human capabilities such as cognition, learning, memory, and decision making [35].

This study aims to reveal the situation regarding the use of visual design and animation, which are among the assistive technologies, on the use and accessibility of animation technology in special education and to analyze the adoption of digital education in schools.

### 3. Materials and Methods

#### 3.1. Research Model

In this study, a qualitative research method was used as this method is useful when the data collection methods include observations, interviews, and document analysis. A “qualitative process is followed to reveal perceptions and events in a natural environment realistically and holistically” [36]. According to [37], “the main feature of qualitative research is to reveal the perspectives and worlds of meaning of the participants and see the world through the eyes of the participants”.

### 3.2. Data Collection Tool: Questionnaire

As a data collection tool in the study, self-reflection-type questions were prepared, and the research questions were asked. In the qualitative research approach, in-depth interviews (face-to-face interviews), direct observation, and document analysis techniques are generally used to collect data [38]. The data of this research were obtained through the analysis of public reports and the face-to-face interview technique, which cannot be directly observed with other data collection tools, provides the opportunity to understand the perspectives of the participants on the subject, and is frequently preferred in the qualitative research approach [38]. The self-reflection questionnaire created within the scope of this study included two open-ended questions.

The first data collection tool was about obtaining opinions on visual designs on the use and accessibility of gamified animation, the development of students in educational and skills, and also motivation-enhancing learning experiences with visual designs. As the accessibility of gamified animation designs for teachers and families during the COVID-19 pandemic period is of great importance, this self-reported data collection tool was used to evaluate opinions on animation design for game-based learning. In addition to this, managerial implications are important to foster game-based learning in special education [39]. In this respect, a self-reflection task about digital leadership was conducted with teachers to examine their views on digital leadership, the characteristics and behaviors that teachers have regarding digital leadership, and the necessity of digital leadership and management for innovative practices in special education schools in order to achieve readiness for game-based learning.

A face validity of the self-reflection questionnaire was established. To ensure the internal validity, the questionnaire was submitted for examination by faculty members from the Near East University, Faculty of Education, Department of Educational Sciences to obtain an expert opinion. In line with these opinions, the questionnaire was rearranged. After that, a pilot was conducted by selecting a working group equivalent to the study group. Thus, it was determined whether the questions were clear and understandable and whether the answers reflected the answers to the questions asked. Then, in the process of preparing the questions, expert opinions, education management experts, and Turkish language linguists were consulted for software rules, examining the transcripts, checking whether the questions asked were clear and understandable, and checking whether they covered the subject in question, and the possibility of providing the necessary information was taken for control purposes. Since it was concluded that the self-reflection task questions would provide the desired data, the data collection process was started. In this study, content analysis was used to analyze and interpret the qualitative data obtained from the participants.

### 3.3. Working Group

The research study group consisted of 10 participants: teachers working in randomly selected special education and rehabilitation centers in Northern Cyprus for the accessibility of animations; and 13 teachers and one headmaster who participated in the analysis of digital leadership. Researchers have indicated that in the case of qualitative studies, a sample size of 10 may be an adequate sample among a homogeneous population [40]. Further, a depth of understanding, rather than breadth, becomes important in qualitative research when dealing with a non-positivity paradigm [41]. Ref. [42] suggests qualitative sample sizes of 20–30 using a grounded theory approach for qualitative enquiry (p. 56). While forming the study group, the snowball sampling method was chosen from purposive sampling methods. This sampling model was preferred because it allows the opportunity to form a study group of the participants from whom the richest data can be obtained. In the snowball sampling model, very rich and deep data can be obtained since it involves directing participants with detailed knowledge of the research topic to others with a similar level of knowledge.

### 3.4. Data Collection

The participants were informed in advance about the purpose of the study and the use of the interview as the data collection method. A “Google Meeting” was organized to explain the subject and purpose of the meeting to the participants. The study data started being collected in September 2021 with the participants who participated in the study voluntarily.

### 3.5. Analysis of Data

According to the participants’ opinions from the self-reflection questionnaire, the answers given to each question were categorized one by one and placed in the tables. After this first categorization, the data were re-examined by the researcher, and basic themes and categories were created. These identified themes and categories were reviewed by considering the relevant literature, and categories showing similar patterns were combined. Those that differed were grouped under a separate category and coded. Next to these categories, whichever manager answered was written in numbers. The sentences extracted from the categories were written as examples in the expressed part. The self-reflection questionnaires underwent content analysis, and the data were analyzed in four stages [36]:

1. **Coding the data:** In this first stage of the content analysis, after each participant was given a number and the responses of the self-reflection questionnaires were recorded, the data obtained from the participants were analyzed within the framework of the research and divided into meaningful parts, and the conceptual meaning was named and coded. Based on the conceptual framework of the research and the questions, the code list, which was prepared before, was finalized after examining all of the data. This code list served as a critical list in organizing the data. The data outside the research questions were excluded from the coding. Afterward, the researchers read the coding keys separately, and the necessary arrangements were made by discussing the “consensus” and “disagreement” issues. For the reliability calculation of the research, the average was calculated as 93% using the reliability formula suggested by [43]. Reliability calculations over 70% are considered reliable for research [43]. The result obtained here is deemed to be reliable for the research. In the coding made by the researchers, the codes showing compatibility were taken as the basis for reaching the themes.
2. **Finding themes:** At this stage, the codes determined during the data’s coding phase were considered separate categories and evaluated as separate themes.
3. **Organizing and defining the data according to codes and themes:** At this stage, the opinions of the participants were explained in a language that the reader could understand, and the views were presented to the reader firsthand. Footnotes were used to determine which participant the notes belonged to, and the notes were given in quotation marks.
4. **Interpretation of findings:** This last stage involves the interpretation of the findings, which are described and presented in detail by the researcher along with an explanation of some of the results.

## 4. Findings

The research findings were analyzed to answer each research question, and the results of this analysis are given below, respectively.

*First Dimension: Status of Visual Designs on the use and accessibility of animation technology in special education:*

The first dimension of the research was created within the scope of revealing opinions about the status of visual designs on the use and accessibility of animation technology in special education. In this context, 10 participants were asked for their opinions. The answers given to these questions were coded, and the themes were extracted; the distributions of these themes are given in Table 1.

**Table 1.** Status of visual designs on the use and accessibility of animation technology in special education.

Themes	Respondents (N)
Thanks to visual designs on the use and accessibility of technology in special education, the development of students in educational and skill issues is increasing.	8
Providing an interest and motivation-enhancing learning experience with visual designs in line with the characteristics of students' development	6
Progress in student development with visual designs in technology-supported learning environments in teaching many different behaviors and concepts for individuals with special needs	7

The first dimension of the research was created within the scope of revealing opinions about the status of visual designs on the use and accessibility of animation technology in special education. In this context, it is understood from the participant opinions that the development of students in educational and skill issues is increasing thanks to visual designs on the use and accessibility of technology in special education. According to the participants' opinions, it can be said that an interest and motivation-enhancing learning experience can be provided with visual designs in line with the characteristics of the students' development. In addition to these, it is understood that there is progress in student development with visual designs in technology-supported learning environments in teaching many different behaviors and concepts for individuals with special needs. In the light of these evaluations, the views of the participants on the use and accessibility of animation technology in special education are as follows:

T(4): *"I think that there are great advances in student development with visual designs in technology-supported learning environments in teaching many different behaviors and concepts for individuals with special needs."*

T(9): *"Yes, I can say that it can be done with visual designs that increase interest and motivation in the development of students in line with their characteristics."*

*Second Dimension: Status of animation usage in special education in terms of use and accessibility of animation technology:*

The second dimension of the research was created within the scope of revealing opinions about the use of animation technology in special education and its accessibility. The answers given to these questions were coded and the themes were extracted, and the distributions of these themes are given in Table 2.

**Table 2.** The status of animation usage in the use and accessibility of animation technology in special education.

Themes	Respondents (N)
The use of 2D and 3D animation designs in teaching many different skills, behaviors, and concepts for individuals with special needs.	7
The accessibility of animation designs for teachers and families during the COVID-19 pandemic period is of great importance.	8
Technology education supports the visual, listening, reading, writing, social, and communication skills of individuals with special needs, facilitates independent living skills, and contributes to their development as a guide.	9

The second dimension of the research was created within the scope of revealing opinions about the use of animation technology in special education and its accessibility. In this context, it is understood from the participants' opinions that the use of 2D and 3D

animation designs in teaching many different skills, behaviors, and concepts to individuals with special needs plays an important role in student development. It can be said, according to the participants opinions, that the accessibility of animation designs became much more important during the COVID-19 pandemic period for teachers and families. In addition, it is understood that technology education supports the visual, listening, reading, writing, social, and communication skills of individuals with special needs, facilitates their independent living skills, and contributes to their development as a guide. In light of these evaluations, the views of the participants on the use and accessibility of animation technology in special education are as follows:

T(2): *“I think that the use of 2D and 3D animation designs in teaching many different skills, behaviors, and concepts for individuals with special needs plays a significant role in student development.”*

T(8): *“I can say that Technology Education supports the eyesight, hearing, reading, writing, social, and communication skills of individuals with special needs, facilitates their independent living skills and contributes to their development as a guide.”*

### *Third Dimension: Evaluation of Participants’ Views on Digital Leadership*

The themes, responses, and percentages regarding participants’ views about digital leadership are presented below in Table 3.

**Table 3.** Participants’ views on digital leadership.

Responses Related to Digital Leadership	Respondents (N)
The process of using digital platforms within the management mechanism	7
Using the knowledge and skills necessary for management with the technology of the age	4
Combining competencies from different disciplines	2
Reaching the social target by using information and communication technologies	4

Table 3 shows that around half of the respondents treat digital leadership as the process of using digital platforms within the management mechanisms.

K9 said: *“I can say that it is the process of using digital platforms within the management, within the scope of evaluating the participants’ views on what digital leadership is.”*

While approximately one-fourth of the participants said that social goals could be achieved through technologies in information and communication, about one-fourth of them also emphasized that certain elements required for management, such as knowledge and skills, must be combined with technology.

### *Fourth Dimension: Evaluation of Participants’ Views on Digital Leader’s Characteristics and Behaviors*

The themes, responses, and percentages within the scope of the participants’ opinions regarding the characteristics of a digital leader and the behaviors that should be exhibited in line with the education they received are shown in Table 4.

**Table 4.** What are the characteristics and behaviors of a digital leader?

Responses Related to Behaviors and Characteristics of a Digital Leader	Respondents (N)
Open to science	10
Following the technological developments	9
Adapting the managed institution to the era in which it is lived	10
Innovative and entrepreneurial	9
Reliable	5
Collaborator	8
Problem solver	4

Table 4 presents the participants' views on some of the characteristics that a digital leader should have and the behaviors expected to be exhibited.

K5 said: "I can say that within the scope of evaluating the views of the participants on the characteristics and behaviors that a digital leader should have, it is to ensure the adaptation of the managed institution to the era in which it is lived."

K2 reported: "As part of the evaluation of the participants' views on the characteristics and behaviors that a digital leader should have, I can say that it is necessary to be open to being scientific."

K12 said, "I can say that the participants should be innovative and entrepreneurial within the scope of evaluating their views on the characteristics and behaviors that a digital leader should have."

In line with the findings mentioned above, it can be inferred that:

- More than half of the participants see being open to being scientific as digital leadership.
- More than half of the participants stated that the digital leader should manage the institution they work for by using technology suitable for the conditions of the age.
- More than half of the participants stated that the digital leader should be innovative and entrepreneurial.
- More than half of the participants noted that the digital leader should also follow technological developments.

#### *Fifth Dimension: Evaluation of Participants' Views on the Necessity of Digital Leadership in Schools*

The themes, responses, and percentages within the scope of the participants' opinions are presented in Table 5 regarding the necessity of digital leadership in schools in line with the education they received.

**Table 5.** Is digital leadership necessary in schools?

Responses Related to Digital Leadership in Schools	Respondents (N)
Following new developing technologies	8
Achieving the goals of schools	10
Community reaching the desired point	7
Use in the education of students	5
In case of disruption of face-to-face education (under pandemic conditions)	6

Table 5 shows the data for the participants' views on the need for digital leadership in schools.

K4 said: "Within the scope of evaluating the participants' opinions about the need for digital leadership in schools, I can say that schools must achieve their goals."

K14 reported: "I can say that within the scope of evaluating the participants' opinions on the need for digital leadership in schools, in terms of following new emerging technologies."

K1 indicated: "Within the scope of evaluating the opinions of the participants about the need for digital leadership in schools, I can say that if face-to-face education is disrupted and there is a pandemic."

From the views expressed by the respondents, it can be seen that that:

- The majority of the participants stated that digital leadership is necessary within the scope of the school for schools to achieve their goals.
- It is seen that nearly half of the participants stated that digital leadership is necessary for school conditions to follow new technologies and reach the desired level of society.

- Nearly half of the participants, on the other hand, expressed their views on the necessity of digital leadership in schools if face-to-face education is disrupted and there is a pandemic.

## 5. Discussion

Within the scope of the research on how the teachers and administrators working in official special education and business education schools working under the Ministry of National Education in our country perceive the organizational culture of the institution in which they work, and to ensure the development of school culture, the administrators and managers in Famagusta Special Education and Business Education School teachers were trained on the topic of “digital leadership”.

Among the words that define the world we live in and that we encounter intensely are competition, change, and, accordingly, transformation and destructive technologies. The speed experienced in today’s technological developments [44] has forced human resources at all levels to work on technology literacy. It has been stated in studies that it is necessary to be aware of developing technologies and that this is very effective on students in academic terms [45].

“What is digital leadership?” An answer was sought to the question, and an attempt was made to give the participants a perspective on this issue. The answers given by the participants were patterned in the following themes:

- Use of digital platforms within the management mechanism.
- Managers have the technology knowledge and skills used in today’s world.
- Using communication and information technologies to achieve social goals.

Providing the necessary interaction, communication, sharing, and cooperation by using digital technologies comes to the fore in digital leadership. As a result of the increase in speed due to all of these digital technologies, the widespread use of applications such as messaging and file sharing required by the job facilitates the communication between the manager and the employee in the working environment, and increases the interaction [46]. Understanding and applying what kind of technology, when and where it will be appropriate and necessary to improve the processes experienced and increase productivity is the basic skill of digital leadership. Based on this, “What are the characteristics and behaviors of a digital leader?” constituted our second question. In line with the answers given by the participants, the following themes were reached:

- Ensuing the technological developments,
- Ensuring the managed institution adapts to the era in which it is lived,
- Innovative and entrepreneurial,
- Collaborative,
- Trustworthy,
- Open to science.

The most important task of school leadership is to reveal the potential and talent of school employees in parallel with the existing goals of the organizational structure [47]. If we look at digital school leadership from this point of view, human resources should be trained within the framework of the vision created by the school and in parallel with digitalization, and they should be able to cooperate with stakeholders by working in an interdisciplinary way on the issue of realizing and revealing their power and potential. In special education schools, the participants were asked the question “Is digital leadership necessary, and why?”, and the themes of their answers are expressed below:

- Schools can achieve their goals,
- The society’s ability to reach the desired point,
- In case of disruption to face-to-face education (in pandemic conditions).

## 6. Conclusions and Recommendations

The first dimension of the research was created within the scope of revealing opinions about the status of visual designs on the use and accessibility of animation technology in special education. In this context, it is understood from the participant opinions that the development of students in educational and skills issues is increasing thanks to visual designs on the use and accessibility of technology in special education. According to the participants' opinions, it can be said that an interest and motivation-enhancing learning experience can be provided with visual designs in line with the characteristics of the students' development. In addition to these, it can be concluded that there is progress in student development with visual designs in technology-supported learning environments in teaching many different behaviors and concepts to individuals with special needs.

The second dimension of the research was created within the scope of revealing opinions about the use of animation technology in special education and its accessibility. In this context, it is understood from the participants' views that the use of 2D and 3D animation designs in teaching many different skills, behaviors, and concepts to individuals with special needs plays an essential role in student development. It can be said, according to the participants' opinions, that the accessibility of animation designs became much more critical during the COVID-19 pandemic period for teachers and families. In addition, it can be concluded that technology education supports the visual, listening, reading, writing, social, and communication skills of individuals with special needs, facilitates independent living skills, and contributes to their development as a guide.

In the analysis of digital leadership, it is observed that it is essential that digital platforms be used within the management mechanism within the scope of the participants' opinions—presented in Table —on what digital leadership is in line with the education they received. According to the views of the participants, it can be said that the knowledge and skills necessary for management should be used together with the technology of the age. Therefore, competencies belonging to different disciplines should be used together. Consequently, it can be said, according to the opinions of the participants, that it will be much easier to achieve social goals by using information and communication technologies. It is pertinent that being open to being scientific is of great importance within the scope of the participants' opinions regarding the characteristics that a digital leader should have and the behaviors that should be exhibited in line with their education. Therefore, technological developments should be implemented within the scope of digital leadership.

For this reason, it is understood that the managed institutions should adapt to the era in which they live. Therefore, it can be said, according to participant views, that executive leaders should be innovative, entrepreneurial, reliable, collaborative, and problem solvers. Within the scope of the participants' opinions on the necessity of digital leadership in schools in line with the education they received, it is imperative that new technologies should be deployed, and technology is an inevitable necessity for schools to achieve their goals. We can say that technology should be used in order for society to reach the desired point and that digital education should take a large part in the education of students. According to the participants' opinions, we can state that digital education emerges as the most significant educational tool, especially in the case of disruption to face-to-face education (under pandemic conditions).

## 7. Limitations and Suggestions for Further Research

This study focused on the digital leadership in school management with reference to special needs education. The study is limited to the teachers in special education and it sheds light on raising awareness of accessibility in animations for game-based learning. In addition to this, it gives insights into how capacity building for teachers is important in digital transformation. In this respect, in further studies, teacher training programs can be examined in terms of capacity building for fostering accessible games and learning within the scope of education for all. On the other hand, further research may be carried out in the higher education sector and involving regular-needs students. Another area

worth exploring is an analysis of the digital competencies of teachers contributing towards sustainability in education.

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