DS Journal of Digital Science and Technology
Volume 3 Issue 1, 11-19, Jan - Mar 2024
ISSN: 2583-5416 / https://doi.org/10.59232/DST-V3I1P102

Original Article

Building Digital Transformation Solutions for Higher Education Institutions in Ho Chi Minh City

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Received: 10 January 2024; Revised: 13 February 2024; Accepted: 27 February 2024; Published: 8 April 2024;

Abstract - An overview of the processes, entities, and human aspects of digital transformation in high school education in Ho Chi Minh City is given in this study. It looks at a number of important aspects of digital conversion in the context of education. The process of digital transformation extends beyond simple technological changes and includes adjustments to teaching and learning strategies. Educational institutions ought to cultivate dynamic learning spaces that promote ingenuity and flexibility in both instructional and administrative approaches. This calls for dedication and a change of perspective and disposition on the part of all those involved. Education is undergoing a digital revolution that benefits educators and learners alike while also advancing sustainable development in society by preparing learners for success.

Keywords - Digital Transformations (DT), Higher Education Institutions (HEI), DT entities, DT process, School administration.

1. Introduction

The widespread use and usage of digital technology has advanced significantly in recent times thanks to noteworthy advancements in digital transformation. Significant features have been added to the digitization process by advances in digital conversion, making it easier for users to interact with these systems and create a variety of digital media products. As a result, there has been a noticeable growth in interest in digital tools and new platforms for digital transformation in recent times. There are many opportunities to raise the standard and effectiveness of the teaching and learning process thanks to the digital revolution in education. It is a fundamental change in the methods utilized in teaching and learning, not merely a fad.

The advancement of technology in the era of Industry 4.0 has deeply influenced Higher Education Institutions (HEIs), compelling them to confront the challenges of Digital Transformation (DT) across all facets [1]. With the capability to delineate the intricate connections among stakeholders within digitally empowered teaching and learning environments, the application of digital transformation methodologies in the education sector has emerged as a burgeoning field of interest in recent times. The following viewpoint is used to understand digital transformation and related terms in this study.

1. Digital transformation is the process of employing digital technology to transform traditional activities, procedures, and working methods into digital forms. The term "digital transformation" in education describes the use of digital technologies to improve instructional design and administration [2].
2. Digitization is the process of transferring data from continuous analog form to binary digital form, a coding that may be represented by sequences of only two number digits, 0 and 1 digitization. This could entail taking pictures, scanning, or converting paper materials into digital representations through encoding [2].
3. Digitalization is the process of applying and using digital technologies to tasks. Digitalization in education refers to the use of computers and software to streamline procedures and assignments, resulting in increased productivity and automation. Using online teaching tools or Learning Management Systems (LMS) may fall under this category [3].
4. Digital Technology is that all electrical gadgets and programs that use binary digital information fall under the category of digital technology. Teachers and learners use these digital tools and gadgets, which include computers, tablets, smartphones, digital projectors, and others, to access and exchange knowledge [4].
5. Digital Platform refers to a grouping of digital resources, such as content and services, that facilitate value-adding interactions between outside producers and consumers. This platform, in the context of education, is a system or application that has digital services and features built into it to make managing, delivering, and interacting with educational data and information easier [5].

In Ho Chi Minh City, Vietnam, cutting-edge technologies including blockchain [6], big data analytics [7], cloud computing [8], IoT [9], 5G wireless networks [10], and artificial intelligence [11, 12] are largely responsible for the digital transformation of a number of educational sectors.

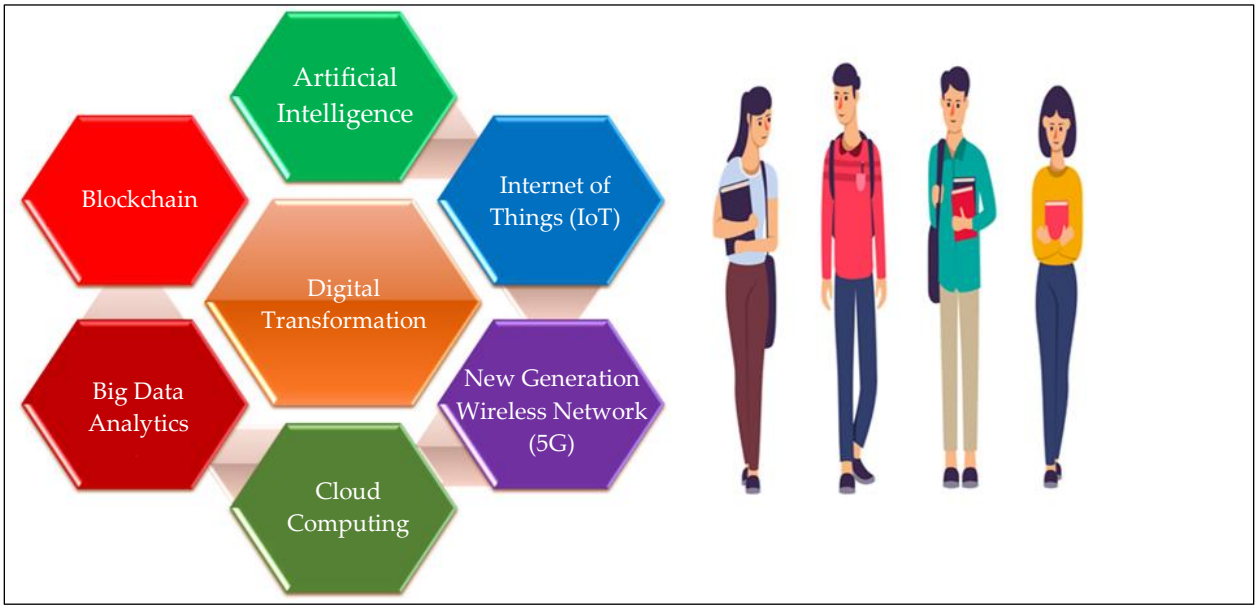

Fig. 1 Digital technologies in HEIs in HCM City

2. Digital Transformation in School Management and Instructional Organization in HEIs

2.1. Digital Transformation in Education

Digital transformation in education [13, 14], is a revolution with profound implications for the education systems worldwide. It is a process that leverages digital technology and its applications to enhance teaching and learning processes, as well as to create more modern and flexible learning environments. During the implementation of digital transformation in education [15-18], three important factors need to be carefully considered and evaluated: processes, entities, and people.

1. The process is at the core of every educational system. To successfully implement digital transformation, educational institutions need to adapt and optimize traditional educational processes. This includes considering how teaching and learning are organized, how data and resources are managed, and how learning performance is assessed and measured. Processes must be adapted to suit modern technology and learning objectives.
2. Entities include systems, infrastructure, and technological software. Educational institutions need to ensure that these entities are robust and efficient enough to support digital transformation in education. This may involve investing in digital infrastructure, developing learning applications and platforms, and ensuring smooth integration between different systems. Entities must be designed to meet the needs of teachers and learners in a digital learning environment.
3. People are the most important factor in the digital transformation of education. Both teachers and learners need to adapt to technology and learn how to use it to improve the learning process. This requires continuous training and support for teachers so that they can use technology effectively and create diverse learning experiences for learners. Learners also need to be guided and encouraged to use technology to develop critical thinking, creativity, and problem-solving skills.

Digital transformation is not simply the application of digital technology. However, more importantly, it is the transformation and change of mindset, approach, and application to create a business model and operating method that is more efficient, convenient, and groundbreaking than the old model. The digital transformation process affects not only businesses but also many other areas of society, including art, science, mass media, government, and education.

In summary, digital transformation in education is a complex process that requires focusing on processes, entities, and people. Only by carefully considering all three of these factors can educational institutions create an effective digital education model that brings real benefits to the learning community.

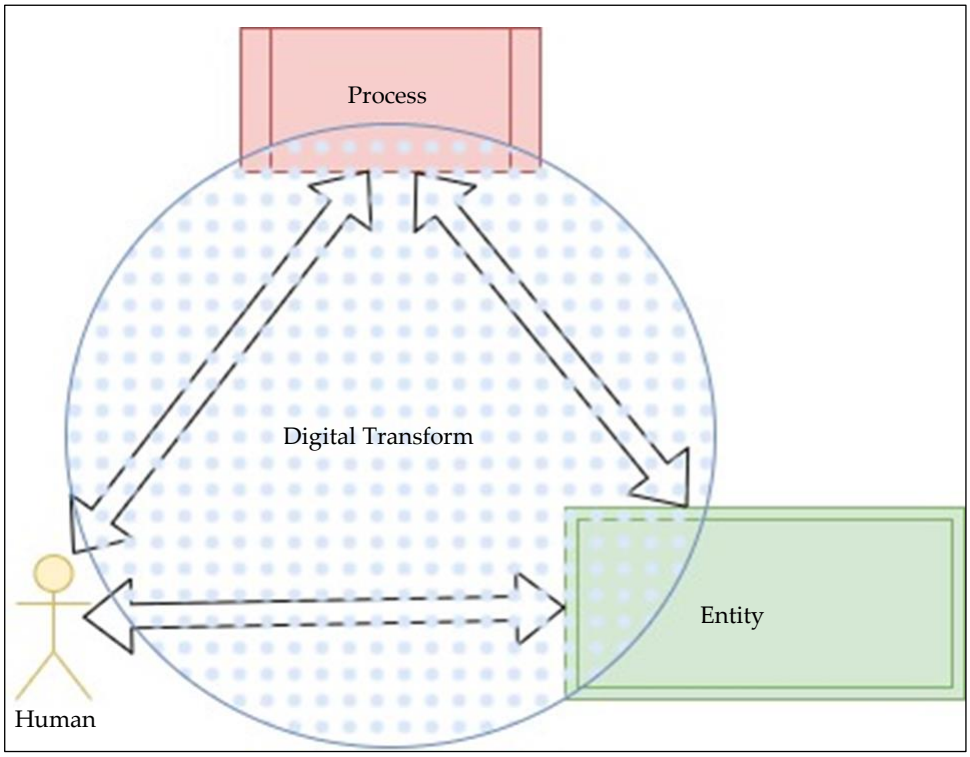

Fig. 2 Digital transformation in HCM HEIs

2.2. Digital Transformation in HCM HEIs Administration

Digital transformation in school administration is witnessing a comprehensive overhaul in the management and operation of educational systems. This necessitates a deep understanding of administration and the ability to utilize digital technology to optimize management processes and enhance the learning experience. Below are key areas of school administration crucial to digital transformation in the educational sector [19]:

1. In the organization of school development planning.
2. In the management of teaching and learning activities.
3. In school, human resource management.
4. In the organization and administration of the school.
5. In school financial management.
6. In the management of facilities, equipment and technology in teaching and learning for learners of the school.
7. In the management of school quality assurance activities.
8. In building a school brand.

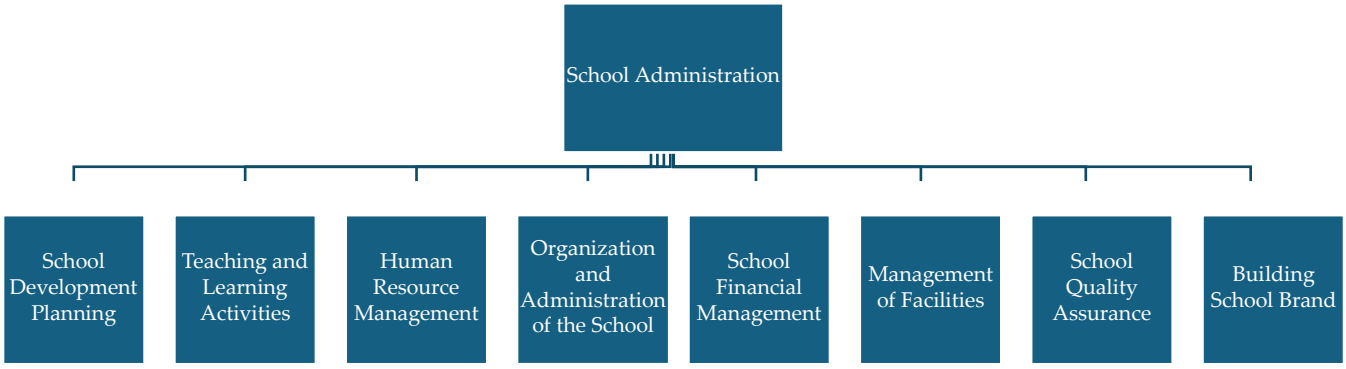

Fig. 3 The fields within school administration in HCM HEIs

2.3. Digital Transformation in HCM HEIs Teaching Activities

Digital transformation in teaching and learning activities is driving a significant change in the way teachers approach and deliver knowledge to learners. By integrating digital technology and educational applications into the teaching process, educational institutions are creating a more modern and diverse learning environment.

3. Digital Transformation Solutions in HCM HEIS

To effectively digitize schools, it is necessary to follow the following basic sequences [20, 21] :

1. Developing a digital transformation strategy in education is a crucial step to ensure effectiveness and success in integrating digital technology into the education system. Below are some orientations and suggestions for developing a digital transformation strategy:
   a. Identifying Digital Transformation Goals: To begin, it is essential to define specific objectives to be achieved through digital transformation clearly. This may include improving teaching quality, enhancing student engagement, increasing school management efficiency, and other objectives. Goals must be specific, measurable, and relevant to the specific needs of educational activities.
   b. Planning Implementation: After identifying the objectives, a detailed plan is needed on how to implement digital transformation. This plan should include specific steps, timelines, and necessary resources to achieve the identified goals. It should also have a specific schedule for implementing each phase.
   c. Identifying Budget and Resource Requirements: Digital transformation often requires investment in both budget and resources. It is necessary to identify available budget sources, including financial resources and information technology equipment. Additionally, it is essential to identify the necessary human

resources, including teachers, technology experts, and support staff.

2. Improving Information Technology infrastructure is a crucial part of digital transformation. Here are some guidelines:
   a. Modernizing hardware and network systems: Make sure the school's hardware and network systems are strong and adaptable enough to handle the incorporation of digital technologies. This could entail installing new hardware, maintaining consistent connectivity across the school, and updating the network infrastructure.
   b. Purchasing educational software and applications: Choosing and putting into practice appropriate educational software and applications to assist in the process of teaching and learning. Digital teaching tools, school management software, and online learning programs may fall under this category.
3. Training and developing human resources are crucial factors to ensure that everyone in the education system is prepared and confident in using digital technology.
   a. Training teachers and administrators in digital technology: Providing training courses and support related to digital technology so that teachers and administrators can understand and use technology effectively. This includes learning how to integrate technology into teaching and management.
   b. Encouraging creativity and change in teaching and management: Encouraging teachers and administrators to participate in the process of creativity and change in teaching and management by creating space for them to experiment and develop new ideas using digital technology.

This study proposes a digital transformation solution architecture for schools, as illustrated in Figure 4, and conducts a pilot implementation of this solution at several secondary schools in Ho Chi Minh City, Vietnam. Creating a digital transformation strategy is the first step in the Ho Chi Minh City secondary schools' digital transformation solution. After that, a coordinated transformation plan will be put into action, with an emphasis on the entities, people, and procedures that need to be digitalized in the field of education. The transformation strategy will influence the digital transformation's architecture. The digital transformation solution will be implemented through two iteration cycles, dubbed Macro and Micro.

Following the Blended Learning paradigm, the Macro DevOps cycle will identify and execute DT for necessary entities, customize business processes to fit with DT, and deploy DT training activities for humans. It will affect and bring about modifications to the DT solution architecture now in use at the institution. Ultimately, the DT system's operational procedures and technologies will be modified. The Micro PDCA (Plan-Do-Check-Act) process will execute the following steps:

1. Plan: Four steps must be followed for a school to transition toward a more digital setting successfully. To begin with, an evaluation needs to be carried out to determine how the school currently uses technology. The next step is to establish clear goals for the digital transformation while taking the school's particular needs and aspirations into account. A thorough plan is created with these objectives in mind, defining the precise steps, deadlines, and materials needed to accomplish them. In order to guarantee buy-in and alignment from the entire school community, all important stakeholders—teachers, students, parents, and administrators—are actively included in the planning process.
2. Do: The transformation process proceeds into the implementation phase after the strategy has been decided upon. This entails implementing the anticipated digital tools and technologies for education. Faculty and staff members receive training sessions to ensure successful adoption, giving them the knowledge and skills they need to use these new technologies and approaches. Furthermore, the new digital solutions are smoothly integrated with the current workflows and processes. It is crucial to communicate clearly and consistently during this implementation phase. Teachers, students, parents, and administrators are among the stakeholders who receive regular updates and information about changes and upgrades, along with the required assistance and guidance to ensure a smooth transition.

3. Check: The digital transformation process needs to be monitored and evaluated on a regular basis to stay on course. This entails tracking development throughout time in relation to predetermined benchmarks and criteria set during the planning stage. Getting input on the changes that have been put into place from all parties involved-teachers, students, parents, and administrators-provides insightful information. Ultimately, a thorough performance evaluation is carried out to determine how well the digital initiatives performed in reaching the intended goals. This makes it possible to pinpoint areas in need of development, guaranteeing that the school's digital transformation keeps up with the dynamic demands of the educational environment.
4. Act: After deployment, the process of digital transformation continues. There must be a constant cycle of improvement and adjustment. The strategy and plan are adjusted based on evaluation results to make sure they stay current and functional. In order to maximize their impact, effective methods and solutions are then chosen for scaling up and expanding to other parts of the school. Finally, a culture of ongoing learning is promoted in order to cement the shift. Future efforts make sure the school embraces ongoing digital transformation and adequately prepares students for a world driven by technology by incorporating lessons learnt from the evaluation process.

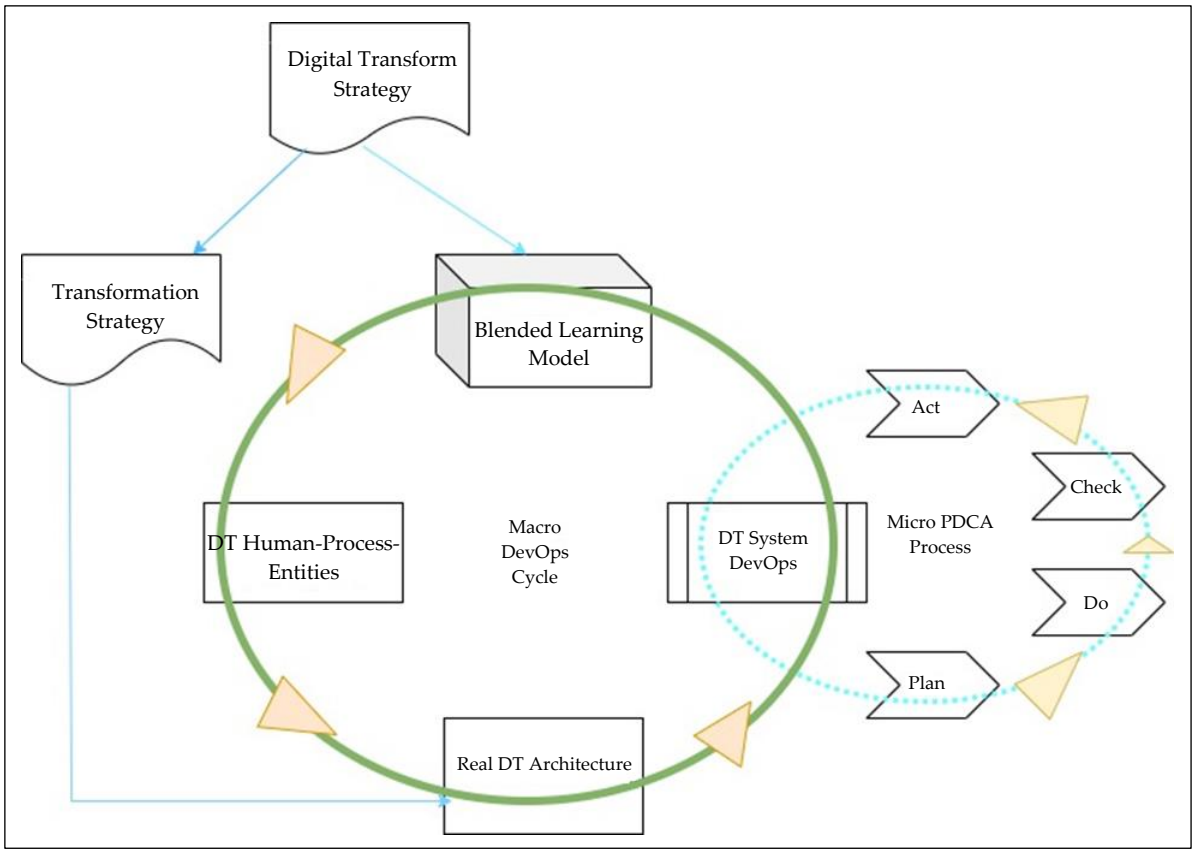

Fig. 4 DT solution architectures for HCM HEIS

4. Results and Discussion

The study conducted a survey of 200 learners after experiencing the proposed digital transformation system. The survey assessed on a five-point scale including: “Very poor”, “Poor”, “Average”, “Good”, and “Excellent”. The survey criteria included increased interaction, organized management of learning activities, and support for resolving queries. The results are presented in the following table:

Table 1. Survey results for digital transformation system evaluation

Rating	Increased Interaction	Organized Management of Learning Activities	Support for Resolving Queries
Excellent: 5	119	121	123
Good: 4	43	44	40
Average: 3	24	21	23
Poor: 2	7	7	6
Very poor: 1	7	7	8

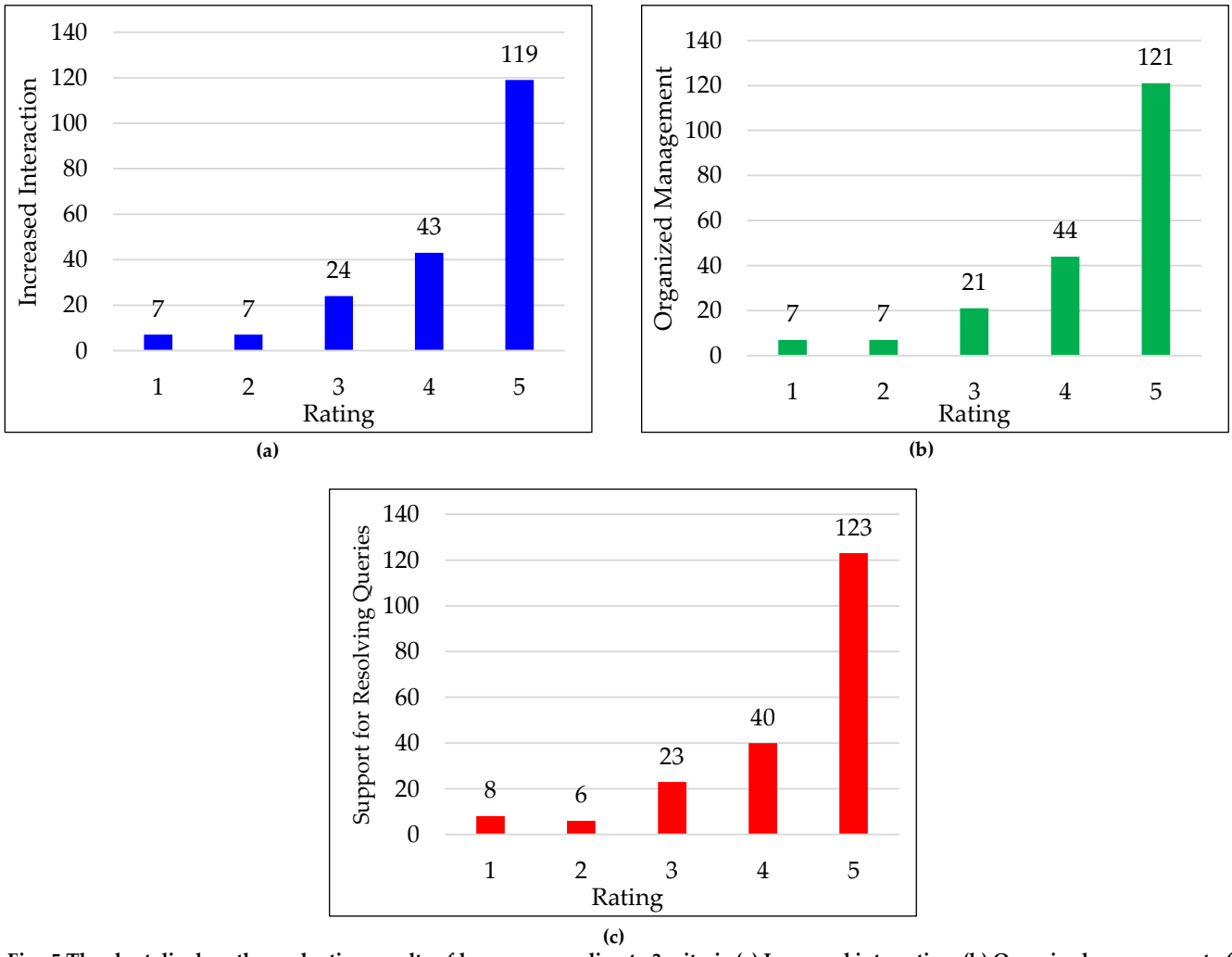

Fig. 5 The chart displays the evaluation results of learners according to 3 criteria (a) Increased interaction, (b) Organized management of learning activities, and (c) Support for resolving queries.

After 200 learners used the digital transformation system in multiple schools, the survey results are shown in Table 1. The number of learners who assigned a different quality rating to the system based on various criteria is indicated by each cell in the table. For instance, the interaction level of the system was assessed as "Excellent" (level 5) by 119 learners, as shown by cell 119 in the "Increased Interaction" row. Comparably, the cell 40 in the row labeled "Organized Management of Learning Activities" indicates that 40 learners gave the system's arrangement and oversight of the lessons a "Good" rating (level 4). The remaining figures show comparable

evaluations for several parameters, giving a general idea of how learners feel about the effectiveness and caliber of the digital transformation system in place. The average ratings from 200 learners for the three criteria of Increased Interaction, Organized Management of Learning Activities, and Support for Resolving Queries are 4.30, 4.33, and 4.32, respectively, indicating the feasibility of the proposed solution.

5. Conclusion

The processes, entities, and individuals involved in digital transformation in education have all been covered in this study. It also examined the digital transformation of teaching activities and eight areas of school administration, ranging from creating development goals to managing the school's reputation. The conference also suggested ways to implement digital transformation in education, including creating a strategy for change, enhancing the infrastructure of information technology, and investing in the training and development of human resources. This research has covered a number of significant facets of the digital transformation of education. It is more important than ever to integrate digital technology into classrooms in a world where technology is used more and more. However, school units require considerable thought and a clearly defined strategy in order to implement digital transformation successfully.

The process of digital transformation involves altering teaching and learning methods in addition to technology. In order to foster creativity and innovation in the teaching and administrative processes, schools must establish an engaging learning environment. Everybody involved needs to be committed to this and have a mentality and attitude shift. By giving the next generation of learners the knowledge and skills they need to thrive in the digital world, the digital transformation of education benefits both teachers and learners while also promoting sustainable social development.

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