



Digital Leadership in the Scope of Education

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Abstract. Leadership in the educational context space continues to experience a shift, especially in the era of the Industrial Revolution 4.0. As a leadership policy maker, the principal must be able to read the current developments of the times, one of which is by taking a digital leadership approach. This research uses a qualitative descriptive approach with the type of literature study research. The data is obtained from various sources such as national and international journals in accordance with the focus studied. Meanwhile, data analysis uses data reduction, display data, and conclusion. The results of this research digital leadership is a combination and collaboration between leaders, technology and resources. The digital leadership of school principals is an important key to facing today's era of technological disruption. Digital leadership can be realized if the principal continues to strive and provide opportunities for all school members to come into direct contact with digital technology. Formula 4C (Critical thinking, Creativity, Communication, Collaboration) is also one of the keys that needs to be applied to digital leadership in the educational environment. Digital leadership strategies can be carried out through transparent leadership in all aspects of schools, including openness to budgeting funds, procurement of infrastructure, as well as criticism and suggestions from various parties.

Keywords: Digital Leadership · Principal · Education

1 Introduction

Technological developments tend to have an impact on socioeconomic structures and systems [1]. This is based on the trend of global market development that has an impact on human lifestyles. The changes of time and times continue to shift, as well as the demands of human life [2]. Various human activities have experienced the development of digital technology, this not only has an impact on the economic field but penetrates the fields of education, science and technology (science and technology) [3]. For the world of education, the era of the industrial revolution 4.0 has become a challenge in itself so that it is necessary to carry out transformation to be able to adapt to the demands of the times [4]. The industrial revolution 4.0 is characterized by the existence of advanced artificial intelligence, supercomputers, genetic [5].

The current of development that occurs in the modern era requires humans to always reconstruct new things that can improve the quality of human life, so as to become

superior human beings and also be able to compete in the midst of the rampant currents of globalization. According to Kusvitaningrum, et al. [6]. In facing these developments and changes, the world must be able to see opportunities so as to produce quality human resources through education. Efforts made in improving the quality of education in order to achieve the vision, mission and goals of education in Indonesia, have actually been pursued and implemented optimally [7]. To improve the quality and competitiveness in the world of education, then if leadership is needed in this case, namely a principal who is professional, reliable and able to read all changes that occur. According to Yani, et al. [8] The principal as the highest stakeholder in education, is responsible for all activities and progress of education implementation in order to implement educational goals. To prepare students to face the future in the era of the industrial revolution 4.0, reliable school leaders are needed in building an effective learning ecosystem [9].

The principal is a person who plays an important role in the progress of the educational institution he leads [10]. This is because the task carried out is not easy. Leadership has duties and obligations and responsibilities morally and morally to its subordinates in carrying out the duties they lead [11]. The principal as an educational leader has a function in the implementation of all educational programs in the school [12]. In addition, the era of the industrial revolution 4.0 requires school principals to better master digital literacy [13] in order to be able to compete in the midst of increasingly high technology. In essence, leadership is a supporting element in the management process. Whether or not an institution is successful in carrying out what has been planned, certainly requires the support of school leaders. To continue to develop over time, it requires school leadership that is able to manage, organize and manage the institutions it leads by empowering all existing resources [14].

The leadership of the principal is an important factor that can influence the success or failure of an educational institution. As a leader in an educational institution, the principal has great duties and responsibilities [15]. Quality leadership will certainly have a positive influence, so it can be concluded that leadership is the key to the success of an organization in achieving goals [16]. The results of the research conducted showed that there was a direct positive influence of leadership on teacher performance although not directly on school and student outcomes [17, 18]. Other research proves that digital leadership contributes to teaching and learning outcomes and school control. Other findings suggest that with the ability to plan and organize programs, digital leadership can help improve students' academic performance [19].

According to Sheninger [20] A digital leader in school education must have several skills including: communication, public relations, branding, student engagement, professional development, innovative learning spaces and environments, and opportunities.

Leadership is intended to be able to be a catalyst for changes that occur in the midst of globalization. Each has an important role to play in ensuring a positive school culture. Leaders can begin to transform and transform their schools into schools that prepare learners with essential digital age skills while engaging multiple stakeholders. Digital leadership begins by identifying barriers to change and specific solutions to overcome them to transform schools in the digital age.

2 Methods

This research uses a qualitative descriptive approach with the type of literature study research. The data collection method in this study is a literature study. The data used are secondary data obtained from textbooks, journals, scientific articles, and literature reviews in accordance with the focus or topic to be discussed in this study. Literature review is used to study the results of previous research both from journals and in the form of books that are in accordance with the focus studied [21]. Data analysis using the model from Miles, M & Huberman, M (1984) namely data reduction, data display, and conclusion. To get maximum results, the researchers tried to collect various data from various credible and accountable reference sources, so the researchers took reference sources from the last 10 years.

3 Result and Discussion

The discussion about the definition of digital leadership is more commonly found in the world of business management, because digital leadership is more likely to be applied to the business sector. Various terms have emerged to describe leadership in this field, such as electronic leadership, EdTech leadership, ICT leadership, technology leadership, virtual leadership, digital leadership to online leadership [23]. According to Yusof, et al. [24] digital leadership is the integration of digital technologies such as mobile devices, communication applications, and web applications in school leadership practices towards continuous change in the use of technology in schools. Another definition explains that digital leadership is defined as leadership that can determine direction, influence others, initiate sustainable change through access to information, and build relationships to anticipate changes that occur for the success of schools in the future [25, 26]. So in short, digital leadership is a combination of a leader, technology and also resources.

Various organizations lately have switched to digital technology, digital technology has brought significant changes in the environment and the competitive role of the organization, this change is necessary in many dimensions of the organization such as role, work culture, and technology [27]. The role of digitalization is very important for every organization and society [25] especially for education. The principal's digital leadership is identified with the use of technology-based digitalization in carrying out various activities that support the progress of the school. There are three main emphasises in digital education leadership, namely: 1) the effective application of digital technology, 2) critical reflection on technology, 3) the ability to take into account actions related to the use of digital technology, which can inherently affect the school transformation process [26, 28].

Principals who want to actualize digital leadership if necessary wisely take advantage of the space and opportunities to bring about changes to school culture, thus bringing a positive impact on the education system in the IR 4.0 era [19]. Of course, this requires a dynamic combination of mindsets, behaviors, and skills used to change and improve school culture through the help of technology [29]. Digital leadership refers to the use and application of modern technology platforms, so this is in accordance with the leadership approach in the digital age. Of course, in this case, a digital leadership needs a high level

of innovation [30]. Digital leaders in the industrial era 4.0 have a big role in developing the organizations they lead, this is as Wulandari, et al. argue [31] that the ideal leadership in the digital era 4.0 is leadership that is able to keep up with the demands of change that arise in the era of revolution 4.0. Leaders in the digital era 4.0 must have skills in influencing, encouraging, managing, and moving others to keep going and developing.

In principle, digital leadership in education refers to the integration of the use of technology in every school activity activity, so it can be ascertained that digital leadership plays a key role in integrating technology into the educational process in accordance with the demands of the industrial revolution 4.0. According to Hamzah [32] Leaders in educational institutions must know how to manage human and other resources by maintaining communication and interacting in a variety of roles and situations to achieve the right technological goals in the organization.

The era of the industrial revolution 4.0 and globalization is a phenomenon that causes major changes in human life. The seemingly obvious change is marked by the emergence of digital technologies that are starting to be used by people in everyday life. The existence of digital technology can provide convenience for humans so that it is currently starting to be used in various sectors of work. According to Astuti & Nurmawati [33] the existence of digital technology promises speed so that jobs can be completed quickly. In response to this, now the field of education is also slowly starting to apply digital technology both in activities related to learning and outside of learning activities in schools. The goal is none other than to improve the quality of education in each school unit.

The use of digital technology related to learning is basically to make it easier for teachers to be more innovative and creative in compiling and organizing learning so as to create new nuances for students who follow it. Teachers are professional educators who must be adaptive to changes in learning in the current technological era, the hope is that with the help of digital technology teachers can use more economical and efficient equipment, especially in making creations and variations of learning media [34]. Learning that was originally more conventional in nature which was only focused on modules, now with the existence of digital technology, it is hoped that teachers will be more creative in determining learning models in the classroom this way the quality of learning is always considered by teachers. The expression corresponds to research conducted by Nugroho [35] that the role of teachers with the existence of technology is now as a conveyor of knowledge, as a source of information and as a facilitator of learning where what was originally more controlling is now becoming more alternative to students in participating in learning.

According to Triyono & Febriani [36] in his research, he stated that the existence of digital technology in addition to helping in the learning process is also useful in helping the process of counseling guidance services in schools. The use of varied and innovative media and service methods has an impact on the absorption of students in the counseling process. On the other hand, digital technology also has an impact on librarians, especially for managing the quality of school library services [37]. Based on the previous description, it has been briefly described about examples of the use of digital technology in terms of their importance in schools. Each education unit will continue to compete to show its existence through the quality and quality of schools offered to the

community. Quality schools are not judged by how many programs are offered but rather by principals who are skilled at seizing opportunities to bring change to the organization they lead. As in the current era, a leader who is able to transform all members is needed to know and be able to use digital technology. The reason is that the digital leadership of the principal is needed to change the school culture so that the quality of education can be improved.

In relation to the quality of education, the digital leadership of school principals is an important key to face the current era of technological disruption. Before that, the principal must at least meet the characteristics of digital leadership including digital business characteristics, social attitude characteristics, characteristics general mindset [38, 39]. The first point related to the characteristics of digital leadership explains that the principal not only emphasizes innovative visionary but also must have networking intelligence and digital talent scout capabilities. Furthermore, the second point explains that a digital leader must provide motivation and become a role model for its members. The last point explains that a digital leader must be able to make strategic transformations and have the ability to learn by errors, knowledge oriented, and life long learner. If the principal can meet the characteristics mentioned earlier, then digital leadership can at least be applied in every educational unit, especially in improving quality. The reason is, the principal's digital leadership can help improve the pedagogical competence of teachers where the principal will later become a role model and provide direction and guidance both digitally and directly related to the use of technology [40].

Digital leadership can be realized if the principal continues to strive and provide opportunities for all school members to come into direct contact with digital technology. Nugroho [35] states that there are three things that need to be considered related to digital leadership to improve the quality of education, including students and teachers have access to digital technology and the internet, the existence of quality materials, and teachers have the knowledge and skills to operate digital technology. The development of the times will continue so that each education unit competes to prepare skilled human resources and is ready to compete globally. So it is the responsibility of the principal to prepare himself, especially to answer future challenges, especially in the field of education. It is possible that all activities related to learning and school management will fully implement digital technology. Therefore, it is necessary to have a strategy that can be applied by the principal to make digital leadership a success, including improving the quality of infrastructure and human resources, especially digital competencies, principals who are open and responsive to change, and are process and result-oriented.

Implementing a digital leadership system in the field of education is relevant, especially in today's era. The transformation carried out by leaders in educational institutions should be carried out entirely on the use of technology in various substances of management and management. In this case, a school principal needs to implement various strategies in implementing leadership in the era of the industrial revolution 4.0. Several studies describing various digital leadership strategies within the scope of education are listed in Table 1.

Based on the Table 1, various strategies can be carried out by a leader in implementing digital leadership in the scope of education. Learning needs to be focused on the needs of learners [41]. Some of the factors to consider in digital leadership include: 1) knowing

Table 1. Digital Leadership Strategy in Education Scope

No	Strategy	Reference
1.	is more Less Support from the top Learner-centered Leaders as teachers Learning partnerships What gets measured gets done	[41]
2.	Improving the quality of human resources in the fields of Technology, Information, Communication Open mind leadership Readiness to face the unexpected Quick reaction to change Result oriented Application of the formula 4C: Critical thinking, creativity, Communication, Collaboration	[42]
3.	Measure the level of readiness Task-oriented Delegation	[1]
4.	Quality improvement in the field of Technology, Information, Communication Openness to developments Quick reaction about changes Process and result oriented Mastering formulas 4C: Critical thinking, Creativity, Communication, Collaboration	[43]
5.	Visionaries Designer Influencer Motivator Trendsetter	[44]

the level of experience and its role in the organization; 2) determine a leader's time that may be used for training and development; 3) define specific learning objectives based on organizational goals, then select digital assets that align with those goals. In addition, measuring every development effort on digital learning is important to ensure that it is effective and meaningful. In this case, the evaluation that needs to be considered is on the aspect of learning initiatives and aspects of student engagement.

Digital leadership strategies can be carried out through transparent leadership in all aspects of schools, including openness to budgeting funds, procurement of infrastructure, as well as criticism and suggestions from various parties. In addition, a principal needs to have the readiness to adapt to any adjustments as an effort to improve the quality of the institution. In this case, the principal must increase sensitivity to existing information and updates. These strategies should be carried out based on accurate and relevant data,

which has been professionally analyzed so that it can be properly accounted for in accordance with the goals to be achieved [42].

Strategies related to the level of readiness were also conveyed by Farunik [1] Through his research that focuses on situational leadership styles, strategies that can be carried out in the application of digital leadership are by measuring the level of readiness of leaders and members in carrying out tasks or responsibilities in the organization. A leader also needs to delegate members who have a high level of readiness in the performance of certain tasks to help other members who are perceived to have a lower level of readiness.

In addition, the 4C formula (Critical thinking, Creativity, Communication, Collaboration) is also one of the strategies that needs to be applied to digital leadership in the educational environment. A leader in the industrial era 4.0 must have a 4C formula in carrying out his duties [45]. Based on this formula, a principal must have the ability to think critically so that he is always ready to find solutions to the problems at hand. In addition, as the highest top holder of the organization, the principal is also expected to be more communicative in explaining information so that it is easily understood by its members. In terms of creativity, a leader is required to be able to create new innovations that can keep up with the times. In the end, to implement these three formulas, the principal must be able to interact and cooperate with any stakeholder who can help improve the quality of the institution. The ability to collaborate is needed from a leader to make it easier to achieve common goals.

The ideal digital leadership is leadership that follows the industrial revolution 4.0 [44]. The school's leadership strategy in the digital age is that in addition to being a leader capable of using technology, he must also be a visionary, designer, influencer, supporter, and trendsetter for those around him. A leader must be able to recognize the opportunities and potentials that exist by identifying problems that exist in his institution. Leaders who monitor technological advances must be able to motivate, guide, and organize others in the implementation and growth of education and teaching in the digital age. In this case, a principal must be able to be a role model for teachers as demonstrated by the ability to use new technologies. With proper planning, digital leadership strategies can offer ways that can support principals in improving the quality of education in the institutions they lead.

4 Conclusion

Generally, digital leadership is found in the scope of business management, because digital leadership is more likely to be applied to the business sector. Various terms describing digital leadership have also been found in various literature, this illustrates that these terms are developing so quickly in accordance with the development of the industry. Digital leadership has also begun to be adopted into the world of education, where the principal is the spearhead in this regard. The principal's digital leadership is identified with the use of technology-based digitalization in carrying out various activities that support the progress of the school.

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