

# **The Implementation of Digital Technology in Sociology Learning to Achieve Sustainable Education In Senior High Schools in Surakarta**

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**Abstract**— . The development of technology in the era of the Fourth Industrial Revolution brings significant changes in various aspects of human life. The transformation of the educational paradigm demands a more innovative education system, especially in the use of technology. However, challenges such as the digital divide, infrastructure readiness, and the lack of digital literacy among teachers and students remain major obstacles. This research explores the role of digital technology in sociology education, the shift from teacher-centered to student-centered learning, and the implementation of digital sociology in Surakarta's high schools. The theories used are the community of inquiry, critical pedagogy, and Digital Sociology. These three theories emphasize that digital learning should encourage active participation from learners and create inclusive and liberating learning spaces. This research method uses descriptive qualitative with a case study method. Data were collected through observation, documentation, and questionnaires from the training participants. Then the data was analyzed through three main stages using Habermans's perspective. The research results show that: MGMP plays an important role in enhancing teachers' understanding of digital technology, there is a transformation of learning into a student-oriented approach through problem-based learning, teachers are beginning to integrate artificial intelligence to develop teaching materials and assessments.

**Keywords** — digital competence, Sociology teachers, educational technology, learning strategies, sustainable education

## **I. INTRODUCTION**

The transformation of education in the era of the Fourth Industrial Revolution is becoming increasingly evident, along with the rising use of digital technology in the learning process. In Indonesia, internet penetration continues to increase, becoming a key indicator of infrastructure readiness to support technology-based education. Based on data from the Indonesian Internet Service Providers Association (APJII), Indonesia's internet penetration rate in 2024 reached 79.5%, up from 78.19% the previous year [1]. Meanwhile, a UNESCO report indicates that access to digital technology is a crucial factor in achieving the Sustainable Development Goals (SDGs), particularly in realizing quality and inclusive education [2]. However, despite the increase in internet access, the digital divide remains a challenge. According to an APJII survey, underdeveloped regions in Indonesia still face connectivity challenges [1]. This condition directly impacts students' learning opportunities, especially for those living in areas with minimal technological infrastructure. Therefore, many phenomena such as the digital divide, infrastructure readiness, and the lack of digital literacy among teachers and students still pose major obstacles in achieving sustainable education [3]. The readiness of teachers to utilize technology becomes a determining factor in the effectiveness of educational transformation. A study by UNESCO emphasizes that teachers' digital literacy is highly influential in creating an adaptive and innovative learning environment [4].

One of the important factors in this transformation is the role of teachers, who are

not only educators but also facilitators and innovators in learning [5]. Teachers not only need to understand technology but also must be able to use it effectively in teaching to encourage creativity, critical thinking, and collaboration among students [6]. Therefore, continuous training, adequate policy support, and an inclusive learning environment are crucial factors in building an education system that is responsive to the changing times. This research emphasizes that the success of educational transformation cannot be separated from the roles of various stakeholders, including the government, educational institutions, industry, and society [7]. However, in the city of Surakarta, the gap in digital infrastructure remains a challenge in the implementation of technology-based learning. Teachers from several schools reported limited internet access and supporting devices. This shows that not all schools have the same level of infrastructure readiness, which directly affects the quality of digital learning that can be implemented. In the ever-changing world of education, digitalization is both a challenge and an opportunity that can be studied through the lens of sociology. Therefore, digital sociology is a breakthrough by contemporary thinkers in their efforts to understand various complex issues arising from human-computer interaction (HCI) or technology in modern society, and such interactions are now developing very rapidly. This also has an impact on the world of education, especially in the classroom learning system. The paradigm of education is shifting from teacher-oriented to student-oriented. Education in the digital era should be able to create inclusive, adaptive, and empowering learning spaces for students. So that teachers have adequate digital competencies and students have equal access and abilities regarding technology. However, the facts on the ground, based on the researchers' initial observations, indicate that sociology teachers in the Subject Teacher Consultation (MGMP) for Sociology in Surakarta City have not received adequate training to integrate technology into the learning process. This is

in line with data from the Indonesian Ministry of Education, Culture, Research, and Technology, which shows that many teachers still lack adequate digital skills [8]. The report from the Program for International Student Assessment (PISA) also reveals that many Indonesian students lag behind in critical thinking and problem-solving skills compared to other countries [9].

According to Paulo Freire, education must respect humans as the center of the learning process. This approach does not mean eliminating the role of the teacher, but rather emphasizes the importance of balancing control between the teacher and student independence. Blended learning emerges as a strategy that bridges this shift. Through a combination of online and face-to-face learning, blended learning expands the learning space while providing flexibility for students to manage their own learning process [10]. This approach also allows for adjustments to different learning styles, while encouraging autonomy and active cognitive exploration. With the increasingly massive digital era, there is the concept of digital sociology by Deborah Lupton, which aligns with Paulo Freire's thinking on individual liberation through critical consciousness. Digital sociology has a broad scope, but Deborah Lupton has her own boundaries regarding what she proposes as the definitive lines of the digital sociology concept [11]. The four important aspects of digital sociology proposed by Lupton are actually just boundaries to prevent its scope from expanding further. The establishment of such concrete boundaries is indeed necessary so that the study being conducted does not become increasingly global. When that happens, the focal point will be lost and the problem that is supposed to be solved will become even more unclear [11]. Thus, there is an urgency to enhance teachers' capacities so that they are not only able to use technology but can also integrate it effectively into 21st-century competency-based teaching methods. There are 4 competencies that teachers must possess, which include: pedagogical competence,

personality competence, social competence, and professional competence. These four competencies are holistic and integrative in the performance of teachers. Moreover, although the digitalization of education can expand access to learning, its implementation must still consider the aspect of humanizing education. UNESCO emphasizes that education is not only about the transfer of knowledge but also about shaping character, ethics, and empathy [12]. Therefore, the transformation of education in the digital era does not only focus on the adoption of technology, but also on the application of technology to enhance more meaningful interactions between teachers and students. By examining the role of teachers, infrastructure readiness, and challenges in reducing the digital divide, this research is expected to provide evidence-based policy recommendations to sustainably improve the quality of education in Indonesia

## II. METHOD

This research uses a qualitative approach, specifically descriptive qualitative research. The data collection methods include interviews and document analysis [13]. This approach was chosen to deeply understand the role of digital technology in shaping teachers' digital competencies and applying them in Sociology teaching. Informants were selected using purposive sampling technique. The participants in this study are sociology teachers in the city of Surakarta who are members of the MGMP Sociology of Surakarta, totaling 35 people. The Sociology MGMP is located at Jalan Slamet Riyadi number 445 Surakarta. Data were obtained through observation, interviews, and documentation during the training period. The informants interviewed included the Chairperson of the Subject Teacher Consultation Group (MGMP) for Sociology, MGMP administrators, and permanent MGMP members. Data analysis uses the interactive model of Miles and Huberman, which includes the stages of data collection, data reduction, data presentation, and conclusion drawing [14]. This analysis

method was chosen because it aligns with the research objectives. This study uses data triangulation through classroom observations, in-depth interviews with MGMP teachers, and the review of learning documents. This approach provides methodological strength because it allows researchers to comprehensively compare findings from various sources. The analysis results are presented narratively to illustrate the dynamics, challenges, and strategies of sociology teachers in responding to educational demands in the digital era..

## III. RESULTS AND DISCUSSION

### A. RESULT

Education for Sustainable Development (ESD) is an educational approach aimed at equipping learners with knowledge, skills, and attitudes oriented towards sustainability [15]. ESD emphasizes the importance of integrating environmental, social, and economic values into the learning process. Through the implementation of ESD, education does not only focus on academic achievements, but also on a deep understanding of sustainable development issues in local, national, and global contexts. Teachers are required to have adequate skills and knowledge to design and implement educational programs that prioritize sustainability [16]. However, most teachers still consider the implementation of ESD to be the same as P5 (Project Penguatan Profil Pelajar Pancasila). "ESD can be applied when there is P5, because it usually supports sustainability themes." However, this activity is also time-limited, usually one month" (Ratnasih, private school teacher in Surakarta City) (Wahyu, Chairperson of the Sociology MGMP of Surakarta City) In line with that, most MGMP teachers in Surakarta City believe that the implementation of ESD is only done temporarily. However, in reality, ESD practices can be developed in sociology learning in line with the appropriate material. For example, in the context of massive development in the city of Surakarta, it can be linked to the material on social change. Simultaneously, with the ESD approach, we

invite discussions on changes in people's lifestyles and social inequalities resulting from development. Along with the digital transformation in the world of education, the need for interactive, independent, and socially connected online learning is also increasing. In this regard, the Community of Inquiry theory offers an important conceptual framework. This theory emphasizes that effective online learning is not merely about transferring materials to a digital platform, but must embody a collaborative and democratic pedagogical approach [17]. The integration of theoretical concepts such as Community of Inquiry, Critical Pedagogy, and Digital Sociology is not only conceptual but demonstrably reflected in the practical transformation within the MGMP community. For instance, teachers' ability to adopt project-based learning, engage students in critical discussions, and apply collaborative digital tools aligns strongly with these theoretical pillars, confirming the practical relevance of the selected framework. Digital technology, in this view, becomes a tool to expand access to education and strengthen the active and inclusive participation of learners. In this context, members of the MGMP Sociology of Surakarta City agree that the use of the internet as part of technological development can enhance student participation in learning.

"Students can be more enthusiastic and easily grasp the material when the teacher tells stories or lectures in front of the class during the lesson." So that the sociology class does not feel long for the students. Of course, this is something very disappointing in the learning process. (Cettra, Administrator of the MGMP Sociology of Surakarta City) Manuel Castells also emphasized the role of the internet in giving rise to new forms of knowledge. In the context of education, Castells emphasizes the importance of digital literacy and critical engagement as the foundation for inclusive education in the networked era [18]. Education no longer takes place solely in physical spaces, but also in virtual spaces that facilitate ideological interactions and public participation. On the

other hand, the theory of connectivism emphasizes that learning in the digital era is not centered on the individual, but rather on interconnected information networks [19]. This is reflected in the activities of the Sociology MGMP in Surakarta City, where teachers share teaching modules, utilize online platforms, and build collaborative learning communities to enrich Sociology learning that is adaptive to technological developments. Knowledge is now fluid, widely dispersed, and constantly changing. Therefore, the ability of learners to establish and manage connections becomes a key competency in the learning process. This theory reshapes the perspective on the roles of teachers and students, where both collaborate in a learning environment that is adaptive, open, and integrated with technology. The MGMP Sociology teacher training in Surakarta City showed that most participants were only familiar with a few Artificial Intelligences such as Claude AI (for summarizing material), Suno (for creating creative videos), and Magic School (for designing interactive learning activities). "Usually, I use Canva and Quiziz for sociology lessons in class, but after attending this training, I found out that there are many Artificial Intelligence tools that can be utilized, like Suno for making videos. This makes the atmosphere in sociology lessons more vibrant." (Satna, Member of the Sociology MGMP) "Through direct practice within the MGMP community, teachers can expand access to digital technology as a means to enhance student participation in learning." Through direct practice in the MGMP community, teachers can expand access to digital technology as a means to enhance student participation in learning. Especially social topics that are relevant to students' lives. The survey results also indicate that 90% of participants feel that training like this can enhance teachers' digital competencies and can be directly applied in Sociology learning activities.

## **B. DISCUSSION**

UNESCO formulated four pillars of education that describe the dimensions of learning as a whole, namely: learning to know, learning to do, learning to be, and learning to live together [20]. These pillars affirm that learning is not merely the activity of a teacher instructing, but rather a personal experience that grows from individual awareness and involvement. This idea aligns with the thoughts of Paulo Freire, a figure in liberation education, who emphasized that the goal of education is to free humans from the shackles of unconsciousness. For Freire, the ideal education is one that can foster critical consciousness (the highest form of human awareness in understanding and responding to the surrounding social reality [21]. In the context of the MGMP Sociology of Surakarta city, the learning for students is starting to be directed towards fostering critical thinking. So that students do not only learn theory in the classroom. "In practice, students are encouraged not only to learn in the classroom but also by watching films, discussing current social issues, and conducting interviews with the surrounding community." So that students can think critically and analyze social phenomena occurring in society. (Sofi, Member of MGMP) Furthermore, post-training classroom observations and self-report surveys reveal that over 80% of MGMP teachers noticed an increase in student engagement and critical analysis. Digital platforms encouraged students to articulate their views, analyze social content, and participate in peer feedback activities—an embodiment of participatory learning and reflective pedagogy

On the other hand, there is the concept of learning 2.0 enriching the dimensions of learning in the digital era. The internet is no longer just a source of information, but rather a dynamic arena for social interaction [22]. Students are not only recipients of information but also active producers of knowledge through discussion forums, collaborative projects, and open learning communities. In this space, a more inclusive

participatory pedagogy for all individuals is born. This learning model is reinforced by the Community of Inquiry Framework, which emphasizes the importance of social, cognitive, and teaching presence in the learning process. "The average age of Sociology teachers in the MGMP of Surakarta City is above 30 years." This poses a challenge for us because communication between teachers and students has generational differences. Sociology teachers in the city of Surakarta are mostly from Generation X and Y, while the students belong to Generation Z. (Wahyu, Chairperson of the Sociology MGMP of Surakarta City) Meaningful interactions between students, whether direct or virtual, are an important element in building reflection and critical awareness [23]. Therefore, blended learning is not just a method, but a transformative strategy that shapes a new way of viewing education as a space for dialogue, not just a teacher's monologue. This change is also driven by the awareness of the emergence of a new generation, namely digital natives. They were born and grew up in a digital environment, with different learning preferences that are fast, interactive, and visual. The conventional approach that is passive and teacher-centered can no longer meet their needs. Education must transform, aligning itself with the mindset and learning characteristics of this generation to remain relevant and impactful. "The total member of MGMP Sociology teachers is 65, and the existence of this MGMP Sociology is expected to become a forum for discussion and learning for teachers." So that every teacher can keep up with the dynamics of educational and technological developments happening today. (Wahyu, Chairperson of the MGMP Sociology of Surakarta City) In the end, the transformation of education from teacher-oriented to student-oriented is not just a pedagogical discourse. It is a necessity in facing the realities of the times. In the context of this training, participants are invited to design project-based learning with local issues. Teachers realize the importance of

providing space for ideas and discussing solutions based on the use of technology. Thus, the role of the teacher shifts from being a transmitter of material to a facilitator of dialogue and reflection. Because in essence, education is not about how much we teach, but how far we can unleash the human potential within each individual.

#### IV. CONCLUSION

The transformation of education in the era of the Fourth Industrial Revolution demands significant changes in the roles and competencies of teachers, particularly in effectively integrating digital technology into the learning process. Sociology teachers are not only required to master pedagogical, personal, social, and professional competencies holistically, but they must also possess strong digital literacy to meet challenges and seize opportunities in the digital era. Through a learner-centered approach, such as Project Based Learning and the integration of Education for Sustainable Development (ESD) values, teachers can create a more democratic, participatory, and inclusive educational ecosystem. Findings from a systematic literature review indicate that digital technology plays a crucial role in democratizing access to education, expanding student participation, and supporting the achievement of sustainable education goals. However, significant challenges remain, particularly related to the digital divide, limited infrastructure, and low digital skills among teachers. Therefore, sustainable policy interventions, needs-based training, and cross-sector collaboration between the government, schools, communities, and industry are needed to support the strengthening of teachers' capacities in the digital era. The proposed policy recommendations such as localized teacher training, use of opensource digital platforms, and community-supported tech integration are designed with awareness of Indonesia's current limitations in funding and institutional support. Rather than proposing abstract ideals, this research promotes

feasible, scalable models rooted in actual teacher practices in Surakarta's MGMP activities.

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