Information and Communication Technology-Based Learning Management at SMA Muhammadiyah 2 Medan

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Abstract

Information and Communication Technology (ICT)-based learning management aims to improve the efficiency of the teaching and learning process in schools by using digital devices that facilitate classroom activities. This study aims to describe (1) the methods of implementing ICT-based learning management at SMA Muhammadiyah 2 Medan, (2) the effectiveness of ICT use in improving learning quality, and (3) the challenges and obstacles encountered in its implementation. This study employs a qualitative approach with a case study design. Data collection techniques include semi-structured interviews, direct observation, and document analysis. Data analysis is conducted thematically to group information based on relevant patterns of findings. The results indicate that teachers utilise various digital platforms to access materials and assignments and integrate game elements such as Quizizz and Kahoot to enhance student engagement. Learning is also supplemented with video media and discussion activities to reinforce understanding. Findings also indicate that students are more enthusiastic and active when learning using technology. However, the main challenges faced include limited access to devices, unstable internet connections, and distractions caused by the use of digital devices. Despite this, using ICT has proven to enrich the learning experience, encourage student participation, and improve the overall quality of learning.
Keywords: Management; Learning; ICT.

Introduction

The development of information and communication technology (ICT) has brought significant changes to various aspects of life, including the world of education. Today's students are growing up in a digital ecosystem filled with devices such as smartphones and tablets and digital applications such as social media, educational videos, and educational games. This phenomenon requires educators to shift from conventional approaches to more adaptive ones that cater to the characteristics of digital native students.[1]

The use of ICT in learning is no longer merely a supplement but has become an integral part of the teaching and learning process. Various digital learning resources, such as educational apps, instructional videos, and interactive games, offer new alternatives to enhance student motivation and engagement. ICT-based learning management becomes crucial in this context as it creates more collaborative, interactive, and geographically transcendent learning experiences.

Previous research has provided an overview of how ICT can support cross-cultural collaborative learning and expand access to learning resources. However, some studies have only focused on theoretical concepts, while others have examined the implementation domain. These are very limited to local cases and are difficult to generalise. ICT-based learning management at the secondary school level, particularly in private educational institutions, has different characteristics and resources from public schools or higher education institutions.[2]

Furthermore, most previous studies have focused on aspects of technology use or user perceptions, with few comprehensively examining how learning management, including planning, implementation, and evaluation, is systematically designed based on ICT in the context of specific educational units. This research is where the novelty lies: it focuses on concrete managerial practices in managing ICT-based learning at SMA Muhammadiyah 2 Medan, a private school that has significantly integrated digital infrastructure into its learning system.

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[1] (Syaifudin, Mokhamad. *Integrasi Teknologi Dalam Pembelajaran Di Kelas*. Surabaya: Kanzun Books, 2021.

[2] Tyler, Mark, Linda De George-Walker, and Veronika Simic. "Motivation Matters: Older Adults and Information Communication Technologies." *Studies in the Education of Adults* 52, no. 2 (2020): 175–94. https://doi.org/10.1080/02660830.2020.1731058.

This study also reflects the importance of strengthening the theoretical framework. For example, Siemens' connectivism theory, which emphasises the importance of digital networks in the learning process, is relevant for explaining how students build understanding through information connectivity. On the other hand, cognitivist theory emphasises internal processes in information processing, which form the basis for designing digital learning media that aligns with students' cognitive capacities.[3]

Rukajat's learning management theory, which includes planning, organising, directing, and evaluating learning, will be used as the main framework. Although this theory is general, this study adopts it more contextually in ICT-based learning management by highlighting how each element in the management cycle is adapted in a digital learning environment. Therefore, this approach adds value to Rukajat's theory, which has not been extensively explored in the context of learning digitalisation in secondary schools.[4]

Based on initial observations, SMA Muhammadiyah 2 Medan has demonstrated readiness regarding infrastructure, human resources, learning systems, and external collaboration to support implementing ICT-based learning. Some initiatives that have been implemented include the availability of a computer laboratory with 50 computers, learning support facilities in the classroom such as projectors, speakers, and televisions, and training for teachers in the use of digital learning media.

Considering this background, this study aims to identify and analyse ICT-based learning management at SMA Muhammadiyah 2 Medan, including its effectiveness in improving learning quality and the challenges faced during the implementation process. The results of this study are expected to contribute to developing an applicable and contextual digital learning management model, particularly at the secondary school level.

Methodology

This study uses a qualitative approach with a case study conducted at SMA Muhammadiyah 2 Medan. This approach was chosen because it provides an in-depth description of how Information and Communication Technology (ICT)-based learning is

[3] Putri, Kinkin Yuliaty Subarsa dan Elisabeth Nugraheni p. *Literasi Media Pembelajaran Inovatif*. Depok: PT Raja Grafindo Persada, 2020.
[4] Rukajat, Ajat. *Manajemen Pembelajaran*. Yogyakarta: Deepublish, 2018.

implemented in schools, ranging from the role of teachers and student involvement to its impact on overall learning quality.

Participants in this study were selected purposively, namely, those actively involved in ICT-based learning processes. Twelve participants were involved: four teachers, one principal, and seven students from grades X to XII. The teachers had bachelor's and master's degrees and diverse teaching experiences. At the same time, the students were selected because they were accustomed to participating in learning activities using various digital media, such as Google Classroom, Quizizz, and educational videos.

Data collection was conducted through interviews, observations, and document studies. Interviews were conducted directly and were semi-structured so that the information obtained was not rigid and could develop according to the direction of the conversation. These interviews involved the principal, teachers, and students to get a complete picture from various perspectives. In addition to interviews, observations were conducted in classrooms and the school environment to directly observe how ICT-based learning processes were implemented, the extent to which teachers used technology, and students' responses and engagement in learning activities. Meanwhile, document studies were conducted by reviewing school policies, teacher training schedules, available technology facilities, and learning evaluation reports.

The collected data were analysed thematically. The researchers reread all the data and grouped the information into specific themes, such as teachers' strategies in using ICT, obstacles encountered, and students' experiences participating in digital learning. The analysis was conducted manually by examining interview patterns, observation results, and school documents.

To ensure data accuracy, the researcher used triangulation of sources and techniques. Findings from interviews were compared with observation results and relevant documents. Some participants were also asked to confirm the findings to ensure the researcher's interpretations aligned with their intentions. With this approach, it is hoped that the research findings reflect the actual conditions in the school.

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Definition of Management

According to [5]"*Management is seen best, therefore, as a process common to all other functions carried out within the organisation. Management is essentially an integrating activity*". Management is best seen, therefore, as a general process for all other functions performed in an organisation. Management is essentially an integrating activity. The definition of management in a broad sense is planning, organising, directing and controlling (P4) organisational resources to achieve goals effectively and efficiently.[6]

Another opinion about management, according to George R. Terry in his book Principles of Management, explains that management is a unique process, consisting of planning, organising, moving and controlling actions carried out to determine and achieve predetermined targets through the use of human resources and other resources.[7]

Thus, it can be concluded that management is the process of controlling existing resources by involving the POAC (Planning, Organising, Actuating and Controlling) function to achieve previously set goals or objectives effectively and efficiently.

Definition of Learning

In terms of language, the word learning is a translation of instruction, which means an effort to learn by a person or group of people using various strategies, methods, and approaches to achieve previously set goals. Meanwhile, according to the term, learning is a process in which a person's environment is deliberately managed to allow them to participate in certain behaviours in special conditions, or produce responses in certain conditions.[8]

According to Warsita [9] It is an educational effort that is carried out deliberately with goals that have been set before the process begins, and is carried out with control. Thus, it can be concluded that learning is a system which consists of various components that are interconnected with each other. These components include: goals, materials, methods and evaluations. Of the four components, teachers must pay attention to them and determine what approach will be used in the learning process.

[5] Mullins, Laurie. J. *Management and Organisational Behaviour*. New York: Prebtice Hall, 2005.
[6] Usman, Husaini. *Manajemen: Teori, Praktik, Dan Riset Pendidikan*. Jakarta: Bumi Aksara, 2011.
[7] Rifa'i, Muhammad. *Dasar-Dasar Manajemen*. Medan: CV. WIDYA PUSPITA, 2019.
[8] (Rukajat, 2018: 10)
[9] Rusman. *Belajar Dan Pembelajaran Berbasis Komputer*. Bandung: Alfabeta, 2013.

Information and Communication Technology-Based Learning Management

In the world of education, management is important; therefore, management is needed in learning. Because without good management, learning activities will not run effectively. Information and communication technology (ICT)-based learning management is an approach that uses technology to improve the learning process and education management. ICT includes various platforms and tools that enable interaction between students and teachers and wider access to information.

Learning management is a series of structured and systematic activities to plan, manage, and evaluate the learning process. The learning process is carried out to achieve the learning objectives that have been set. In this case, the main objective of learning management is to increase the efficiency and effectiveness of the learning process.

The principles used to select appropriate learning media are as follows: media must be adjusted to the level of student development, based on learning objectives and materials to be delivered, and media must be adjusted to the teacher's abilities. An effective learning process will help students achieve optimal learning outcomes. In addition, media must be appropriate to the situation and conditions, or at the right time, place, and situation.[10]

Communication and Information Theory in Islam

Communication in the world of education is a process of exchanging information, knowledge, values, and skills between educators and their students to increase understanding, change attitudes, and improve the quality of learning. In Islam, there are six concepts known as "Qaulan", which are the principles of good and ethical communication. These principles can be applied in educational management to increase the effectiveness of information dissemination, build good relationships between teachers and students, and create a learning atmosphere full of wisdom.[11]

1. *Qualan Sadidan* (True and firm words)
2. *Qualan Balighan* (Words that are touching and memorable)
3. *Qaulan Ma'rufan* (Words that are good and appropriate)

[10]Miftah, M. *MANAJEMEN PEMBELAJARAN BERBASIS TIK TERINTEGRASI*. Pascal Books, 2022.
[11] Rachman, Taufik. "Etika Komunikasi Islam Dalam Berbagai Perspektif (Intrapersonal, Interpersonal Dan Kelompok Kecil)." *Jurnal Hikmah*, 2022.

4. *Qualan Layyinan* (Words that are gentle and polite)
5. *Qualan Kariman* (Words that are noble and respectful)
6. *Qualan Maysuran* (Words that are easy to understand)

By implementing the six Qualan in learning management, the learning atmosphere will be conducive, effective, and full of blessings. Teachers will not only convey knowledge but will also be role models in communication, so that students not only have academic intelligence but also have Islamic manners and character.

Implementation of Innovative Learning

The implementation of innovative learning is an important step towards increasing the effectiveness of learning in the digital era. By using contemporary methods and technologies, learning can be more interesting, relevant, and support the development needs of students to face the challenges of the world in the future. Everyone, including teachers, students, parents, and the government, must support the successful implementation. For this reason, Innovative Learning requires a learning management process that involves the use of innovative strategies, methods, and technologies to improve student learning outcomes. This approach focuses on the use of modern technology, interactivity, and collaboration to create a more effective and attractive learning environment.[12]

This is in line with research conducted by Pole, Danvy Le,[13] This states that through innovative course assignments, students learn new platforms, thereby enhancing their digital fluency. Digital fluency skills among Generation Z learners by using platforms outside of learning management systems to align with learning outcomes that emphasise new and emerging technologies. This pedagogical approach facilitates content retention through higher-order learning while building practical skills.

Innovative learning by utilising information and communication technology (ICT) is an approach that utilises modern technology to improve the effectiveness, efficiency, and

[12]Pamungkas, Ibrahim Bali, Alvin Praditya, and Universitas Pamulang. "TINJAUAN PUSTAKA : DAMPAK TEKNOLOGI INFORMASI DAN KOMUNIKASI (TIK) PADA PRAKTIK MANAJEMEN SUMBER." *SCIENTIFIC JOURNAL OF REFLECTION: Economic, Accounting, Management and Business* 7, no. 3 (2024): 610–24.

[13] Pole, Danvy Le & Antoinette. "Beyond Learning Management Systems: Teaching Digital Fluency." *Journal of Political Science Education* 19, no. 1 (2022).

quality of learning. This method includes the integration of hardware, software, and internet networks to support the learning process.[14]

The components of Information and Communication Technology (ICT) infrastructure that can be used in innovative learning are as follows:

Komponen	Media Pembelajaran	Kegunaan
Perangkat keras (*Hardware*)	Komputer, Laptop, tablet, Smartphone	Alat pembelajaran
	Proyektor	Presentasi materi
Perangkat lunak (*Software)*	Google Classroom, Moodle, atau Edmodo	Manajemen kelas virtual
	Quizizz, Kahoot, dan Nearpod	Kuis dan latihan interaktif
	Google Docs, Zoom, Google Meet	Diskusi dan Kerja Kelompok secara virtual
Jaringan dan akses internet	*WiFi*	Akses cepat ke sumber belajar online
Konten digital	E-book, dan video pembelajaran	Sumber belajar

Table 1. ICT infrastructure components

By utilising various Categories of Information and Communication Technology (ICT) Based Learning Equipment and Media above, teachers can design interesting and interactive learning activities by utilising various platforms.

Challenges and obstacles in implementing Information and Communication Technology (ICT) Learning

Integrating Information and Communication Technology (ICT) in learning can provide many benefits, but also involves several obstacles that need to be overcome, namely as follows:

1. Lack of teacher training, one of the main challenges is the lack of training for teachers in using Information and Communication Technology (ICT). Such as minimal technological mastery skills and the inability to integrate Information and Communication Technology (ICT) into learning.[15]

[14]Salimodo, Devi, Taruna Christofer S, Agus Lestari, Universitas Jambi, Learning Models, and Article Info. "INOVASI DALAM MANAJEMEN KURIKULUM : PEMANFATAN." *Al-Rabwah : Jurnal Ilmu Pendidikan* 17, no. 02 (2023).

[15] Asamoah, Moses Kumi. "Sturdiness and Scuffle in Deploying Educational Technologies for Teaching and Learning in a Low-Technology Context: Students' Experience in a Developing Society." *African Journal of Science, Technology, Innovation and Development* 0, no. 0 (2020): 1–18. https://doi.org/10.1080/20421338.2020.1773604.

2. Limited access to infrastructure, limited internet access, inadequate technology infrastructure, and lack of digital devices. Such as uneven access to technology in certain areas, and outdated and incompatible digital devices.[16]
3. Changes in learning behaviour, changes in learning approaches and teacher-student interaction patterns require adjustments. Such as creating a collaborative and interactive learning environment. And developing effective technology-based learning strategies.[17]

Integration of ICT-Based Learning in Islamic Education Management

1. Critical Dialogue between Findings and Connectivism Theory

Siemens's connectivism theory states that the modern learning process is no longer entirely under individual control but occurs through the interaction of digital nodes, social networks, and dynamic learning resources.[18] In this context, teachers act not as the sole source of information but as facilitators in a network-based learning ecosystem.

Your field findings showing the use of platforms such as Google Classroom, Quizizz, and learning videos align with the main principles of Connectivism. Students shape their learning experiences through independent and collaborative exploration, including creating videos as a medium for presentation.

These activities show that the learning process is not linear and shifts from teacher to student to networked learning. However, the theory of Connectivism also emphasises meta-cognitive abilities to recognise valid information amid a flood of digital data.

In this case, teachers had no explicit strategies to teach students to critically evaluate digital content, so connectivity without literacy could become a gap. This provides room for reflection on the limits of applying this theory in a school environment.

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[16] Seifu, Kelemnesh. "Determinants of Information and Communication Technology Integration in Teaching-Learning Process at Aksum University." *Cogent Education* 7, no. 1 (2020). https://doi.org/10.1080/2331186X.2020.1824577.

[17] Mohamad Miftah. "Manajemen Pengelolaan Pembelajaran Berbasis TIK." *Educenter: Jurnal Ilmiah Pendidikan* 1, no. 3 (2022): 276.

[18] GEORGE Siemens, "Connectivism: A Learning Theory for the Digital Age. International Journal of Instructional Technology and Distance Learning," *Online] Retrieved from: Http://Www. Idtl. Org/Journal/Jam _05/Article01. Html*, 2005.

2. Synthesis of Findings and POAC Principles in Education Management

The classic POAC (Planning, Organising, Actuating, Controlling) management model is still relevant for analysing ICT-based learning systems. Based on your interviews and observations, strong evidence of the first two components of the POAC model has been found:

a. Planning: Teachers prepare digital media and platforms the day before (videos, quizzes, and materials).
b. Organising: The school has established a system for using computer labs, projectors, and connectivity, although there are technical constraints.

However, in terms of Actuating, there is still a reliance on conventional lecture methods when infrastructure issues arise. Meanwhile, in terms of control, there are no systematic indicators such as using LMS tracking, digital feedback, or data-based formative assessment.

This shows that ICT utilisation has not yet touched data-informed management, as highlighted by Yusuf et al. ICT development should accompany a data-based decision-making model (e.g., monitoring dashboards, LMS analytics).[19]

3. Equity Perspective in Access to ICT-Based Learning

One crucial aspect that needs to be explored further is the issue of digital equity in implementing ICT-based learning. Findings from teachers and students indicate limitations in internet access, shared use of computer labs, and connectivity issues. Although these data are described descriptively, they need to be raised as structural issues rather than merely technical ones.

Zen et al. state that the success of ICT integration is highly dependent on infrastructure support and fair resource distribution policies among schools. When internet access is slow or digital devices are inadequate, students from vulnerable groups will fall further behind.[20] Therefore, ICT-based learning strategies must be balanced with an inclusive infrastructure approach and subsidy schemes to ensure equity.

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[19] Juhriyansyah Dalle et al., "A Prototype for Parents to Monitor The Children's Use of Gadgets Applying Systems Development Life Cycle-Prototype: A Case of Indonesia," *International Journal of EBusiness and EGovernment Studies* 14, no. 4 (2022): 137–50.

[20] Wahyuli Lius Zen et al., "Implementing Information and Communication Technology-Based Learning (ICT-Based Learning) Models to Increase Student Learning Motivation," *Society* 10, no. 2 (2022): 579–90, https://doi.org/10.33019/society.v10i2.450.

4. Islamic Communication Ethics as a Pedagogical Intervention Framework

The integration of Qaulan values (Sadidan, Balighan, Ma'rufan, Layyinan, Kariman, and Maysuran) in teacher-student communication practices is this study's uniqueness and main contribution. From the perspective of transformational pedagogy, communication is not merely a tool for conveying content but also a medium for character formation.

Abubakari et al.'s study shows that a religious perspective strengthens technology acceptance when spiritual values are embedded in the learning process. In your practice, the principles of Qaulan Layyinan and Qaulan Kariman enhance interpersonal relationships in digital learning, which often feels impersonal.[21]

This concept can form a new model in ICT-based Islamic education: Islamic values as a pedagogical filter, not merely a supplement to the curriculum. This opens up opportunities for further research in religious-based ethical EdTech.

5. Theoretical Contributions and Practical Implications

This study presents an integrative framework for ICT-based learning in Islamic educational settings. The synthesis of theory and field findings can be summarised in the following table:

Framework	Role in Study	Practical Manifestation
POAC	Management structure	Digital material planning, use of iFocus, interactive quiz assessment
Connectivism	Learning theory	Student-made videos, online discussions, and Google Docs collaboration
Qaulan	Ethical-pedagogical filters	Polite communication in digital interactions, Islamic character building
Equity	Critical perspective	Akses lab terbatas, ketimpangan digital, distraksi siswa

The integration of these four aspects shows that infrastructure and the accompanying management framework, ethics, and social justice determine the success of ICT-based learning.

[21] Mussa S Abubakari et al., "Analysing Technology Acceptance for Digital Learning in Islamic Education: The Role of Religious Perspective on ICT," *Journal of Computing Research and Innovation* 8, no. 1 (2023): 1–16.

Conclusion

Based on the results of the research that have been presented, it can be concluded that the Information and Communication Technology-based learning management method in learning uses an online platform to access materials and assignments. And integrating game elements in learning, such as quizzes and Kahoot. The effectiveness of the use of Information and Communication Technology (ICT) in improving the quality of learning is very effective, which can involve students in learning that has great potential to improve the quality of education. As well as the challenges and obstacles faced in Information and Communication Technology-based learning, namely, sometimes unstable internet access, Distractions during learning, the use of digital devices can cause disruptions, such as access to social media or irrelevant content.

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