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Technology and Information-Based Facility Management to Improve Academic Achievement of Inclusive Students

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ABSTRACT

This study aims to examine strategies for improving the learning achievement of inclusive students in utilizing information technology (IT) facilities at MAN 2 Sleman, a reference madrasah in implementing inclusive education. The background of this study is based on the fact that access for children with disabilities to digital learning in Indonesia is still limited, with only 24% having internet access (UNESCO, 2020), and 68% experiencing difficulties in online learning. The research approach used is descriptive qualitative, with data collection techniques through observation, in-depth interviews, and documentation studies. The results of the study show that the active involvement of students with disabilities in the digital learning process has increased significantly along with the availability of technology literacy training for teachers, the provision of adaptive IT facilities such as braille keyboards and JAWS (Job Access With Speech) screen reader applications, and the integration of learning approaches based on active and participatory learning experiences. In addition, the preparation of madrasah policies that are responsive to the individual needs of students with disabilities, such as Routine Based Interview (RBI) and the involvement of guardians, also encourage increased student participation and achievement. Field data shows an increase in average academic scores of 10–13% in the even semester of the 2024/2025 academic year among inclusive students who are actively involved in digital-based learning. The conclusion of this study states that the use of information technology in an inclusive and adaptive manner, with teacher support, equitable infrastructure, and responsive policies, contributes significantly to improving the academic achievement of students with disabilities. These findings provide important implications for madrasahs in developing more targeted operational strategies to support the transformation of digital learning that is truly friendly and fair to all students.

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INTRODUCTION

The transformation of education in the digital era has given rise to the urgency to review conventional approaches in the teaching and learning process, especially in relation to the use of

information technology (IT). Along with increasing investment in the field of education in the form of hardware and software procurement, digital platforms, and internet network infrastructure, there is an expectation that technology can be the main instrument in improving the quality of education (Alam et al., 2023; Fahrurrozi et al., 2024; Kurniawati et al., 2023; Wijaya et al., 2023). However, previous studies have shown that the availability of technological infrastructure in schools is not automatically proportional to the effectiveness of its use in the learning process (Ma'arif et al., 2024). This is mainly due to inequality in access, readiness of educational institutions, and the competence of educators in managing and integrating technology into the curriculum (Alfina & Hasanah, 2024; Jauhari et al., 2022; Tri & Nugroho, 2024).

From the perspective of educational facility management, the use of information technology in learning is not just a learning support. Information technology can also be managed according to the functions of facility management, namely planning, procurement, inventory, use and utilization, maintenance, and disposal (Everard et al., 2004). In this framework, at the stage of use and utilization of facilities, technology can support the learning process, including in the context of implementing inclusive education. In line with this framework, the use of technology not only has implications for internal management aspects, but also has the potential to improve the quality and characteristics of educational services produced (Piaget, 1970).

Along with technological advances and digital dynamics, this phenomenon has brought major consequences in the implementation of educational services, especially in educational units that carry the principle of inclusivity. The use of information and communication technology in learning, such as e-learning and hybrid learning, is also able to provide better flexibility and accessibility (Anderson et al., 2009; Moskal et al., 2023). Based on report data from Kemendikbudristek (2023a) as of December 2022, there are 40,928 schools in Indonesia that provide inclusive education, including elementary, junior high, high school, and vocational levels, both public and private. Of these, as many as 135,946 students with special needs have been registered and participated in the learning (Direktorat Pembinaan PKLK, 2017). In this context, Madrasah Aliyah Negeri (MAN) 2 Sleman as one of the inclusion madrasas in the Special Region of Yogyakarta, has shown a strong commitment to integrating information technology into the inclusive learning process. MAN 2 Sleman not only provides technological facilities and infrastructure for general learning, but also specifically accommodates the needs of students with disabilities through the use of IT-based applications and assistive devices.

Digital transformation in the world of education after the COVID-19 pandemic has encouraged educational institutions to adopt technology as an integral part of the learning process, including in the madrasah environment (Deviyanda et al., 2022; Ningsih et al., 2021). However, in the context of inclusive education, the use of information technology is not completely evenly distributed, especially for students with disabilities. Based on data UNESCO (2020) as of April 2020, only 24% of children with disabilities in Indonesia had internet access, compared to 50% of children without disabilities. A total of 68% of students with disabilities reported difficulties in online learning, and only 20% were able to access and participate easily. So that children and adolescents with disabilities have a triple higher risk of dropping out of school compared to children without disabilities. In addition, data from UNICEF (2023) mentioned that about 3 out of 10 children with disabilities in Indonesia do not go to school. In addition, data shows that girls with disabilities are more susceptible to stunting and lack of immunization (UNICEF, 2020). Therefore, there needs to be a more responsive and inclusive strategy in integrating learning technology so that the participation and academic achievement of students with special needs can be improved in a sustainable manner.

Furthermore, in the context of inclusive education, the challenges of using technology have become more complex. Inclusion students need an adaptive and responsive learning approach to their individual needs, including in terms of technology use. Unfortunately, much of the literature still focuses on technical and infrastructural aspects, with little attention to the dimensions of inclusion student participation and engagement in the use of technology (Lestari et al., 2025; Riyadi et al., 2025). Without such involvement, technology tends to become a passive resource that does not contribute much to the achievement of learning outcomes. In the perspective of the theory of social constructivism from Vygotsky (1978), Learning will take place optimally if students receive social support, interaction, and scaffolding that suits their learning needs. The active involvement of

inclusive students in the use of technology needs to be supported through teacher mentoring, a collaborative learning environment, and accessible learning media.

The Universal Design for Learning (UDL) principle emphasizes the importance of providing various forms of material representation, learning expression, and student involvement so that all students, including students with special needs, can access learning equally (Ainscow et al., 2006). Digital literacy levels, internal motivation, and external support from teachers and parents determine the extent to which inclusive students can leverage technology to support their learning process (Antoninis, 2021; Inayah & Prasetyo, 2025; Salsabila et al., 2022). In line with the Technology Acceptance Model (TAM) Davis (1989), the acceptance and effectiveness of the use of technology is influenced by the perception of the ease of use and usefulness of the technology for users. This engagement includes not only how often students use technological devices, but also how effective they are in helping them understand the material, develop competencies, and improve learning achievement.

The main problem to be revealed in this study is how the strategy to increase the involvement of students with disabilities at MAN 2 Sleman in the use of IT devices and applications mediates the influence of the availability of infrastructure facilities on learning achievement. Strategies to foster active and independent student involvement will strengthen the positive influence of the availability of IT facilities on learning outcomes, especially in the context of inclusive madrasas that have supported technology-based adaptive learning. Thus, if schools want to maximize investment in technology, then strategies to increase digital literacy and student motivation must also be made a top priority. MAN 2 Sleman's efforts in applying technology in learning for students with disabilities are a concrete example of how educational facilities can be adapted to meet the needs of all students. However, even though the availability of IT-based infrastructure has met inclusion standards, the effectiveness of its use is still largely determined by the active involvement of students in utilizing the technology. Without meaningful engagement, the devices and applications that have been provided run the risk of becoming suboptimal resources (Hartati et al., 2023; House & Dirgantara, 2022).

The results of initial observations show that not all students with disabilities at MAN 2 Sleman make maximum use of technology in their learning process. Some students still show a high dependence on the help of accompanying teachers or are not used to using the applications and devices provided. This indicates the need for further study on the extent of the involvement of students with disabilities in utilizing the available IT infrastructure and how this involvement impacts the improvement of their learning achievement. This research is important to uncover strategies in the dynamics of the use of technology in inclusive schools, especially in the context of MAN 2 Sleman which has been more advanced in terms of providing technological infrastructure for inclusive learning to improve students' academic achievement.

In the context of inclusive education that is moving towards comprehensive digitalization, there is an urgent need to understand how the internal dimensions of students, especially students with disabilities, play an important role in bridging the availability of technology and expected learning outcomes. Referring to the theory of constructivism by Vygotsky (1978), emphasizing that learning occurs optimally through social interaction and the active involvement of individuals in building knowledge, this study is directed to examine how strategies and involvement of students with disabilities as active subjects in the learning process are able to strengthen the effectiveness of the use of technological infrastructure facilities that have been available in the madrasah environment to improve their achievements. Therefore, through careful observation of the dynamics of IT-based inclusive learning at MAN 2 Sleman, this study is directed to reveal how the interaction between the availability of technology and the involvement of students with disabilities forms certain configurations that have an impact on their learning outcomes.

In a post-pandemic education landscape that demands the acceleration of technology integration equally and equitably, openness to digital innovation in the madrasah environment is inevitable, especially for educational units that have a mandate as an inclusive service provider (Kemendikbudristek, 2023b). MAN 2 Sleman, as a madrasah that has initiated the use of adaptive technology for students with disabilities, needs a stronger epistemological foundation to develop a

technology-based learning model that is not only structurally transformative, but also substantive in accommodating the active involvement of students. Referring to Self-Determination Theory (Ryan & Deci, 2017), emphasizing that a person's intrinsic motivation grows when the need for competence, independence, and connectedness is met, so the involvement of students with disabilities in the use of technology cannot be interpreted as a mere mechanical activity, but as a process that requires reinforcement from within and the support of an inclusive environment.

In the midst of the dominance of a structural approach that emphasizes the availability of infrastructure as a prerequisite for the use of technology in inclusion madrasas, this study implicitly proposes a paradigm shift towards a participatory approach that places student involvement as the driving axis of digital learning effectiveness. This approach is in line with the findings Maulana et al. (2024) which confirms that the success of technology integration in education is highly dependent on the level of participation and motivation of end-users, especially students. In the context of students with disabilities, this involvement includes not only the technical dimension of device use, but also the affective and social aspects that make up a meaningful learning experience. Unfortunately, as noted in a study by Averoes (2023), most programs at Madrasah Inklusi still focus on the procurement of technological aids without being balanced with user empowerment strategies.

Previous studies such as those conducted by (Azizah & Hendriyani, 2024; Mayangsari et al., 2020; Shegupta et al., 2020) More emphasis on technology integration from the side of teachers or school policies, while studies on user experience from the side of students, especially inclusion students, are still relatively limited. Several studies have shown an increase in learning achievement with the use of technology, but have not specifically discussed the mechanisms of inclusion student involvement in the process and the challenges they face. Meanwhile, research that specifically examines the role of the involvement of students with disabilities as mediators between the use of technology and learning outcomes is still very limited. In the context of MAN 2 Sleman, this research approach raises the aspect of the experience and involvement of inclusion students in using IT infrastructure, which until now has not been widely discussed in the technology-based inclusion education literature. In other words, this study uses an integrative approach that simultaneously examines the relationship between the availability of IT infrastructure facilities, inclusive student involvement, and learning outcomes, taking into account contextual and personal factors that affect these three variables.

METHODS

This type of research adopts a descriptive qualitative approach. According to Sugiyono (2022), The qualitative method is based on the philosophy of postpositivism, which prioritizes a deep understanding of natural phenomena in the real world, where researchers play the role of the main instrument. This approach is very suitable for exploring the dynamics and complexities that occur in the context of innovative learning, especially related to the implementation of IT management-based learning at MAN 2 Sleman. The focus of this research is to understand how innovative learning management strategies involving technology can play a role in supporting the success of learning implementation which will later have an impact on improving the learning achievement of inclusive students, by considering aspects such as policies, strategies, challenges, and best practices applied.

The subjects of the study, according to Sidiq & Choiri (2019), refers to the individual or group that is the focus of the research, where data related to the research variables are obtained. In the context of this research, the research subjects include teachers and students with special needs at MAN 2 Sleman. The subject of this research has a very strategic role, because the data produced will provide in-depth insights into the use of technology and its relationship to improving their achievements. The research objects cover various aspects of learning management, including the strategies used, the challenges faced, and the best practices applied in the implementation of technology-based learning for inclusion students at MAN 2 Sleman.

The data collection techniques used in this study include observation, in-depth interviews, and document analysis. Observation is carried out at the initial stage to directly observe the learning process that takes place, as well as the interaction between teachers and students in the context of learning activities involving technology. In-depth interviews were conducted with subject teachers,

special assistant teachers, and heads of disability service units, using interview instruments to obtain richer and more relevant data. In addition, document analysis will be used to evaluate various written sources, such as curriculum, syllabus, and learning outcome reports at MAN 2 Sleman, which can provide a more comprehensive picture of the implementation of the program.

To analyze the data obtained, this study uses a triangulation technique. Triangulation in this study involves several analysis steps, namely data collection, data reduction, data presentation, and conclusion drawn. Conform to the opinion Sugiyono (2022) Data analysis in qualitative research is a systematic process of organizing data obtained through interviews, field notes, and documentation, then grouping it into relevant categories. The next steps include compiling the data into smaller units, synthesizing them, identifying emerging patterns, and determining which information is most important for further analysis. Eventually, this process results in conclusions that can be clearly understood by researchers and readers.

RESULTS AND DISCUSSION

Results

The results of this study provide a comprehensive overview of the level of student involvement, especially inclusion students, in the use of information technology facilities at MAN 2 Sleman. Based on data obtained through direct observation in the inclusion classroom, in-depth interviews with teachers, students with disabilities, and documentation of the use of learning tools, it was found that student involvement was at varying levels of participation, depending on the type of disability, the readiness of technological devices, and pedagogical support from teachers.

In general, students with visual disabilities show quite active participation when facilitated with appropriate technology, such as JAWS (Job Access With Speech) to read text on a computer screen, a braille keyboard for typing, goalball , which is a ball containing 3 bells in it to make it easier for blind students to participate in sports subjects, as well as access to digital hadith books that support learning accessibility for students with special needs. These findings are reinforced by the observation that students who are used to using these devices tend to show independent learning initiatives, access materials more flexibly, and are able to participate in class discussion activities equally. However, this engagement also depends on the reliability of infrastructure, such as a stable internet network and the availability of individual devices, which in some cases are still technical constraints.

1. IT-Based Learning Strategies for Students with Special Needs

   The results of the study show that the information technology (IT)-based learning strategy applied at MAN 2 Sleman for inclusion students has been designed adaptively by considering the individual characteristics and needs of students. One strategy that has proven effective is the use of assistive technology that is integrated into regular learning. Applications such as JAWS are used consistently to assist visually impaired students in accessing digital texts in common subjects such as Indonesian, jurisprudence, and Islamic cultural history. Teachers specifically compile teaching materials in accessible digital formats, including .docx and .pdf-based files that are compatible with screen readers, allowing students to independently access teaching materials in and out of the classroom. The use of braille display keyboards and digital hadith books also enriches the learning experience of students with disabilities, which ultimately has an impact on improving material understanding. The learning of physical education subjects for inclusion students also utilizes goalballs, especially to facilitate the participation of visually impaired students so that they can participate in sports activities more optimally. This is strengthened by the statement of the Special Assistant Teacher (GPK) who stated that:

   "Kami menyesuaikan media dan teknologi pembelajaran sesuai kebutuhan masing-masing siswa inklusi agar mereka tetap dapat mengikuti pembelajaran secara mandiri dan setara dengan siswa lainnya." (A Special Assistant Teacher Interview (GPK), 2025).

   Another strategy used is the implementation of blended learning that combines face-to-face learning with platform-based online learning such as Google Classroom, Wayground and

WhatsApp Group inclusion. Through this strategy, students can repeat learning materials flexibly and take online quizzes based on interactive feedback. Teachers also provide learning videos with strong audio narration and clear visual structures for students with mild cognitive barriers, thereby strengthening the absorption of the material being taught. In addition, a technology-supported peer tutoring strategy is one of the approaches that has a significant impact on academic achievement.

2. IT-based Facility Planning

Based on the results of interviews and documentation studies at MAN 2 Sleman, the planning stage of technology-based and information-based learning for students with special needs is carried out systematically by referring to diverse learning needs and inclusive learning principles. Planning is not only oriented to the provision of facilities, but also to learning designs that are able to accommodate the diversity of student characteristics.

The results of the study show that Special Assistant Teachers (GPK), as well as information technology teams collaborate in developing learning tools, such as lesson plans and digital-based teaching modules. In this process, an initial identification of the student's learning profile is carried out, including sensory, cognitive, and social-emotional barriers. This data is the basis for determining strategies, media, and technology platforms that will be used in learning. This is strengthened by the statement of the Special Assistant Teacher (GPK) who stated that:

"Dalam menyusun pembelajaran, kami terlebih dahulu mengidentifikasi kebutuhan masing-masing siswa agar media, metode, dan teknologi yang digunakan benar-benar sesuai dengan karakteristik mereka." (A Special Assistant Teacher Interview (GPK), 2025).

Empirically, learning planning has integrated a multimodal and collaborative approach, which is then implemented in the form of project-based learning. Teachers design learning activities that allow students to work in heterogeneous groups with roles assigned to their respective abilities. For example, in Islamic Religious Education lesson planning, teachers have determined that students with visual impairments will use screen reader software such as JAWS, while other students contribute to the visual aspects and presentation of the material.

In addition, planning also includes the selection of media and various teaching material formats, such as accessible digital texts, audio, and online conference platforms facilitated by madrasas. This shows that teachers have adopted the principle of Universal Design for Learning (UDL) from the planning stage, especially in providing multiple means of representation, variety in task expression, and strategies to increase student engagement (multiple means of engagement).

3. Implementation of IT-Based Learning for Students with Special Needs

Based on the results of observations and interviews conducted at MAN 2 Sleman, it was identified that the collaborative and multimodal learning approach is one of the determining factors that contribute significantly to the involvement of students, especially students with disabilities, in the technology-based learning process. This approach is clearly implemented in the form of project-based learning activities, where students are encouraged to work in heterogeneous groups with tasks that integrate various learning media, such as audio presentations, digital text exploration based on JAWS screen readers, and online discussions using video conferencing platforms Internal madrassas. One real example of this implementation can be seen in the Islamic Religious Education lesson, where visually impaired students are actively involved in the project of making digital summaries of the hadith book. In these activities, students use laptop devices with JAWS software to read and organize materials, while other students play a role in visual design, sound narration, and bibliography compilation. The results of interviews with teachers show that student involvement in this kind of activity is higher than the conventional one-way learning model. This is strengthened by the statement of the Special Assistant Teacher (GPK) in an interview stating that:

"Ketika pembelajaran dilakukan secara berkelompok dan menggunakan media yang dapat diakses semua siswa, peserta didik inklusi menjadi lebih aktif, percaya diri, dan berani menyampaikan pendapat." (A Special Assistant Teacher Interview (GPK), 2025).

For students with visual impairments, presenting in audio format makes it easier to understand material that was previously difficult to access in print. Observations show that

students with disabilities who have access to various formats of material tend to be better prepared to take part in evaluations, be active in class discussions, and show increased confidence when expressing opinions. Conditions in the field also show that the application of the Universal Design for Learning (UDL) principle is a relevant conceptual framework in supporting the success of technology-based inclusive learning at MAN 2 Sleman. The three principles of UDL multiple means of representation, expression, and engagement have been indirectly manifested in the practice of teachers who provide materials in various formats, provide flexibility in the way assignments are collected, and create a learning atmosphere that encourages the active participation of all students.

4. Evaluation

Based on the results of observations and interviews, the evaluation of technology and information-based learning at MAN 2 Sleman is carried out on an ongoing basis by considering the principles of inclusivity and diversity of students' abilities. Evaluation does not only focus on the final results, but also on the learning process that students experience during learning activities.

The findings of the study show that teachers use various forms of assessment that are flexible and adaptive, in line with the multimodal approach applied in learning. Forms of evaluation include project-based assessment, oral presentations, digital portfolios, and participation in online discussions. For students with visual impairments, evaluations are conducted through an accessible format, such as the use of audio or digital text compatible with software such as JAWS.

The results of interviews with teachers show that this diverse evaluation approach provides a more comprehensive picture of student learning outcomes, especially in terms of concept understanding, collaboration skills, and communication skills. In addition, evaluation is also used as a reflection tool to improve learning strategies, both in terms of methods, media, and classroom management. This is as conveyed by one of the subject teachers who stated that:

"Kami tidak menyamaratakan bentuk penilaian untuk semua siswa, tetapi menyesuaikannya dengan kemampuan dan cara belajar mereka agar setiap siswa memiliki kesempatan yang sama untuk menunjukkan pemahamannya." (Subject Teacher Interview, 2025).

Conceptually, this evaluation practice reflects the application of the principles of Universal Design for Learning (UDL), particularly in providing flexibility in the way students express their understanding. Students are not limited to one specific form of evaluation, but are given the opportunity to demonstrate their competence through various ways that suit their conditions and potential.

Furthermore, the results of observations showed an increase in students' readiness to face evaluation, involvement in the learning process, and confidence in conveying their work. This indicates that an inclusive and technology-based evaluation not only serves as a measuring tool, but also as a means to support students' academic and psychosocial development.

5. IT-Based Learning Challenges for Students with Special Needs

Interviews with teachers show that teachers' readiness and competence in using technology play an important role in encouraging student participation. Teachers who have inclusive digital literacy training tend to be able to design more adaptive learning approaches, such as the integration of screen reader applications in learning assignments, providing feedback in audio format, and classroom management that respects the learning rhythm of students with disabilities. However, some teachers recognize the need for advanced training in order to optimize the various technological features that are already available. This is as expressed by one of the subject teachers who stated that:

"Teknologi sebenarnya sangat membantu pembelajaran siswa inklusi, tetapi guru masih membutuhkan pelatihan lanjutan agar dapat memanfaatkan seluruh fitur dan media pembelajaran secara maksimal." (Subject Teacher Interview, 2025).

Another inhibiting factor found is the low basic digital literacy in some inclusion students, especially in those who are using technology devices for the first time in the context of learning.

This shows the need for a gradual, user experience-oriented technology introduction program. In addition, the lack of regular personal assistance in the use of devices, especially for students with mobility or vision impairments, is a challenge that has an impact on the low intensity of engagement. On the other hand, some teachers expressed difficulties in compiling learning media and teaching modules that are suitable for all types of needs of students with disabilities, especially in terms of time and technological competence. On the other hand, not all students with disabilities have personal devices to access multimodal materials independently outside the classroom. However, the support from the madrasah in providing technology access space and additional assistance more or less helped overcome these obstacles.

6. Forms of Collaboration between Stakeholders on the Implementation of IT-Based Learning for Students with Special Needs

The results of the study show that the implementation of information technology (IT)-based learning for students with special needs at MAN 2 Sleman is inseparable from intensive collaboration between various stakeholders who play a direct or indirect role in supporting the learning process. This collaboration is formed in the form of a complementary work network between madrasas, teachers, support staff, parents, and partner agencies such as educational technology service centers and organizations for people with disabilities. The madrasah plays a central role in designing policies and providing disability-friendly technological infrastructure. The head of the madrasah and the representative of the curriculum actively formed an inclusion implementation team tasked with monitoring the effectiveness of the use of IT facilities in daily learning. Teachers as the main actors of learning collaborate closely with special assistant teachers (GPK) in adapting digital-based teaching materials that can be accessed by students with disabilities. This is as conveyed by the Head of the Disability Service Unit who stated that:

"Pembelajaran berbasis teknologi untuk siswa inklusi tidak bisa dilakukan sendiri oleh guru, tetapi membutuhkan kerja sama antara madrasah, GPK, orang tua, dan pihak luar agar kebutuhan siswa dapat terpenuhi secara optimal." (Interview with the Head of the Disability Services Unit, 2025).

In practice, subject teachers work with GPK to compile teaching materials in audio, high-contrast visuals, or simple text formats according to the individual needs of students. Parents of students also play an active role through periodic communication with teachers and madrasas to monitor the development of children's learning at home, especially in the use of technology. Through instant messaging applications, online discussion groups, and regular meetings, parents also provide input and receive short training on how to accompany the use of digital learning applications for reinforcement at home. In addition, madrasas build cooperation with external parties such as the local disability community, in the form of training on the use of adaptive IT devices and technical guidance for teachers and students.

Discussion

The use of information technology facilities by inclusion students at MAN 2 Sleman is part of an adaptive educational strategy in order to improve academic achievement through a more inclusive and participatory learning approach. As a madrasah that has integrated IT-based learning, MAN 2 Sleman encourages the active role of inclusion students in accessing, using, and responding to digital teaching materials through various supporting devices and applications. This active participation not only expands access to learning resources, but also provides a space for students to demonstrate their academic potential through media that suits individual needs. In this context, the involvement of inclusive students is not only as recipients of educational services, but also as learning subjects that contribute to the effectiveness of the teaching-learning process. Although various challenges are still faced, especially in terms of the availability of training, curriculum adaptation, and technological assistance, systematic efforts continue to be made to develop learning strategies that support

learning independence and increase the academic achievement of inclusive students in a sustainable manner.

1. Intensive Training for Teachers in Inclusive Technology Literacy

   One of the main strategies in improving the academic achievement of inclusive students through the use of information technology (IT) facilities is to strengthen teacher competencies through intensive training in inclusive technology literacy. From the perspective of Education Management, especially in the function of use and utilization of facilities in Educational Facility Management, this strategy is not seen solely as the use of stand-alone technology, but as part of efforts to optimize the use of available educational facilities. The results of the research conducted by Rosita et al. (2020), Jauhari et al. (2022), and Llamazares de Prado & Arias Gago (2023) it shows that the effectiveness of technology integration in inclusive learning is highly dependent on the ability of teachers to adapt digital devices and content according to the needs of students with special needs. This is in line with the findings Deviyanda et al. (2022), which emphasizes that the success of IT-based learning in an inclusive madrasah environment requires a pedagogical approach that is responsive to individual differences, as well as technical skills in managing adaptive teaching media. At MAN 2 Sleman, teacher training in inclusive technology literacy has become part of the teacher professional development program, especially since this madrasah was established as a national reference in inclusive education. Based on field data, around 87% of teachers involved in inclusion classes have participated in training on the use of adaptive technologies such as audio-visual-based learning platforms. The training not only focused on the technical aspects of using the tools, but also on learning strategies based on the principles of Universal Design for Learning (UDL), such as compiling materials in various formats and creating participatory spaces for students with disabilities.

   Furthermore, the results of interviews with subject teachers showed that intensive training had a significant impact on their ability to design more flexible and accessible learning activities. Within the framework of the function of the use and utilization of facilities, the role of teachers develops not only as a material presenter, but also as a manager and facilitator in optimizing the use of technology facilities to suit the learning needs of students. This is reinforced by the findings of the Romá (2024) which shows that teachers who take part in inclusive digital literacy training are able to increase the involvement of students with disabilities by up to 40% in online-based learning. At MAN 2 Sleman, this implementation is evident in the Indonesian subject, where teachers present narrative texts in audio format that are integrated with interactive exercises based on Google Classrooms and Quizizz. This practice allows blind students to answer questions independently using screen readers such as JAWS.

   The implications of this strategy are reflected in the increase in the academic achievement of inclusion students. Academic data for the odd semester of the 2024/2025 academic year shows that the average score of inclusion students in IT-based subjects increased by 14% compared to the previous semester. This increase not only shows the positive impact of the use of technology, but also confirms the importance of teacher readiness as a key actor in bridging the use of technology with the individual needs of students. This is in line with research Suriaman & Rasau (2023) which emphasizes that inclusive teacher technology literacy plays an important role as an important mediator between digital infrastructure and the learning outcomes of students with disabilities. Thus, intensive training for teachers in inclusive technology literacy is not only a form of investment in human resources, but also a strategy in ensuring that educational technology facilities are effectively utilized within the framework of the functional use and utilization of facilities to create a learning environment that empowers students with special needs academically.

2. Procurement of More Equitable Adaptive Technology Facilities for Students with Disabilities

   Efforts to improve the academic achievement of inclusion students cannot be separated from the availability of adequate and equitable adaptive technology facilities. From the perspective of Education Management, especially in the function of use and utilization of facilities in Educational Facility Management, the availability of these facilities is not only understood as a procurement aspect, but also as a prerequisite for facilities to be used optimally

in the learning process. Research from Muta'alimah (2024) affirm that equal access to special technological devices, such as disability-friendly digital learning media and the use of AR (Augmented Reality) technology (Chavez-Perez & Iparraguirre-Villanueva, 2025), has a positive correlation with increased participation and learning outcomes of students with special needs. In this context, the procurement of appropriate and evenly distributed facilities is an important strategy to create a fair and empowering learning environment. The field conditions at MAN 2 Sleman show a serious commitment to the development of adaptive technology for inclusion students. Based on the documentation of the madrasah inventory in 2024, the school has provided at least 12 computer units that have been equipped with the JAWS (Job Access With Speech) application, 6 braille keyboards, and a collection of digital hadith books in audio and text formats. This facility is intended for visually impaired students and students with other visual impairments, who have had difficulty accessing conventional teaching materials. However, even though procurement has been carried out, the distribution of facilities still faces obstacles because the number of tools is not fully proportional to the number of students in need.

The findings are in line with the results of the study Paramansyah & Parojai (2024), which shows that the limited ratio of adaptive devices to the number of students with disabilities can hinder learning continuity, especially when students need more flexible time in understanding the subject matter. In some cases, delays in access to devices even lead to decreased motivation and dependence on teachers or companions. In the framework of the function of the use and utilization of facilities, this condition shows that the limitation of distribution not only has an impact on the aspect of availability, but also directly affects the effectiveness of the use of facilities in supporting the learning process. The procurement of adaptive technology facilities that are more equitable not only functions as a technical tool, but also as a form of affirmation of equal learning rights for all students. From a pedagogical perspective, the existence of adaptive means equally strengthens the implementation of the principle of equity in education, which is different from equality. Equitable education requires the provision of resources that are appropriate to individual needs, not just equal treatment. This is emphasized by the theory Vygotsky (1978) about the Zone of Proximal Development (ZPD), where external support in this case adaptive technology is an important bridge for inclusion students to achieve their learning potential optimally. Thus, the use of adaptive technology in this context needs to be understood as part of optimizing the function of the use and utilization of educational facilities, not as a stand-alone use of technology.

3. Integration of Active and Participatory Learning Experiences Oriented Learning Approaches

Improving the academic achievement of inclusive students through the use of information technology (IT) requires more than just the provision of learning aids. From the perspective of Education Management, especially in the function of use and utilization of facilities in Educational Facility Management, the use of this technology is understood as an effort to optimize the use of facilities that have been available in the learning process. One of the important strategies that has proven effective is the integration of learning approaches that emphasize active and participatory learning experiences. This approach not only allows students with disabilities to be more fully involved in the learning process, but also provides space for them to express understanding, create, and interact through an inclusive digital medium. Research conducted by Tanjung et al. (2024) shows that students with special needs show significant improvements in learning outcomes when engaged in project-based learning activities, digital discussions, and technology-assisted simulations. At MAN 2 Sleman, this strategy has begun to be implemented in a number of subjects, especially in the learning of Islamic Religious Education (PAI) and Indonesian Language.

Within the framework of the use and utilization function of facilities, these practices demonstrate that technology is not only used as an additional medium, but is strategically managed to maximize the accessibility and learning engagement of inclusive students. The teacher developed a multimedia-based interactive module that

included voice narration, text visualization, and animated videos with subtitles and text-to-speech features, which made it easier for visually impaired students and students with cognitive disabilities to follow the material. Data from observations in the odd semester of the 2024/2025 school year show that student involvement in online class discussions has increased, as seen from the number of responses and questions asked through the madrasah digital platform. This is in line with the theory of social constructivism Vygotsky (1978) which emphasizes the importance of social interaction and cultural context in learning. In the context of students with disabilities, technology can serve as scaffolding or a buffer that allows them to access previously limited participation spaces.

Through interactive and disability-friendly digital media, students are able to build the meaning of learning independently and collaboratively. At MAN 2 Sleman, several teachers have also implemented the flipped classroom strategy, where the material is delivered in the form of learning videos that can be accessed in advance by students at home using gadgets that have been loaned by the madrasah. This strategy provides students with flexible time inclusion to understand the material with the help of screen reader software or screen enlargement features. In line with findings Ros et al. (2020), The integration of an IT-based active-participatory approach has been shown to improve the motivation and confidence of students with special needs, which ultimately impacts their academic achievement. Therefore, inclusive digital pedagogical training for teachers remains an integral part of the success of this strategy. This also emphasizes that this success is part of optimizing the function of use and utilization of educational facilities, not just the application of stand-alone technology.

4. Formulation of Madrasah Policies that are More Responsive to the Individual Needs of Students with Disabilities in Digital Learning

The effectiveness of the use of information technology (IT) facilities to support the improvement of academic achievement of inclusive students is not only determined by pedagogic and technological aspects, but also supported by institutional policies that are responsive to the individual needs of students. From the perspective of Education Management, especially the function of use and utilization of facilities in Educational Facility Management, the use of technology is understood as part of optimizing the use of educational facilities, not as a stand-alone use of IT. An inclusive and data-based madrasah policy allows for the realization of a digital learning system that is adaptive, flexible, and oriented towards equity in access to learning. Research by Munajah et al. (2021) dan Winda et al. (2024) emphasized that the formulation of school policies that consider the assessment of the individual needs of students with disabilities has a significant impact on the success of technology integration in learning. As a reference madrasah in the implementation of inclusive education, MAN 2 Sleman has begun to implement a special needs-based policy by involving the special service team, accompanying teachers, and madrasah IT personnel in the process of preparing and evaluating digital learning programs. In addition, the internal policy of the madrasah also regulates the flexibility of time for assignments and assessments for students with mild motor or cognitive impairment.

Observation and interview data in the 2024/2025 school year show that this kind of policy contributes positively to increasing the participation and achievement of students with disabilities. There was an increase in the average even semester report card score of 10-13% in inclusion students who actively participated in digital-based learning programs, in line with the support of madrasah policies that provide accommodation and modification of individual learning. This policy is also supported by the involvement of parents in individual learning plan (RBI) discussions, as well as the integration of a

digital reporting system that allows teachers, students, and parents to monitor progress on a regular basis. Theoretical support from Tomlinson & McTighe (2006) about differentiated instruction and the idea of an inclusive policy framework from Hawkins et al. (2007) emphasizing that education policies that are responsive to the diversity of student needs are a basic prerequisite to ensure the effectiveness of inclusive learning.

General Guidelines for the Implementation of Inclusive Education issued by Kemendikbudristek (2022) explicitly suggests that each inclusive education unit needs to develop internal policies that accommodate the specific needs of students through flexible, adaptive, and individual-need-based learning arrangements. In the context of MAN 2 Sleman, this policy is implemented through the development of a digital-based Individual Learning Plan (RBI), where students with disabilities receive special arrangements both in the delivery of materials, the use of adaptive technology, and customized forms of evaluation. This policy is not only formulated top-down, but also through collaboration with teachers, parents, and special support teams. This approach is in line with the principles of inclusive education policy according to UNESCO (2009), which emphasizes the importance of the participation of all stakeholders in designing inclusive and participatory policies. Based on the framework of the function of the use and utilization of facilities, this policy acts as a guide so that the available technological facilities are utilized optimally and on target. One of the concrete forms at MAN 2 Sleman is the integration of an application-based reporting system that allows teachers, students, and guardians to monitor learning progress on a regular basis.

CONCLUSION

Based on the results of research on the role of inclusive students in the use of information technology at MAN 2 Sleman, it can be concluded that the active involvement of students with disabilities in digital learning has a real contribution to improving their academic achievement, especially when supported by adaptive madrasah policies, teacher training in inclusive technology literacy, and equitable procurement of adaptive technology facilities. Data from observations, interviews, and documentation in the field show that a collaborative, multimodal, and active learning experience-oriented learning approach is able to increase student motivation, confidence, and participation in the learning process. In addition, the preparation of digital-based Individual Learning Plans (RBI) involving teachers, students, and parents has become an effective strategy in accommodating the specific needs of each student with disabilities. The implications of these findings point to the importance of consistency in teacher training on inclusive technology and the need for the equitable provision of adaptive tools, such as screen reader software and specialized hardware such as braille keyboards. Operationally, madrasas need to develop digital learning policies that are more responsive to the diversity of students and design an adaptive evaluation system in accordance with the abilities and needs of students with disabilities which adjusts the conditions of children with diverse special needs, so that it is in line with the principle of optimizing the use of educational facilities according to the characteristics of student needs. These findings emphasize that the effectiveness of inclusive digital learning does not only depend on technology alone, but also on pedagogical design, institutional support, and sustainable cross-stakeholder collaboration. This also emphasizes that technology functions as an educational facility that needs to be managed and utilized systematically in order to have an optimal impact on the learning outcomes of inclusive students. Therefore, efforts to expand access to and quality of inclusive education must continue to be developed through contextual, participatory, and field-data-based strategies.

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