

## INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN STUDY IN MADRASAH: A CRITICAL REVIEW

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### Abstract

Information and Communications Technology (ICT) in madrasah education, with emphasis on a careful balance between the potential and challenges emerging from the use of technology. The potential advances of ICT in developing educational practices in the madrasah have gained widespread recognition, promising increased accessibility to a variety of resources as well as pedagogical differentiation capable of adapting to the individual learning needs of students. The method of research carried out in this research is literature by searching for literature that fits the context of the research. The results of the research show that ICT has offered to educational institutions that are not only public schools but also madrasas, but such developments not only integrate Islamic values of literacy but require dealing with infrastructure deficits, improving the capacity of educators, as well as formulating comprehensive policies that support the use of safe and effective technology in educational environments.

**Keyword:** TIK, Learning, Madrasah.

### Introduction

Developments in an era of globalization and rapid digitalization, Information and Communication Technology (ICT) has transformed many aspects of human life, including in the education sector. (Sitopu et al., 2024; Guna et al., 2024; Hairiyanto et al., 2024). Before technology underwent development in today's information age, technology was still very simple and underwent a gradual and exciting evolution that has brought about significant changes in the way we teach and learn. From the outset, technology has been

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used to support learning processes, ranging from the use of tablets, textbooks, to educational software and the Internet.

In the early 1990s, universities around the world began to be connected to computer networks that enabled the exchange of information through standard software that has been operating for years. (Hakansson, H., & Waluszewski, A. 2003). The highlight was when the World Wide Web (WWW) was introduced in 1993, opening a new era in educational technology by facilitating access to unlimited learning resources from all over the world. It enables distance education and online learning as a worthy alternative to traditional face-to-face learning. This is reinforced by increased access to personal computers and mobile devices, which makes e-education resources more available to the general public. (Powell, J., & Clarke, A. 2002; Berners-Lee et al., 2023; Al-Masri, E., & Mahmoud, Q. H. 2008).

Technology development is not just a limit, furthermore, learning technology progress continues to grow with the emergence of LMS (Learning Management Systems), MOOCs (Massive Open Online Courses), and various other educational platforms (Turnbull et al., 2020; Ellis, R. K. 2009; Tubagus et al., 2023; Aslan & Shiong, 2023)

This technology allows learning to be more personalized, interactive, and adaptive to individual needs and ICT offers significant opportunities to improve the quality and effectiveness of teaching learning processes. (Oliveira et al., 2016). ICT development is not only by colleges or schools of international level, but also by educational institutions, including madrasah (Muharrom et al., 2023; Nurhayati et al., 2023; Nurdiana et al., 2023; Erwan et al., 2023).

Madrasah is an educational institution that educates students towards a better Islamic education system. Madrasah studied about Islam and was often regarded as another name of the school in the context of Islamic education. (Sarmila et al., 2023; Sulastri et al., 2023; Haddar et al., 2023). In Indonesia, madrasah has several categories, including Madrasah Ibtidaiyah (MI) for basic education, Madrasah Tsanawiyah (MTs) for primary secondary education, and Madrasah Aliyah (MA) for secondary higher education, as well as Mu'allimin and Mu'allimat for education of teachers of Islam and Diniyah which is non-formal education of Islam. (Drajat, M. 2018).

Madrasah is also a symbol and treasure of Islamic culture that is strongly rooted in Indonesian society, showing the social and cultural significance of madrasah that goes beyond its educational aspects. (Tuhuteru et al., 2023; Aslan & Pong, 2023). Madrasah Aliyah, for example, played an important role in forming a young generation of noble, knowledgeable, and competent in the fields of religion and general science. (Astuti et al., 2023; Fitriani et al., 2024). The history, curriculum, and benefits of Madrasah Aliyah show how education in madrasah seeks to create a balance between religious science and general science, leading to the formation of individuals who are not only spiritually educated but also adequate in secular sciences. With the advancement of technology, madrasahs with symbols of Islam are also faced with the need to adapt to this technology to meet the demands of the times and improve their educational standards. (Mariana, D.,

& Helmi, A. M. 2022). In this context, the use of ICT in learning in the madrasah is emerging as an important and urgent area of research.

The use of ICT in education can enrich learning processes, provide access to extensive learning resources, and enhance collaboration between learners and educators. (UNESCO, 2011). Furthermore, a study by Kozma (2005) confirmed that the integration of ICT in education could result in better learning outcomes, provided that such technology is used strategically and adapted to educational needs.

However, the implementation of ICT in the context of the madrasah is not without challenges. Madrasah as an educational institution oriented towards Islamic values faces its own challenges related to integration and adaptation to Information and Communication Technology. (TIK). This phenomenon stretches between the dilemma of internalizing traditional values in an era that advances speed, efficiency, and innovation.

Madrasah is in a unique position to equip students with extensive technological knowledge while inculcating Islamic values and ethics. With the rise of digital content, there are concerns about potential inconsistencies between material available online and Islamic principles. It requires madrasah to take the initiative in developing or curating appropriate digital content and enriching Islamic education. (Ahmad, 2019). Then, the next challenge the madrasah faces in embracing ICT is the limited access and adequate infrastructure. The education sector, especially in remote areas, often lacks sufficient resources for effective technology implementation. (Bano, 2018). These include hardware constraints, stable internet access, and teacher training in using technology effectively in learning, as well as the capacity and readiness of teachers in implementing ICTs as real obstacles (Barakabitze et al., 2019), including the issue of digital gaps and the need for teacher professional development to be able to utilize technology efficiently in their teaching. This raises a critical question about how the madrasah can cope with these challenges and use ICTs to improve the quality of learning.

Another challenge is bridging the division between traditional learning methods and modern technology. This consideration requires an approach that respects tradition but is open to innovation, creating a dynamic and responsive learning environment to the needs of students in the 21st century. (Mansoor, 2017). Madrasah, in the face of this challenge, needs to consider a strategic framework that focuses not only on the adoption of technology but also on capacity-building, resource development, and curriculum integration that enables the full expression of Islamic identity while maximizing the benefits of ICT. Therefore, the study aims to provide a critical overview of the implementation and challenges of ICT in learning in madrasah. The study will study relevant literature, analyze empirical data, and formulate strategic recommendations for integrating ICT into the learning process of teaching in madrasah. By implementing an analytical and evidence-based approach, the study is expected to make a significant contribution to the development of education in the madrasah that is adapted to the needs of the times and technology.

## **Research Method**

The research method used in this research is a qualitative approach, which aims to analyze in depth the use of Information and Communication Technology (ICT) in the context of education in the madrasah. The qualitative approach was chosen because of its ability to give a deeper understanding of complex social phenomena. As described by Creswell (2014), a qualitative approach focuses on understanding contextual meanings and subjective interpretations of experiences, paying attention to the setting or environment in which participants interact.

## **Result and Discussion**

### **History of Madrasah in Indonesia**

Madrasah in Indonesia has a long history and is rooted in the tradition of Islamic education, contributing significantly to the development of education in Indonesia. The history of madrasah in Indonesia can be traced back to the early 20th century, when this educational institution began to emerge as a center of Islamic education. (Mukhlis, A. 2017; Tharaba, M. F. 2020).

Madrasah comes from Arabic, meaning a seat for learning, indicating its role as a directed, guided, and controlled learning vehicle. The concept of madrasah itself then developed to become more popular as a formal educational institution in society (Ihsanoglu, E., & Al-Hassani, S. 2004).

The understanding of madrasah, according to the experts, includes various understanding that is rooted in the etymology and function of this institution in Islamic education. The term madrasah has been known to the Muslim community since the triumph of classical Islam. Seeing from the language, madrasah is a makān name (place name) derived from the word darasa which means where people study. (Berkey, J. P. 2007). Thus, the madrasah is understood as a place or institution of education.

The other meaning of madrasah is taken from the root of the word "pain" which means learning. Madrasah is the eating name of this word, so it means a place to study. The term madrasah is often identified with the term school or some form of college that has specific specifications. (Blanchard, C. M. 2007). Meanwhile, educational historians such as A.L.Tibawi and Mehdi Nakosteen say that the madrasah (in Arabic) refers to the vast institutions of higher education in the pre-modern (classical) Islamic world. That is, in terms of madrasah in classical Islamic times is not the same terminology as madrasha in the sense of the Indonesian language today (NurKholida, E., & Choirunisak, L. P. 2012).

From the definitions of these experts, that the madrasah has a broad and profound meaning, not only as a place of study in the physical sense, but also as an institution that embodies the mission of education in the Islamic tradition, with specifications and functions that have evolved throughout history.

Related to the development of madrasah in Indonesia takes place in several phases. Madrasah has been present and thriving in Indonesia since the beginning of the 20th century, playing an important role in providing Islamic-based education and there are also

those who say that madrasah began to thrive since 1909, marking an important period in the history of Islamic education in Indonesia. (Azra et al., 2007).

The history of establishing the first madrasah in Indonesia is also interesting to note. An-Nur reports that the first madrasah in Indonesia was founded in 1906 under the name of Madrasah al-Masriyah in Bukit Mertamajam, Seberang Prai, built by Islamic figures such as Syed Sheikh al-Hadi, Syeikh Tahir Jalaluddin, and Syeih Abdullah Magribi, marking the early steps in the formalization of Islamic education in Indonesia. Therefore, the brief history of madrasah in Indonesia shows that this institution not only plays a role in providing religious education but is also part of the struggle for independence and national identity (Syar'i et al., 2020; Lukens-Bull, R. 2019).

Thus, the history of madrasah in Indonesia is a reflection of the development of Islamic education which has undergone various adaptations and innovations throughout the year. It also shows the importance of madrasah in the Indonesian national educational structure.

### **ICT and ICT development in education**

The history of information and communication technology (ICT) is a long journey that begins from prehistoric times and continues to evolve to the present modern era. Initially, the communication process was done using voices, whispers, and hand signals. The advances of the times have led mankind to the use of more modern and efficient means of communication. (Kaino, L. M. 2008).

In the early 20th century, there was a significant development with the invention of electronic communications. Companies like IBM played an important role in the computing revolution by undergoing a number of name changes and product focus since 1911, before becoming the technology giant now known as an international company in 1924. (Mohammed, K., & Yarinchi, B. M. 2013).

The development of information and communication technology then went rapidly alongside the advances of science. From prehistoric images on cave walls to the use of modern computer hardware and software, information technology has undergone a dramatic transformation. Nowadays, digital technology, the Internet, and social media are acting as major means of communication, enabling information to be delivered at unprecedented speeds. (Karki, H. 2019).

Important discoveries in ICT development include telegraph, telephone, radio, television, computers, and the Internet, all of which have a major impact on how humans communicate and access information. This development transforms the world into a global village, where people from all over the world can communicate easily and quickly. (Fitriani, A., & Suryandari, M. 2022).

In reaching this stage, there have been many contributors, whether individuals, organizations, or companies, who continue to develop new innovations. In the future,

information and communication technologies are expected to continue to evolve, bringing more change and new possibilities to humanity.

From the history of these developments, then experts from various fields have given the definition of ICT based on their perspective. Here are some concepts of ICT according to the experts; Hamzah B. Uno defines information technology as a technology used with the purpose of generating quality information, that is, information that is relevant, accurate, and timely by way of improving, managing, processing. H.M. Stationery Office defines information and communication technology as an aspect involving technology, engineering, and management techniques used for the control and processing of information, as well as its use. (Uno, H. B., & Nina Lamatenggo, S. E. 2022).

From the above definitions, it can be seen that ICT involves not only hardware and software, but also the management and use of information effectively and efficiently. The focus is not only on the technology, but also on how to present quality information that is quickly and accurately accessible to users. The development of ICTs has brought significant changes in many aspects of life, facilitating access to information, communication, as well as supporting the development of various fields, one of which is the ICT development in the field of education. The use of Information and Communication Technology (ICT) in education has undergone a very significant development and continues to innovate as technology progresses. Here are some important developments that have been made in the use of ICT in the field of education:

#### 1. Distance learning (PJJ)

With the Internet and online learning platforms, education is no longer limited by time and place. Students can attend lectures from any home or location, and instructors can provide materials from different parts of the world.

Distance learning (DJJ) is one of the aspects that has undergone a major evolution in education, mainly driven by the increased need due to the COVID-19 pandemic. Here are some important points about the development of PJJ: 1) Online Course Materials. 2) Virtual Classroom. Virtual classroom where participants and teachers can interact through audio, video, or chat. 3) Task and Evaluation. Task delivery and evaluation are also done online. 4) Discussion Forum. Space for students to discuss material with instructors and fellow participants (Uno, H. B., & Nina Lamatenggo, S. E. 2022).

PJJ used; 1) Learning Management System (LMS). Systems like Moodle, Blackboard, and Canvas are used to organize learning materials and interactive activities. 2) Web Conferencing Tools. Tools like Zoom, Microsoft Teams, and Google Meet that enable real-time virtual meetings. 3) Cloud Services. Cloud storage services such as Google Drive and OneDrive that facilitate the exchange of documents. 4) Mobile Apps. Learning apps accessible via smartphones and tablets to facilitate access to learning materials. (Indriani, T. 2021).

#### 2. Virtual Class

Virtual classes use video conferencing tools such as Zoom, Google Meet, or Microsoft Teams to conduct learning sessions where participants and teachers can interact in real-time, as if they were in the same classroom (Marsen et al., 2021).

### 3. Educational Games and Simulations

The development of educational and simulation games helps students to understand complex concepts through an interactive and enjoyable learning experience. It provides new ways of learning that are more exciting for the digital generation (Akilli, G. K. 2007).

### 4. E-Learning Platforms

E-learning platforms like Coursera, edX, and Khan Academy provide access to thousands of courses from a wide range of fields of study. It allows learners to develop new skills or deepen knowledge in a particular field with high flexibility (Piotrowski, M. 2010).

### 5. Mobile Learning (M-Learning)

Learning through a smartphone app allows students to learn anywhere and anytime. The mobile learning app offers a variety of educational materials ranging from educational podcasts, quizzes, to interactive lesson videos.

### 6. Open Educational Resources (OER)

Open educational resources such as free textbooks, lecture materials, and other learning resources available on the Internet, make education more accessible to many people.

### 7. Digital Libraries and Archives

Libraries and digital archives provide easy access to a variety of reading materials that may previously be difficult to find. It's very helpful in the research and scientific writing process.

### 8. Cloud-Based Tools for Collaboration

Cloud-based tools like Google Docs, Slack, and Asana facilitate group collaboration and learning project management. Students can work together effectively without having to meet in person.

### 9. Personalized Learning

Technologies such as AI and data analytics enable personalized learning, where learning materials and methods are tailored to the needs and speed of the learner.

ICT development in education focuses on making learning more interactive, accessible, and tailored to individual needs. It is a step forward in the effort to provide quality education for all, remove geographical constraints, and encourage lifelong learning.

## **Benefits and challenges of ICT use in education in the madrasah**

There are many benefits when implementing Information and Communication Technology (ICT) in the educational system of madrasah. Increased access and flexibility

refers to the ability of Information and Communication Technology (ICT) to make it easier for students and teachers to obtain information and participate in the learning process without being constrained by location or time factors. Proper implementation of ICT in education, including in the madrasah environment, can open up wide and in-depth learning opportunities. Here are some important aspects relating to increased access and flexibility through the use of ICT; a) Online Learning Materials. With the learning materials available online, students in the madrasah can access learning resources whenever they want. This is beneficial for students who may be far from physical education resources or have irregular schedules. Digital libraries, video learning, and online courses give students wide access to knowledge from all over the world. The existence of these resources supports self-learning and the wider exploration of science. 2) Interaction and Collaboration. Through an online platform, students and teachers can interact and collaborate in real time, beyond physical locations. 3) Various Learning Resources. ICTs allow access to a wide range of rich sources of information and knowledge, ranging from online books, multimedia content, to discussion forums. 4) Developing 21st Century Skills. Through the use of technology, students can sharpen essential skills such as digital literacy, critical thinking, and teamwork. 5) Differential and Personal Learning. ICT can support differential learning methods, enabling personalized learning to suit the needs of each student. (Kurniawan, W. A. 2023; Santosa, S., & Jazuli, M. F. 2022).

Meanwhile, ICT challenges in education in Madrasah, among them; 1) Infrastructure constraints. Not all madrasah have adequate ICT infrastructure, such as computer devices, internet connections, and stable power sources. There are still many teachers who have limited ICT skills. Therefore, professional training and development is required to upgrade their skills. 3) Curriculum and Pedagogy. Integrating ICT into curricula and learning practices requires change and adaptation, which may require time and resources. 4) Economic and social issues. Not all students have access to ICT devices at home, which can lead to disparities in access to education. 5) Data security and protection. The use of ICTs carries data security and privacy risks, which require appropriate rules and protections. (Iqbal et al., 2023; Santosa, S., & Jazuli, M. F. 2022).

Overall, despite the challenges, with the right approach and adequate support, the integration of ICT in education in the madrasah has the potential to transform a more interactive and contextual way of learning and teaching, while also preparing students for the digital age. Moreover, although increased access and flexibility bring a lot of potential in supporting learning in the madrasah, it is also important to pay attention to the quality of content, professional development of teachers, and student involvement to make this learning effective and productive. The strategic integration of ICT into education requires careful planning, investment in infrastructure, and creative thinking in the pedagogical approach.

## **Policies and Regulations relating to ICT implementation in Madrasah**



The policies and regulations related to the application of Information and Communication Technology (ICT) in Madrasah in Indonesia have evolved along with technological advances. One study showed that Madrasah Aliyah teachers in Sukabumi district have a higher ICT competence index than the average in West Java Province. It marks a positive effort in improving the competence of teachers in the implementation of ICT in Madrasah (Alia, N., & Siagian, N. 2020).

On the regulatory side, the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia, under the leadership of Nadiem Anwar Makarim, has established guidelines on the implementation of curricula that support the use of ICT in the teaching learning process. This policy is expected to facilitate the integration of ICT into learning in Madrasah. Furthermore, the Ministry of Communications and Informatics is also actively involved in the formulation of ICT-related policies, as evidenced by efforts to implement the public trial of the draft regulation of the Minister of Communication and Information Technology on the General Policy of Maintenance of Audit of Information and Communication Technologies. It shows efforts to harmonize ICT regulation and its audits in various sectors, including education. (Hasudungan, A. N., & Abidin, N. F. 2020).

The implementation of ICT in Madrasah is not only limited to the technical aspects, but also how to prepare a qualified digital generation through the integration of religious values. This means that ICT is seen not only as a tool but also as a medium for developing positive attitudes such as ethics and digital security among the students of madrasah. There is a government policy to accelerate digital transformation, as revealed by Ditjen Aptika, demonstrating a strong commitment to maximizing ICT potential for various sectors including education. (Sitokdana, M. N. 2015). This policy focuses not only on the growth of the digital economy, but also on ensuring that educational institutions like Madrasah can adopt and integrate ICT effectively.

From the above description, it is clear that the implementation of ICT in Madrasah in Indonesia is supported by various policies and regulations from various ministries aimed not only to improve the quality of education but also to prepare students to be part of the modern digital society.

The concept of "modern digital society" encompasses a complex and multidimensional landscape that has evolved significantly with rapid technological advances. This society, marked by the presence of digital technology everywhere, encompasses transformative changes in the way individuals communicate, work, and participate in civil life. What is central to the emergence of a modern digital society is the advances in information and communication technology. (TIK). Castells (2010) argues that the emergence of networking societies, an important component of the digital age, is deeply rooted in the interaction between social dynamics and technological innovation. This interaction drives the digitization of almost every aspect of life, embodied in phenomena such as the Internet of Things (IoT), Big Data, and Artificial Intelligence. (AI). Significantly, these technologies have redefined the connection parameters, enabling real-time interaction on a global scale.

Despite many advances, the modern digital society faces a number of challenges, among which the digital divide and privacy issues are the main ones. Van Dijk (2006) explains the digital divide is not only a question of technology access, but also the differential ability to use digital technology effectively. This digital divide highlights socio-economic disparities, potentially exacerbating existing disparities. Furthermore, the prevailing data fiction in the digital society raises acute concerns about privacy and data protection. Commodification of personal data, without strong governance mechanisms, poses a risk to individual autonomy and freedoms.

With regard to the professional environment, with regard to brand trust, modern digital society demands a review of engagement strategies. Brands must navigate an increasingly selective digital audience, sensitive to the authenticity and ethical behaviour of companies. Luhmann (1979) recalls that trust is a mechanism to reduce social complexity, a principle that acquires a new dimension in digital interaction. Therefore, brands are expected to build trust through transparency, ethical data practices, and consistent digital experiences, rooted in an understanding of the dynamics of digital society.

The trajectory of modern digital society affirms the importance of sustainable adaptation and adoption of digital ethics. As explained by Floridi (2014), the establishment of a framework for Information Ethics is crucial in dealing with the ethical challenges posed by digital technology. This kind of approach is crucial in ensuring that advances in digital technology drive inclusive growth and equitable opportunities for all sectors of society.

Thus, modern digital society is characterized by a dynamic interaction between technological innovation and social adaptation. As these societies evolve, the interactions between digital technology and social norms will require a more detailed understanding, in the context of brand trust and professional involvement. The future of a truly inclusive and ethical digital society depends on our collective ability to navigate this complexity with insight and responsibility.

### **Implications of the use of ICT in learning in the madrasah**

The use of information and communication technology (ICT) in learning in the madrasah has a number of important and promising implications. However, like other striking technology implementations, comprehensive ICT also brings its part of the challenge. The implications of these two aspects, the potential for positive change and the challenges to be faced.

Positive Implications of ICT Use in Learning in Madrasah, i.e. 1) Improved Access and Quality of Learning. With digital technology, a teacher can provide learning materials in an interactive and exciting format, which can help strengthen the understanding of concepts by students. ICTs also extend access to diverse and valuable learning resources, as well as offering opportunities for independent learning (Roschelle et al., 2004). In today's digital age, having digital skills is the key to achieving success in a variety of fields. The use of ICT

in the madrasah not only perfected the learning process, but also equipped students with digital skills (Voogt, J., & Knezek, G. 2008).

Meanwhile, the challenges and negative implications of the use of ICT in learning in Madrasah, i.e. 1) Digital gaps. Although ICT offers many advantages, the reality is that the digital gaps are still a challenge, especially in the madrasah in rural areas. Access to technology, internet connectivity, and digital literacy are key issues. (Van Dijk, J. 2006). 2) Security and Privacy Issues; While ICT encourages online learning, it also opens up opportunities for security and privacy threats. Students may become targets of cyber attacks, information theft, and online harassment (Livingstone, S., & Helsper, E. 2007).

Thus, like other technological innovations, the application of ICT in learning at the madrasah brings a set of challenges and opportunities. On the one hand, this technology embraces innovation and provides significant advances in qualitative learning. However, it also brings challenges in terms of accessibility, digital gaps, and security issues. Integral, holistic, community-based solutions may need to be implemented to ensure that the transition to ICT-based learning in the madrasah is inclusive, fair, and secure.

## **Kesimpulan**

The application of Information and Communication Technology (ICT) in the context of learning in the madrasah, should take into account both the potential optimization of the educational process and the obstacles that arise during its implementation. A thorough understanding of these two sides is key to identifying ways in which ICT can be effectively integrated into the curriculum and pedagogical practice in the madrasah.

First of all, it is undeniable that ICT has transformative potential in enriching learning experiences. Through the use of digital tools and online resources, students have the opportunity to access extensive information, interact with learning materials interactively, and develop competencies related to digital skills and information literacy. Furthermore, ICT also strengthens differential teaching and learning adaptation that meets the individual needs of students, an important aspect in improving the quality of education.

However, the implementation of ICT in learning in the madrasah is not exempt from the various challenges. The main obstacles include digital gaps, which have a negative impact on students in environments with limited access to technology and online security and privacy issues as well as the need for teacher professional development to be able to integrate these technologies into their learning practices effectively. In addition, cultural and institutional factors also play a role in regulating the extent to which ICTs can be adopted in the madrasah. The role of traditional values and standardized education approaches can raise tension with the learning paradigm supported by ICTs, which often adapt a more flexible and student-oriented approach.

Therefore, the presence of ICT developments in improving the quality of learning in the madrasah is significant, its successful implementation requires a holistic approach. It demands addressing infrastructure barriers, developing policies that support the widespread use of ICTs, as well as supporting systems for teacher professional development. In this way, ICT will not only be a tool that improves access to learning resources, but will also encourage a more inclusive, interactive, and responsive pedagogical approach to the learning needs of students in the madrasah.

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