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Adaptation of Technology for Islamic Religion Teachers in Elementary Schools with Bibilographic Approach

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Abstract

This study aims to explore the adaptation of technology by Islamic Religion teachers in elementary schools through a bibliographic approach. With the rapid advancement of technology, there is an increasing need to integrate technology into the learning process, including in Islamic education. This research examines relevant literature to identify various methods, challenges, and best practices in using technology to support Islamic Religion teaching at the elementary level. Utilizing a bibliographic approach, the study analyzes academic sources and existing practices, identifies patterns and trends in technology adaptation, and provides recommendations to enhance teaching effectiveness. The findings are expected to offer valuable insights for policymakers, educators, and technology developers in designing more effective strategies for integrating technology into Islamic education in elementary schools.

Keywords: *Adaptation of Technology, Islamic Religion Teachers, Elementary Schools Bibilographic Approach*

INTRODUCTION

The development of technology plays an important role in education [1][2], helping teachers deliver material, manage classrooms, evaluate learning outcomes, and communicate with students and parents [3][4]. However, not all teachers possess the adequate skills to utilize technology [5][6], which makes training and support necessary for more effective integration of technology in learning [7][8]. According to data from the Ministry of Education and Culture, only about 15% of the 2.8 million teachers in Indonesia have competence in the use of ICT [9]. A survey by Huriyatunnisa shows that the majority of elementary school teachers still lack proficiency in operating online learning platforms [10][11], leading them to more frequently use WhatsApp and YouTube to deliver material [12][13]. This has resulted in less effective explanations of the material and a decline in the quality of online learning [14][15]. Therefore, the improvement of teachers' competencies in learning technology is very important [16][17].

The adaptation of technology for elementary school teachers involves adjusting to technological changes in education [18]. Factors such as attitude, motivation, self-confidence, resources, institutional support, and social environment influence the extent to which teachers can integrate technology into learning [19]. Teachers who adapt to technology can enhance the quality of learning through more interactive tools and methods [20]. This adaptation also supports the development of professional competencies, expands knowledge, and keeps up with current educational trends [21][22], making students' learning experiences more effective and helping them face future challenges [23].

Technology has the potential to provide accessibility for students with special needs, including those who experience learning difficulties [24]. Technological aids such as screen reader software or specialized learning applications help teachers accommodate students' needs more effectively [25]. Online learning platforms, discussion forums, and professional social networks allow teachers to share experiences, strategies, and supporting resources [26], which enrich teaching practices and enable cross-subject and cross-class learning.

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This paradigm shift requires support from the government, educational institutions, and the community to provide training for teachers in adopting technology [27]. Funds and resources must be allocated so that every teacher has access to the necessary devices and training [28]. The adaptation of technology is not the ultimate goal, but rather a means to achieve better learning [29]. The teacher continues to play a central role in guiding and shaping students' character [30], while technology is a tool that must be used wisely to achieve broader educational goals [31].

The adaptation of technology for elementary school teachers is a natural evolution in education that aligns with the progress of the times [32]. The integration of technology allows teachers to provide a more relevant and engaging learning experience for students [33]. Thus, teachers can bridge the gap between traditional education and modern technology, while still maintaining the essence of holistic and inclusive education [34]. The rapid development of information and communication technology has made the use of technology in the classroom increasingly common and diverse [35]. Technologies such as projectors, computers, and tablets have made learning more interactive [36][37], while the internet enriches learning resources [38], enhancing student motivation and engagement [39].

However, behind its benefits, teachers in elementary schools face challenges in adapting technology in the classroom. Not all teachers have adequate access or skills to integrate it well [40], which could potentially create a gap between capable teachers and those who are still limited. This research aims to provide a deeper understanding of technology adoption by elementary school teachers in teaching. The results are expected to significantly contribute to the development of technology adaptation in primary education by providing valuable recommendations for teachers, schools, the government, and the community.

METHOD

Study Design

This research uses a bibliographic study to describe technology adaptation for teachers. Bibliographic analysis is a quantitative approach that analyzes data in articles or journals [41]. There are two main approaches: citation analysis, which examines how one article is cited by other articles, and co-citation analysis, which looks at two or more articles that are cited by a single article [42]. This method is commonly used in various disciplines such as sociology, humanities, and marketing. This analysis is useful for investigating the cited references, mapping the scientific field, and classifying scientific articles based on related research [43]. The bibliography can also review the productivity of authors, collaboration, and the use of literature through citation analysis [44]. This study uses statistics to measure the research sample [45] and applies bibliographic analysis to identify patterns, trends, and visualize metadata, following PRISMA guidelines for the search and screening of sources.

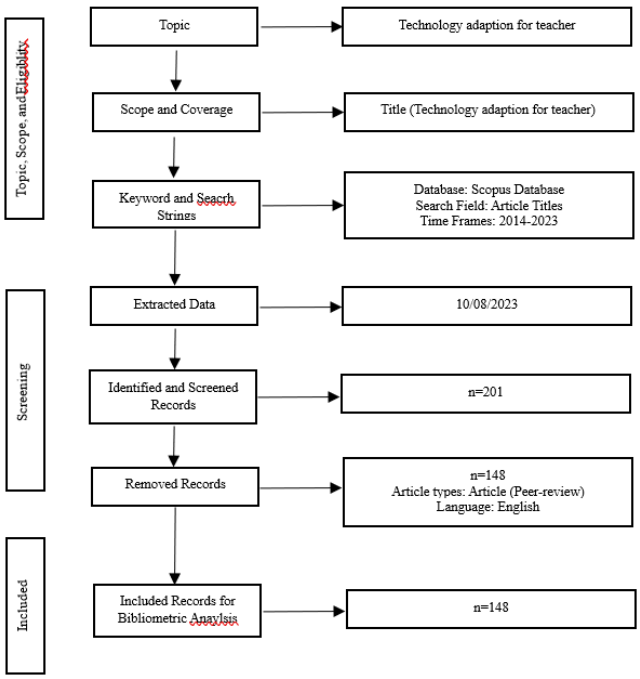


Figure 1. Reporting Item Choices for Systematic Review and Meta-Analysis

Data Search and Identification

The data in this study was taken from the Scopus database on August 10, 2023, focusing on articles published in the last 10 years (2014–2023) regarding technology adaptation for teachers. Scopus includes high-reputation scientific journals with a strict peer review process, ensuring that the data used is valid. This research only utilizes journals indexed in Scopus. The keywords used in the search are "technology adaptation for teachers", which were entered into the Scopus search engine without restricting the initial results to a specific category. The adaptation of technology by elementary school teachers remains a relevant topic, referring to the ability of teachers to integrate technology to enhance the quality of learning and interaction with students [46]. Bibliographic studies can be an effective first step in preparing teachers to face the challenges and opportunities of technology adaptation in education. Although bibliographic analysis has been used in various studies [47][48][49][50][51], research on technology adaptation using this approach is still limited.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1. The main topic involving technology adaptation for teachers. 2. Journal article in English.	1. Not the main theme of the article. 2. Conference/proceedings, book

After selecting the topic to be studied by determining the keywords, the data is exported in CSV format. The data in CSV format is then analyzed using MS Excel. All the obtained data is subsequently exported to Microsoft Excel for organization, correction, and selection. This research uses citation validity and scores with Publish or Perish software. The research analysis technique used in this study is content analysis. The findings are then presented in the form of images, graphs, and tables.

Data Extraction

This research identifies relevant publications and journals listed in Scopus, covering only articles that have undergone the peer-review process. Reviews, books, and conference proceedings are not included. The researchers collected 148 articles and selected the 10 best articles based on Scopus rankings for further analysis, along with an additional 226 articles in the bibliographic analysis. The top ten publications are also reviewed

independently to ensure high validity. The data was selected after reaching an agreement to resolve the differences of opinion.

Statistical Analysis

In this research, the discussion on technology adaptation for elementary school teachers involves 10 top publications, covering topics, journals, institutions, concepts, methods, analyses, and future works. Bibliometric analysis applies bibliometric theory across various disciplines using statistical and mathematical methods to examine relevant material according to the research theme [52]. References were analyzed using the VOSviewer application, which provides bibliometric maps and graphical representations in an easy manner. VOSviewer allows for the visualization of publication metadata, bibliographic coupling, co-authorship, and co-citation.

RESULTS AND DISCUSSION

A few years ago, teachers had to adapt to technology to carry out teaching and learning activities [53], which had a significant impact on their ability to use technology [54]. Research on technology adaptation for teachers is drawn from Scopus-indexed articles over the past ten years, with several of the best articles selected for analysis. Here are ten of the best articles on technology adaptation for teachers:

Table 2. 10 Best Articles on Technology Adaptation for Teachers

Rank	References	Cites	Titles	Key concepts	Methods	Scholary highlights	Future research
1	Steve Graham, Andrea Capizzi, Karen R. Harris, Michael Hebert, Paul Morphy (2014) [55]	134	Teaching writing to middle school students: a national Survey	Writing, Middle schools, National survey	Participants: 285 Location: North America Instrumen: gender, number of years teaching, ethnicity, and educational level Type: Quantitative research	The findings show that many teachers feel unprepared to teach writing, even though some evidence-based writing practices are being used. However, the implementation of this practice is still limited, assessment data is rarely used to guide teaching, and the use of computers in writing instruction is still restricted.	Efforts to enhance teachers' preparation for teaching writing involve better training and internships. It is recommended to encourage the use of evidence-based writing practices and adaptations for students who are struggling. The use of assessment data in writing instruction needs to be enhanced, and the role of computers in writing learning should be expanded.
2	Marina Fridin and Mark Belokopytov (2014) [56]	118	Acceptance of socially assistive humanoid robot by preschool and elementary school teachers	Social assistive robotics, Unified Theory of Acceptance and the Use of Technology, Teacheracceptance	Participants: 18 Location: Israel Instruments: questionnaires and interviews or Group Focus Jenis: Unified Theory of Acceptance and Use of Technology (UTAUT)	This research investigates the initial acceptance of AI by kindergarten and elementary school teachers, providing insights into how this technology is embraced by young educators.	The acceptance of robots has been tested at a personal level, but not at the school or technological level. The influence of a robot's personality on user acceptance also needs to be considered. There is a difference between the behavior of robots (such as comedians or game players) and the results of questionnaires evaluating the acceptance of robots as teaching assistants.
3	Bobo, E., Lin, L., Acquaviva, E., Caci, H., Franc, N., Gamon, L., Purpe Ouakil (2020) [57]	103	How do children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD) experience lockdown during the COVID-19 outbreak?	ADHD; Bien-être; Children; Confinement; Enfants; Famille; Family; Lockdown; School; TDAH; Well-being; École	Participants: 538 Location: France Instrument: in-depth interview Types: descriptive, qualitative, and texttometric analysis.	This research can provide deep insights into the impact of the COVID-19 pandemic on children and adolescents with ADHD, including how environmental factors and changes in routine affect their ADHD symptoms and mental well-being.	This research aims to identify effective strategies to assist children and adolescents with ADHD in coping with limitations in activities and social interactions, as well as to develop appropriate psychosocial support services during crises such as a pandemic.
4	Oliveira, G., Grenha Teixeira, J., Torres, A., &	102	An exploratory study on the emergency remote	COVID-19, emergency remote education,	Participants: 30 Location: Portugal	This research highlights the importance of adopting technology in higher education during the COVID-19 pandemic. This	The results of this research indicate that the impact of technology adoption on distance education will influence the future of higher education. Positive and negative experiences in the use of ICT

	Morais, C. (2021) [58]		education experience of higher education students and teachers during the COVID-19 pandemic	higher education, online learning, qualitative research, technology-mediated learning	Instruments: educational process, ICT use and personal adaptation Type: Qualitative	study provides a deep understanding of the role of technology in connecting students and teachers during a global crisis, as well as the urgency of strategic and collaborative adaptation in higher education.	platforms inform the long-term planning of educational institutions. The future of education may involve improving existing platforms, developing more effective technological solutions, and investing in training for students and teachers.
5	Dovey, Kim, and Kenn Fisher (2014) [59]	102	Designing for adaptation: The school as socio-spatial assemblage		Participants: 59 Location: Australia Instruments: Observation of the study room, Analysis of documents, and interviews Type: Qualitative	This research makes an important contribution to understanding the relationship between school architecture and pedagogical practices in an era of change. Using the assembly theory framework, this research analyzes various school plans and reveals how spatial structure and socio-spatial interconnections can support or hinder the evolution of pedagogy.	This research raises questions about the application of the concepts of adaptation and interconnection in classroom design, as well as educational policy support for this transformation. By leveraging assembly theory and philosophical concepts, further research could delve deeper into the relationship between architecture, learning spaces, and the evolution of educational approaches, opening up opportunities for future innovation.
6	Kim, Yelin, Tolga Soyata, and Reza Feyzi Behnagh (2018) [60]	101	Towards Emotionally Aware AI Smart Classroom: Current Issues and Directions for Engineering and Education	Educational technology, emotion recognition, smart classroom, deep learning, real-time computing, mobile-cloud computing, meta-cognition.	Participants:- Location: America Instruments: Monitoring and Video Recording Systems, Sensors and Recording Equipment Type: Development	In the context of the development of smart classrooms, scientific attention will focus on the integration of real-time sensing technology and machine intelligence in educational environments.	Technologies such as deep learning-based emotion analysis and real-time mobile cloud computing can transform teaching and learning by providing a richer and more responsive interactive experience. Emotion analysis can enhance the quality of presentations through real-time adjustments to the teacher's non-verbal cues, while cloud computing enables quick access to data and suggestions.
7	Perez-Lopez, Eva, A. Vázquez Atochero, and S. Cambero Rivero (2020) [61]	90	Distance Education in COVID-19's period: An Analysis from the perspective of university students	COVID-19, enseñanza superior; educación a distancia; equidad digital; estudiantes universitarios	Participants: 548 Location: Spain Instruments: structured and semi-structured interviews, questionnaires Type: qualitative and quantitative	This article highlights the impact of personal and family context on digital access in education, as well as a comparison of the effectiveness of face-to-face and distance learning models during the COVID-19 pandemic.	The findings of this research suggest that higher education needs to transform towards a more collaborative and student-centered approach. With the rise of digitalization and remote learning, it is important for institutions to address the digital access gap, especially for students from low-income backgrounds.
8	Andrea Gaggioli, Fed erica Pallavicini, Lu ca Morganti, Silvia Serino, Chiara Scaratti, Marilena Briguglio, Giulia Crifaci, Noemi Vetrano, Annu nziata Giulintano, Gi useppe (2014) [62]	90	Experiential virtual scenarios with real-time monitoring (interreality) for the management of psychological stress: A block randomized controlled trial	psychological stress; Interrealit y; virtual reality; biosensor s; heart rate; heart rate variability; biofee dback training; relaxati on training; physiol ogical monitoring; sma rtphones	Participants: 121 Location: Italy Instruments: Interreality (VR Paradigm), Cognitive Behavioral Therapy (CBT) Techniques, and Coping Skills and Emotional Support Type: Quantitative	This research describes an innovative approach that combines VR technology with the real world to address psychological stress, using the Interreality paradigm. Positive results, such as a decrease in chronic anxiety and an increase in emotional support skills, indicate the great potential of this technology in the field of mental health.	The findings of this research provide a strong foundation for the further development of the use of VR and related technologies in addressing psychological stress. The integration of the virtual and real worlds through virtual scenarios, physiological monitoring, and real-time support shows potential for more effective protocols in preventing and managing mental disorders.
9	Tejedor, S., Cervi, L., Tusa, F., & Parola, A. (2020) [63]	86	Education in times of pandemic: Reflections of students and teachers on virtual university education in	Educational technology; Higher Education; public education; educational process; student adaptation; distance	Participants: 300 Location: Spain, Italy and Equador Instrument: survey Type: Descriptive and exploratory	The scientific highlight of this research is the understanding of the paradigm shift in learning that is necessary during a global crisis, with implications for the development of curricula and learning approaches that	The findings of this research provide a foundation for further development in distance education. The future of education will increasingly integrate technology and digital skills into the curriculum, as well as implement reflective and innovative approaches in teaching.

			Spain, Italy and Ecuador	education; virtual learning.		are responsive to unexpected situations.	
10	Munoz-Cristobal, J. A., Jorrin-Abellan, I. M., Asensio-Perez, J. I., Martinez-Mones, A., Prieto, L. P., & Dimitriadis, Y. (2014) [64]	71	Supporting teacher orchestration in ubiquitous learning environments: A study in primary education	Artificial, augmented, and virtual realities, computer uses in education, education, ubiquitous computing, mobile environments	Peserta: 18 Lokasi: Spanyol Instrumen: GLUEPS-AR Jenis: Kuantitatif	This research makes a significant contribution to understanding how technology, particularly the GLUEPS-AR system, can support the orchestration of cross-space learning in complex educational environments. An interpretative approach reveals the complexities of interactions between teachers, students, and technology in outdoor settings.	This research can serve as a foundation for the development and improvement of orchestration support systems like GLUEPS-AR in the future. Further research may include additional technologies such as artificial intelligence and data analysis for more advanced solutions in managing cross-space learning. This finding also provides valuable guidance for developing new approaches in education that more effectively integrate technology and the physical environment.

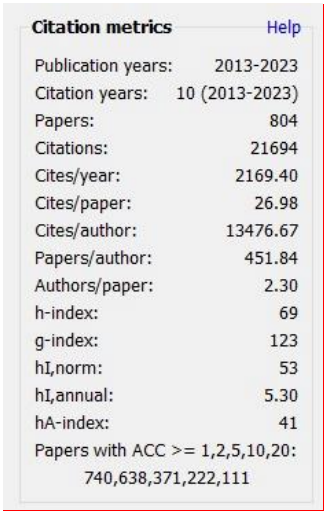
Technology has a direct impact on jobs, including the education sector, where elementary school teachers must adapt to technological advancements to support the teaching and learning process [65]. Does technology adaptation influence the improvement of teachers' competencies? The improvement of teachers' abilities to utilize technology to support learning is essential in today's era [66].

The findings of the journal analysis related to technology adaptation for teachers are presented with a central theme, covering the journal name, country, affiliation, academic thematic trends, methods, and future research directions. Table 2 shows that research on technology adaptation for elementary school teachers over the past ten years has shown an increasing trend, with the highest peak in citations and publications in 2014. The contributions of countries such as the United States, Israel, France, Portugal, Australia, Spain, Italy, and Ecuador are evident in the top 10 articles, reflecting an increase in scientific contributions that benefit teachers' competencies in the teaching and learning process.

In terms of technology, Diana interprets adaptation as the effort of an organism (human or otherwise) to adjust to a specific environment by utilizing available resources to solve pressing problems. Diana defines technological adaptation as the effort to adjust to the environment by leveraging resources to address urgent issues [67]. Apriliani explains technology as the application of knowledge to simplify tasks The adaptation of technology has become a primary focus in research, especially for teachers who must keep up with technological advancements. Dovey emphasizes the importance of understanding the complex relationships in this process [59], while adaptation and interconnection in technology design support that transformation [69]. The listed articles indicate that technology adaptation significantly enhances teachers' competencies, thereby promoting more effective learning. Research shows that these articles have high citations and relevance to the theme of technology adaptation, highlighting the importance of comprehensive teacher training to optimally leverage technology [70]. However, without effective strategies, the use of technology may not achieve the desired outcomes [71].

The journal contribution analysis publishes articles that discuss technology adaptation for teachers.Analysis of publication thematic trends on technology adaptation for teachers.

The search results for metadata on publications in the form of journals titled "Technology Adaptation for Elementary School Teachers" over the last 10 years from 2013 to 2023 show 804 journal articles with a total citation count of 21,694, averaging 2,169.40 citations per year, authored by 13,476 writers.



Citation metrics	Help
Publication years:	2013-2023
Citation years:	10 (2013-2023)
Papers:	804
Citations:	21694
Cites/year:	2169.40
Cites/paper:	26.98
Cites/author:	13476.67
Papers/author:	451.84
Authors/paper:	2.30
h-index:	69
g-index:	123
hI,norm:	53
hI,annual:	5.30
hA-index:	41
Papers with ACC >= 1,2,5,10,20:	740,638,371,222,111

Figure 2. Results of the Publish or Perish metadata analysis from Google Scholar for the journal titled "Technology Adaptatin for Elementary School Teachers."

Source: Research Data Processing (Publish or Perish), 2023

The analysis results from Vosviewer for the title "Technology Adaptation for Elementary School Teachers" revealed 22 items, 3 clusters, 150 links, and a total link strength of 1424. "The adaptation of technology for elementary school teachers" is most closely related to the words: teacher, technology, and elementary school. However, there are fewer words that also draw attention, such as numeracy, technology adaptation, using technology, new, and others that also emerge in this visual network.

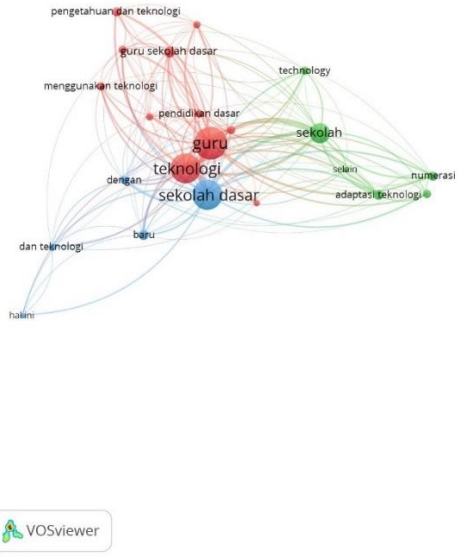


Figure 3. Network Visualization of Technology Adaptation for Elementary School Teachers Source: Research Data Processing (VOSviewer), 2023

The adaptation of technology for elementary school teachers shows, through its overlay visualization, that in the most recent year, the most frequent words are "numeracy" and "technology adaptation."

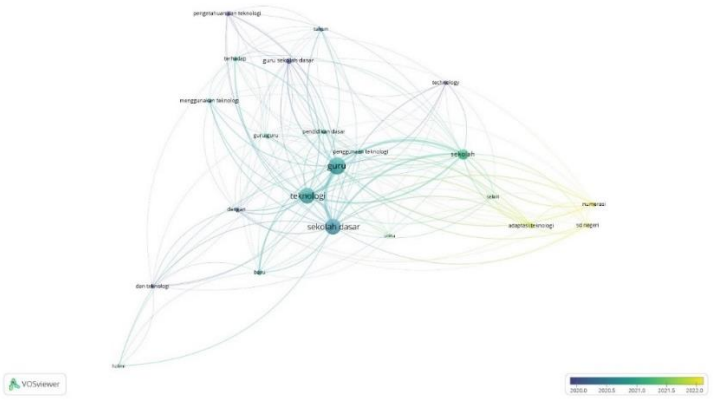


Figure 4. Overlay Visualization of Technology Adaptation for Elementary School Teachers

Source: Research Data Processing (VOSviewer), 2023

The overlay visualization shows a significant increase in the use of two key terms: numeracy and technology adaptation, in the title "Technology Adaptation for Elementary School Teachers" over the past year. The rise in the frequency of the word "numeracy" indicates a focus on counting skills in the context of technology adaptation, while the increase in the term "technology adaptation" reflects the need for adjustments to technological developments in elementary education. This visualization underscores the dominant trend in research related to technology adaptation for elementary school teachers.

The density visualization shows that three main elements: Teachers, Technology, and Elementary Schools are the primary focus in research on technology adaptation for elementary school teachers. The Teacher element highlights the roles and challenges faced by teachers in adapting to technology, Technology focuses on the application of technological tools and platforms, and Elementary Schools emphasize the educational context at the primary level. This visualization provides a clear picture of the main dimensions emphasized in the literature on technology adaptation.

CONCLUSION

The adaptation of technology in teaching Islamic education in elementary schools offers great opportunities to enrich the learning process. Using a bibliographic approach, this research identifies various benefits of technology, such as enhancing interactivity and student engagement through engaging multimedia materials. Technology can also expand access to relevant learning resources and support more dynamic teaching methods. However, challenges such as limited infrastructure, lack of teacher training, and resistance to change must be addressed to maximize those benefits.

To address this challenge, effective strategies are needed, including training for teachers, the development of teaching materials that align with Islamic values, and support from both the school and parents. Sustainable efforts in technology integration must be carried out carefully to ensure that the technology implemented not only supports religious education goals but also aligns with religious principles and supports the holistic character development of students.

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