

Lectora-Based Interactive E-Module: A Solution to Develop Mathematical Logic Intelligence of Islamic Elementary School Student in the Era Society 5.0

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Abstract

The research designed in this library research aims to describe and analyze the advantages and disadvantages of Lectora-based interactive e-modules in developing mathematical logic intelligence of Madrasah Ibtidaiyah students in the era society 5.0. Data collection techniques using documentation, sourced from Scopus articles totaled 7, International articles totaled 5, Sinta 2 totaled 3, Sinta 3 totaled 6, Sinta 4 totaled 5, Sinta 5 totaled 7, Sinta 6 totaled 1, International Proceedings totaled 2, Google Scholar Journals totaled 4, and Scientific Books totaled 7. After the data is collected then analyzed with descriptive analysis and content analysis. The results showed that the use of Lectora-based interactive e-modules proved effective for developing mathematical logic skills of Madrasah Ibtidaiyah students. And can be offered as an alternative in the world of education to face the era society 5.0 because of the easy access to learning through digital technology or Information and Communication Technology (ICT).

Keywords: Era Society 5.0, Lectora Application, Interactive E-Module, Math logic Intelligence

Abstrak

Penelitian yang dirancang dalam penelitian kepustakaan ini bertujuan untuk mendeskripsikan dan menganalisis kelebihan dan kekurangan e-modul interaktif berbasis Lectora dalam pengembangan kecerdasan logika matematika siswa Madrasah Ibtidaiyah di era society 5.0. Teknik pengumpulan data menggunakan dokumentasi, yang bersumber dari artikel Scopus berjumlah 7, artikel Internasional berjumlah 5, Sinta 2 berjumlah 3, Sinta 3 berjumlah 6, Sinta 4 berjumlah 5, Sinta 5 berjumlah 7, Sinta 6 berjumlah 1, Prosiding Internasional berjumlah 2, Jurnal Google Scholar berjumlah 4, dan Buku ilmiah berjumlah 7. Setelah data terkumpul kemudian dianalisis dengan analisis deskriptif dan analisis isi. Hasil penelitian menunjukkan bahwa penggunaan e-modul interaktif berbasis Lectora terbukti efektif untuk mengembangkan kemampuan logika matematika siswa Madrasah Ibtidaiyah. Serta dapat ditawarkan sebagai alternatif dalam dunia pendidikan untuk menghadapi era society 5.0 karena kemudahan akses pembelajaran melalui teknologi digital atau Teknologi Informasi dan Komunikasi (TIK).

Kata Kunci: Era Society 5.0, Aplikasi Lectora, E-modul Interaktif, Kecerdasan Logika Matematika

INTRODUCTION

According to survey data from the Association of Indonesian Internet Service Providers (APJII), the use of internet-based technology in Indonesia in 2023 was 78.19 percent or penetrated

215,626,156 people from a total population of 275,773,901. The data shows a high number, not all internet users are digitally proficient and digitally literate, Indonesia ranks third as the largest internet user in the world, and the application of technology among the community is still limited to educated people and those living in big cities, most people only use the internet for social networking, such as WhatsApp, Instagram, Twitter and Facebook (Yohanna, 2020). The survey results certainly cause concern for teachers and education personnel, regarding the negative impact of the development of digital technology, including causing addiction tendencies, which is a strong willingness to use an object, lose control of its use and always engage with the object without regard to its harmful effects (Kogoya & Uruwaya, 2022).

Teachers in the 21st century digital era, printed to be able to keep up and provide positive alternatives in the form of utilizing ICT learning media in the world of education, besides that teachers are expected to have qualified competence in the field of technology as a provision for the teaching and learning process to run more effectively and efficiently (Erni et al., 2021; Handayani et al., 2023; Sitompul, 2022). This is in accordance with the independent curriculum, that the material taught to students is essential so that it makes teachers need to provide digital technology-based learning media, so that it can accommodate the suitability and level of understanding of students at the Madrasah Ibtidaiyah level, especially learning mathematics (Halimah & Kurniawati, 2022; Putri, et al., 2022; Yunaini et al., 2022). It is important for students to continuously develop their mathematical creative thinking talent during the learning process, as this is comparable to their critical thinking ability (Aizikovitsh-Udi & Cheng, 2015). Creative mathematics can compensate students in developing logical and conceptual critical thinking skills (Maskur et al., 2022).

Mathematics in Madrasah Ibtidaiyah is one of the lessons that is considered difficult, several studies show empirical data that this is due to the modules used in learning mathematics are still only limited to containing formulas and material, thus making learning boring and making learning passive and difficult to understand (Atikah et al., 2021). Furthermore, based on an analysis conducted by the Program for International Student Assessment (PISA) in 2018, it shows that Indonesia ranks 73rd out of 79 countries that have low mathematical logic skills, making it difficult to solve problems related to mathematical logic (Balitbang Kemendikbud, 2018).

The explanation indicates that teachers need to provide more innovative, creative and interesting media in the form of interactive teaching materials (Adoe & Manane, 2022). One of them is an interactive e-module based on Lectora, interactive e-modules are used as an alternative because of their advantages, such as animation, audio, video, and can provide flexibility for students to learn at their own pace and ability and interestingly, assessment can be done independently (self-assessment) in the form of informative assessment instruments. Lectora is a software authoring tool commonly used for e-learning content development that was first launched by Trivantis Corporation founded by Timothy D. Loudermilk in Cincinnati, Ohio, America in 1999. Lectora provides templates that are ready to be used to include learning materials, besides that in the Lectora Library there are already many images, animations, and characters that can be directly used, interestingly interactive e-modules developed with Lectora can be used, both online and offline (Anam & Tijan, 2022). The concept of thinking that links the relevance between mathematics and real-life phenomena in the 21st century is thinking that contributes ideas in making logical and innovative conclusions or also called metaphorical thinking, this thinking provides opportunities for students to explore their knowledge in learning mathematics, or the relationship between mathematics and everyday life so that it can arouse a spirit of curiosity and reflection of prior knowledge (Farida, et al, 2022).

This explanation is in accordance with research conducted by (Mahfudhah et al., 2022) shows that the e-module is valid and can facilitate students' understanding of mathematical concepts. Furthermore (Rachmawati et al., n.d.) also stated that there was an effect of using Lectora Inspire on math learning. Lastly, Istiqomariyah, et al (2022) also strengthened the results of previous studies, which states that Lectora Inspire 17 learning media is very well applied to Madrasah Ibtidaiyah

students, and can improve student learning outcomes in mathematics subjects on the material of volume of buildings, cubes and beams, square numbers and square roots. Some previous studies have shown that lectora-based e-modules are valid and can improve the mathematical logic intelligence of Madrasah Ibtidaiyah students. So, based on the problems and interests mentioned above, as well as previous research literature, the purpose of this study is to describe and analyze the advantages and disadvantages of Lectora-based Interactive E-Modules for the development of mathematical logic intelligence of Madrasah Ibtidaiyah students in the era society 5.0.

RESEARCH METHODS

This research uses a type of library research with qualitative research signs, with the aim of describing and analyzing the advantages and disadvantages of Lecora-based interactive e-modules in developing mathematical logic intelligence of Madrasah Ibtidaiyah students in the era society 5.0. The data collection technique used documentation, which was sourced from Scopus articles totaled 7, International articles totaled 5, Sinta 2 totaled 3, Sinta 3 totaled 6, Sinta 4 totaled 5, Sinta 5 totalied 7, Sinta 6 totaled 1, International Proceedings totaled 2, Google Scholar Journals totaled 4, and Scientific Books totaled 7. After the data was collected, it was analyzed with descriptive analysis and content analysis. Meanwhile, the research subject is the researcher himself who really examines in depth the data related to the research variables. As stated by Sujarweni (2019), library research involves examining written documents such as textbooks, newspapers, magazines, letters, films, diaries, manuscripts, articles, and other published materials. There are three important reasons researchers conduct library research, namely: (1) Research problems can only be answered through literature research; (2) Literature research requires a separate stage, where an initial study is needed to understand the latest symptoms developing in society; (3) The results of literature research can be trusted in answering research problems (Wandi & Mayar, 2020).

The data analysis process uses an inductive thinking method. The inductive thinking method according to Sujarweni (2019) is a pattern of thinking that is carried out to build a theory based on the results of observations or observations made repeatedly and form patterns that will give birth to hypotheses derived from observations made and then a theory is obtained. This method brings together various information findings from relevant previous research related to Lectora-based interactive e-modules, mathematical logic intelligence, and the era society 5.0 to be summarized into a new thought that can be accounted for. The research data analysis process can be described as follows: (1) Theory; (2) Hypothesis; (3) Pattern; (4) Observation (Sujarweni, 2019). based on this, researchers use a framework, namely: (1) Data collection; (2) Data observation; (3) Data generalization; (4) Development of observation data; and (5) Inductive data analysis.

RESULTS AND DISCUSSION

Lectora-based interactive E-Modules can be used as an alternative in improving the mathematical logic intelligence of Madrasah Ibtidaiyah students, based on analysis of 7 Scopus Journals, 5 International articles, 3 Sinta 2 Journals, 6 Sinta 3 Journals, 5 Sinta 4 Journals, 7 Sinta 5 Journals, 1 Sinta 6 Journal, 2 International Proceedings, 4 Google Scholar Journals, and 7 Scientific books related to the research focus. The strengths and weaknesses of Lectora-based Interactive E-Modules in Developing Mathematical Logical Intelligence of Madrasah Ibtidaiyah Students in the era society 5.0 can be described in the following table:

Table 1. (Advantages and Disadvantages of Lectora-based Interactive E-Modules in Developing Logical Mathematical Intelligence of Madrasah Ibtidaiyah Students in the Era Society 5.0)

Numb.	Focus of Research	Advantages	Disadvantages
1.	Lectora-based Interactive E-Modules in Developing Logical Mathematical Intelligence of Madrasah Ibtidaiyah Students in the era society 5.0	Can present material, provide examples through pictures and videos, and evaluation at the same time	Early users have difficulty operating Lectora.
2.		Can provide meaningful learning experiences for students	Takes time to learn the features and how to use it.
3.		Saves time to compile interesting digital-based learning for teachers	The beginning of downloading the trial version of Lectora, it is only valid for 30 days, the rest cannot be used unless you buy the full application on the official Lectora website.
4.		Can be used for independent learning for students	If the processor on the computer is slow, it will affect the speed of the application when used.
5.		Can be accessed anytime and anywhere, both online and offline	The use of lectora must be supported by an LCD, and a computer to run it.
6.		Teachers can create features to develop mathematical logic intelligence of Madrasah Ibtidaiyah students, such as adding games, crosswords, and tests	The creation of Lectora Help agent-based Interactive E-Modules requires Flash Player 8.0 or higher
7.		Increase learning motivation	The creation of Lectora-based Interactive E-Modules requires Microsoft Internet Explorer 6.0 and above, Firefox 1.0 and above, and Safari 1.2 and above, as well as Google Chrome
8.		Support ICT-based learning in the era society 5.0	The creation of Lectora-based Interactive E-Modules also requires Microsoft DirectX 9 or later for Camtasia, Microsoft .NET Framework 3.5 SP1 for flypaper, and adobe flash player version 9.0.115.0
9.		Improve mathematical logical thinking skills	The creation of Lectora-based Interactive E-Modules is often directly installed on the computer, so it sometimes slows down the computer because the installation file size is quite large (around 800 MB).

The information in the table can be described in detail and dialogued with previous theories in the discussion below:

The Advantages and Disadvantages of Lectora-Based Interactive E-Modules in Developing Mathematical Logic Intelligence of Madrasah Ibtidaiyah Students in the Era Society 5.0

Can present material, provide examples through pictures and videos, and evaluation at the same time

Lectora inspire can be used to combine images, screen capture, text, tables, clip art, audio, video, flash animation, special effects, 3D effects and other effects. Lectora includes several included content, namely Flypaper™ for Lectora (to make students more creative by adding flash animation content, transitions and special effects), Camtasia for Lectora (to create more professional tutorials and can be used to capture videos, flash animations or 3D design software) and Snagit for Lectora (used to capture content on the desktop to create images or pictures, and equipped with callouts) (Dewi Shalikhah, 2016a).

Furthermore, the use of Lectora in learning has several advantages, including: (1) Interactive learning system, (2) Using text, sound, video, animation in one unit, (3) Can visualize abstract material, (4) Relatively easy and flexible storage media, (5) Replace very large or dangerous objects in the classroom environment, (6) Display objects that cannot be seen by the naked eye (Dewi Shalikhah, 2016).

Based on some of the literature quoted from the opinions of experts, it can be synthesized that Lectora-based interactive e-modules are very suitable for learning materials that require more concrete visualization, such as materials that are closely related to the use of mathematical logic, so as not to cause misconceptions and encourage students to compete in learning, known as achievement motivation.

Can provide meaningful learning experiences for students

The use of Lectora in learning has several advantages, including: (1) Interactive learning system, (2) Using text, sound, video, animation in one unit, (3) Can visualize abstract material, (4) Relatively easy and flexible storage media, (5) Replace very large or dangerous objects in the classroom environment, (6) Display objects that cannot be seen by the naked eye (Dewi Shalikhah, 2016).

Furthermore, (Masganti et al., 2021) revealed some characteristics of children who have high mathematical logic intelligence, namely: have the ability to process numbers or proficiency using logic, are interested in manipulating the environment and tend to like to apply trial and error strategies, have a great curiosity about an event or experience experienced, and like to arrange games that are categorical and hierarchical. This indicates that in learning mathematics, children will be more interested if the teacher uses interactive learning media, this statement is in accordance with Milsan & Wewe, (2019) which states that mathematics learning in the classroom should emphasize the connection between mathematical concepts and children's daily experiences. In addition, reapplying mathematical concepts that children already have in everyday life or in other fields is very important, for this reason, learning mathematics requires learning media to link mathematical concepts with everyday life.

Saves time to compile interesting digital-based learning for teachers

Interactive e-modules can be developed using the Lectora inspire application which is one of the software created by Triviantis Corporation in 1999 for e-learning needs, among its advantages is user friendly (easy to use) and can be accessed either online or offline, so it can help teachers in time efficiency. Lectora is often used to develop interactive learning multimedia content (Anharuddin & Prastowo, 2023).

Can be used for independent learning for students

Lectora-based interactive e-modules can contain various components in learning, ranging from material, providing examples through images and videos relevant to mathematics learning, to evaluation. Thus, it can provide meaningful learning experiences for students and save time for teachers to develop interesting digital-based learning. Interestingly, Lectora-based interactive e-modules can also be used for independent learning for students and can be accessed anytime and

anywhere, both online and offline (Wulandari & Fatmahanik, 2020).

Furthermore Dewi Nur, I. R., Herman, T., (2018) added, in Lectora-based interactive e-modules, teachers can create features, such as adding games, crosswords, and tests related to developing mathematical logic intelligence of Madrasah Ibtidaiyah students. Nufus et al., (2020) added, the use of e-modules can also increase student learning motivation because in e-modules, learning content is neatly packaged with the hope of making it easier for students to understand the subject matter. The use of interactive e-modules also aims to describe the material conceptually so as to increase students' understanding and memory of the material.

Another advantage of this interactive e-module is that it supports learning in the era society 5.0 which is expected to utilize ICT-based teaching materials and media, making it more flexible and providing many conveniences.

This statement is in line with research conducted by Diana & Sukestiyarno (2019), that after conducting independent learning using e-modules there was an increase in students' mathematical logical thinking skills compared to before students used e-modules independently in the learning process. Furthermore, research conducted by (Mahfudhah et al., 2022) shows that e-modules are valid and can facilitate students' understanding of mathematical concepts. Strengthening this statement, through his research (Wulandari & Fatmahanik, 2020) stated that the use of interactive modules can increase learning motivation, science literacy, learning outcomes, independence, and students' critical thinking skills.

Can be accessed anytime and anywhere, both online and offline

Interactive e-modules are one of the teaching materials containing material, concrete examples, as well as assessments that are packaged attractively, and have the potential to be developed in this century, as a solutions in preparation for the era society 5.0, where the use of ICT is increasing and becoming a necessity for society. This happens because interactive e-modules have advantages compared to printed modules, which can be accessed online or offline, and allow the display of images, videos and animations, as well as formative quizzes that can increase student learning motivation (Amini & Usmeldi, 2022).

Teachers can create features to develop mathematical logic intelligence of Madrasah Ibtidaiyah students, such as adding games, crosswords, and tests

Students' mathematical logic skills at the Madrasah Ibtidaiyah level in some case studies can be developed, teachers have a very important role, as for the efforts that can be made, among others: (1) Manage students' ability to remember abstract patterns, (2) Stimulate students' ability to express logical reasoning inductively, (3) Stimulate students' ability to express logical reasoning deductively, (4) Stimulate students' ability to understand cause and effect, (5) Develop students' ability to count quickly, (6) Develop the ability to operate computer-based interactive media, (7) Stimulate students' critical attitude to ask questions, (8) Manage students' interests with game strategies, (9) Develop students' ability to explain problems logically, (10) Develop students' ability to experiment and test, (11) Use crossword puzzles to hone logic skills, (12) Manage students' interests according to their learning styles, (13) Make math and science learning fun, (14) Develop students' ability to understand cause and effect through question and answer (Dewi Nur, I. R., Herman, T., (2018). However, limitations cannot be denied, such as the lack of resources or suitable teaching methods. So the role of technology is needed in developing mathematical logic intelligence in students.

Increase learning motivation

Motivation is a prerequisite and essential element required for student engagement in learning. It aims for students to get good academic results, and enjoy learning (Suryaningrat et al., 2021). In addition, Oche, (2012.) also added that learning methods influence students' response to being interested, motivated, and engaged in learning. This data suggests that student-centered and

fun learning is expected. Suryaningrat et al., (2021) also argues, that as a learning planner teachers are required to be able to plan an effective and efficient learning process by utilizing various types of media and appropriate learning resources. Therefore, teachers need to have competencies, including being able to develop active and effective learning, provide motivation for learning for students, and digital electronic-based learning. However, there are five things that need to be considered in making e-modules according to the National Standards Agency Team (BSNP), namely the suitability of content, language, and presentation, so that e-modules can provide meaningful learning experiences for students and increase their learning motivation (Suryaningrat et al., 2021).

According to Butler (2012) student learning motivation can be seen from the indicators that support it. such as learning motivation, the need to learn, hopes and ideals, appreciation, exciting activities, and a conducive learning environment, students' enthusiasm for learning will arise if there is a learning evaluation to be carried out. furthermore, Suryaningrat et al., (2021) added that in building a student's learning motivation, it is necessary to have interactive and fun media. at least it contains communication in which there are real human relationships or interactions, writing, images, and sound recordings. so that the five, will make it easier for students to learn teaching materials.

Support ICT-based learning in the era of society 5.0

Society 5.0 is an era that offers a balanced life between society and technology. Technology is expected to be a solution to social problems that occur. Basically, this concept is not much different from industry 4.0, except that society 5.0 focuses on the readiness of human resources in overcoming the challenges found in the industrial era 4.0, so that there is an integration between systems in the digital world and the social world, to build a society that is able to create new values and services continuously so as to make life more harmonious (Ni Putu Sri Pinatih, 2020). One of the digital technologies that can be utilized in the classroom is gamification. Based on several studies, gamification can increase students' motivation to learn. Furthermore, gamified learning can cover students' learning needs and provide additional information without intervention (Lutfi et al., 2023).

Indonesian education is currently in the 4.0 to 5.0 era. A distinctive feature of education in 4.0 is the high level of connectivity of teachers and students through the internet network. Not only that, almost all institutional operations and administration are managed digitally. Starting from the admission of new students with an online system, digital-based libraries, even the transition of the exam model, from paper-based tests to online-based tests. Therefore, in this era of industrial revolution 4.0, educators are required to have strong core capabilities including educational capabilities, research capabilities, digital capabilities, globalization capabilities, and future strata capabilities so that they are able to master technology in the application of learning in virtual spaces (Nastiti et al., 2020.). Education in the 5.0 era should focus on character education and critical thinking, these skills can be developed through digital technology, such as online discussions or collaborative projects. Collaborative PBL is one of them, which allows students to have clear meaning in discussions and build healthy interactions with peers (Donnelly et al., 2005).

Meanwhile, in the 5.0 era, education is required to adapt quickly and maturely to the digitalization of the system. There are three main substances related to the projection of the education curriculum in the 5.0 era, namely: character education, the ability to think critically, creatively, and innovatively, and the ability to apply technology in learning (Novita & Rahayu, 2021). With character education, students can be trained to be able to adapt to changes in the future, be able to independently improve and apply their insights, examine, and be able to combine knowledge with noble morals which are reflected in their daily attitudes. In addition, the ability to think critically accompanied by mastery of technology is a feature of society era learning that makes students the subject of learning (student center). A specific example of an interactive tool that can be used is an interactive e-module that has been widely researched and found to be

successfully used in classrooms in Indonesia (Mahfudhah et al., 2022 & Puspitadewi & Japa, 2022).

Researchers concluded that the Society 5.0 era is an era of balancing the presence of technological advances by society. This aims to overcome the social inequality that exists in society. The step that can be taken in realizing society 5.0 is to prepare for the digitalization of society in the field of education, this aims to improve people's mindset or can be called human resource development, so that they can innovate and initiate meaningful renewal by creating interesting learning based on digital technology.

Digitalization also aims to develop students' mindset and foster their interest in learning through various learning media that can be utilized from technology (ICT), as explained by Isma et al., (2022) that technological developments can be used as learning media to encourage and foster curiosity and foster students' interest in learning (Isma, Rahmi & Jamin, 2022). Based on the previous in-depth exposure, the author examines some of the urgency of digitizing school education as follows: (1) Increasing knowledge needs, (2) Improving the quality of student learning, (3) Supporting the government "Merdeka Belajar" program.

Madrasah Ibtidaiyah has so far improved to welcome the era society 5.0 through digitalization, both in terms of institutional administration, learning implementation, and evaluation and even madrasah promotion. The implementation, of course, must be balanced with the use of several applications to make it easier, one of which is Lectora, as according to Rubiantica, et al, (2021) The first implication of Lectora is that teachers can design and present teaching materials in text format, graphics, animations, videos. Furthermore, Milsan & Wewe, (2019) stated that mathematics learning in the classroom should emphasize the connection between mathematical concepts and children's daily experiences. In addition, reapplying mathematical concepts that children already have in everyday life or in other fields is very important, so that mathematics learning requires interactive learning media to link mathematical concepts with everyday life. Then Juwantara (2019) added, according to Jean Piaget's cognitive theory, children aged 7-12 years are in the concrete operational phase, where children in this phase focus on concrete or real objects. So if it is relevant to the era society 5.0, it certainly indicates that in learning mathematics, children will be more interested if the teacher uses interactive learning media, especially materials that require more concrete visualization such as flat and spatial shapes, KPK and FPB, and multiplication, so that in the process it can develop students' mathematical logic intelligence without experiencing misconceptions, especially at the Madrasah Ibtidaiyah level.

Improve mathematical logical thinking skills

Mathematical logical intelligence is one of the nine multiple intelligences that humans have (Gardner, 1983). That is, every human being has all the potential of multiple intelligences, it's just that not all of them stand out, but only a few or one. (Nabighoh et al., 2022) states that mathematical logic intelligence is the ability to see, understand numbers, shape concepts, patterns and solve simple problems. In line with the previous statement (Milsan & Wewe, (2019) states that mathematical logic intelligence involves several components of mathematical calculations, logical thinking, problem solving, deductive and inductive assessment, and sharpness of patterns and relationships. Furthermore, Wulandari & Fatmahanik, (2020) argue that mathematical logic intelligence involves a person's ability to think abstractly, organize problem-solving strategies, and answer various complex questions. If someone is accustomed to honing their logical thinking in solving math problems, they will also get used to thinking reasonably, critically, coherently and consistently.

Mathematical logic intelligence does not necessarily appear without any background factors. Here are some factors that can affect mathematical logic intelligence, especially in students of Madrasah Ibtidaiyah age: (1) Hereditary or innate factors, meaning that each child has intelligence-carrying genes with different levels. (2) Environmental Factors, meaning that since birth the child begins to interact with the surrounding environment, when the five senses begin to function the

child will have more and more contact with the environment, that's when more or less the environment has a big influence on the child's intelligence. (3) Nutrient intake in food substances, meaning that the amount of nutrients must be balanced and meet the limits of the body's ability sufficiently, because if excessive, these nutrients cannot be absorbed how they function, and can even cause unfavorable side effects. (4) Psychological aspects, meaning that emotional conditions are important for fostering children's interests and talents so that they will greatly affect the level of children's intelligence (Mufarizuddin, 2017).

Lectora provides implications for teachers and students in learning, namely: (1) Through Lectora software teachers can create and present teaching materials in the form of text, graphics, animation, video, sound without having to do programming, (2) Through Lectora software teachers and students can access the teaching / test materials needed, (3) Through Lectora software teachers can manage the use and distribution of teaching / test materials, (4) Through Lectora software teachers can provide tests on teaching materials that have been previously learned, in various forms of tests such as true / false, multiple choice, matching, drag and drop, hot spot, fill in the blank (Istiqomariyah, et al (2022).

Furthermore, to make it easier to recognize the mathematical logic intelligence of Madrasah Ibtidaiyah students, (Wulandari & Fatmahanik, 2020) formulated several indicators of students' mathematical logic intelligence, namely: (1) Provide meaning with answers and opinions that are acceptable to reason, (2) Create logical relationships between different concepts and facts, (3) Predict and test following reason, (4) Rational in solving mathematical problems, (5) Logical in concluding, (6) Rational in solving mathematical problems.

This theory is corroborated by Juwantara (2019) who cites Jean Piaget's cognitive theory, that children aged 7-12 years are in the concrete operational phase, while at this age children are mature enough to use logical thinking or operations, but only focus on objects that are concrete or real. Strengthening this opinion, Hergenhahn & Olson (2015) states that children in the concrete operative phase can already develop the ability to maintain (conservation), classify, sort numbers from smallest to largest and vice versa, and handle number concepts. However, during this phase, the cognitive process must still be directed at things, events or real objects, so that it can help children to keep learning concretely, not abstractly.

Based on the opinions of experts, it can be synthesized that the lectora-based e-module meets the criteria in improving the mathematical logic thinking skills of Madrasah Ibtidaiyah students, because of several advantages, and among them the most appropriate in this case is that it can display abstract objects to be concrete, so that it can stimulate students' critical thinking patterns.

The Disadvantages of Lectora-Based Interactive E-Modules in Developing Mathematical Logic Intelligence of Madrasah Ibtidaiyah Students in the Era Society 5.0

Other research conducted by Mandasari et al., (2020) shows that there are weaknesses in using the Lectora application, the first is that early users have difficulty operating Lectora. Second, it takes time to learn the features and how to use it. Third, at the beginning of downloading the trial version of Lectora, it is only valid for 30 days, the rest cannot be used unless you buy the full application on the official Lectora website. Fourth, if the processor on the computer is slow, it will affect the speed of the application when used. Fifth, the use of lectora must be supported by an LCD, and a computer to run it. Mas`ud (2012) added limitations or obstacles in using lectora, including (1) Help agent requires Flash Player 8.0 or higher; (2) Microsoft Internet Explorer 6.0 and above, Firefox 1.0 and above, and Safari 1.2 and above, and Google Chrome; (3) Lectora also requires Microsoft DirectX 9 or later for Camtasia, Microsoft. NET Framework 3.5 SP1 for flypaper, and adobe flash player version 9.0.115.0.; (4) Lectora is often installed directly on the computer, so it sometimes slows down the computer because the installation file size is quite large (around 800 MB). However, other studies have been conducted. Lectora is effectively used for students at Madrasah Tsanawiyah level on Fiqh subjects. The special features or components of

Lectora-based interactive e-modules that contribute to the effectiveness in developing mathematical logic intelligence, are (1) Through Lectora software teachers can create and present teaching materials in the form of text, graphics, animation, video, sound without having to do programming, (2) Through Lectora software teachers and students can access the teaching materials / tests needed, (3) Through Lectora software teachers can manage the use and distribution of teaching materials/tests, (4) Through Lectora software teachers can provide tests on teaching materials that have been studied previously, in various forms of tests such as true/false, multiple choice, matching, drag and drop, dots, fill in the dots, fill in the blanks (Rubiantica et al., 2021).

Mas`ud, (2012) added Potential weaknesses that exist in Lectora, among others: (1) The help agent requires Flash Player 8.0 or above; (2) Microsoft Internet Explorer 6.0 and above, Firefox 1.0 and above, and Safari 1.2 and above, and Google Chrome; (3) Lectora also requires Microsoft DirectX 9 or later for Camtasia, Microsoft .NET Framework 3.5 SP1 for flypaper, and adobe flash player version 9.0.115.0.; (4) Lectora is often directly installed on the computer, so it sometimes slows down the computer because of the size of the installation file which is quite large (around 800 MB). However, other studies have been conducted. Lectora is effectively used for Madrasah Tsanawiyah level students in Fiqh subjects. The special features or components of Lectora-based interactive e-modules that contribute to the effectiveness in developing mathematical logic intelligence, are (1) Through Lectora software teachers can create and present teaching materials in the form of text, graphics, animation, video, sound without having to do programming, (2) Through Lectora software teachers and students can access the teaching materials/tests needed, (3) Through Lectora software, teachers can manage the use and distribution of teaching materials/tests, (4) Through Lectora software, teachers can provide tests on teaching materials that have been studied previously, in various forms of tests such as true/false, multiple choice, drag and drop, match, bold, fill in the dots, fill in the blanks (Rubiantica et al., 2021).

CONCLUSION

The results of this study indicate that if in the era society 5.0 teachers are faced with technology-based learning, which inevitably invites teachers to always innovate, one of which is by using media in the form of lectora-based e-modules. the research cited in this paper also shows that mathematical logic intelligence can be developed by implementing technology-based learning which is predicted to be a massive thing in the era society 5.0. Madrasah Ibtidaiyah students are trained to develop mathematical logic intelligence through giving concrete examples of some abstract meanings or concepts such as mathematics subjects on the material of volume of buildings, cubes and beams, square numbers and square roots which can only be understood if visualized and packaged in an attractive form such as lectora-based e-modules.

It is important to note that in addition to developing students' mathematical logic intelligence, the use of this lectora-based e-module can also be inserted with educational games that can increase the learning motivation of Madrasah Ibtidaiyah students. However, developing students' mathematical logic intelligence cannot be achieved instantly, it can be balanced and combined with various things such as a supportive learning environment, the use of innovative learning models, and adequate facilities such as the internet, LCD and projectors. The process of developing mathematical logic intelligence for Madrasah Ibtidaiyah students can develop over time, therefore we strongly recommend using lectora-based e-modules which can systematically present learning as a whole and contextually. The implications for the world of education in general obtained from this research can and should be used to encourage the development of mathematical logic in Madrasah Ibtidaiyah students, apart from learning mathematics, because this can also be applied to other learning related to mathematical logic.

From the findings and discussions of this study, several research recommendations emerge as follows. A more comprehensive examination of the process of developing mathematical logic

intelligence in Madrasah Ibtidaiyah students: to what extent can students demonstrate the process of developing mathematical logic intelligence in each phase, describe orally and in writing, thought processes, and relate mathematical logic to everyday life? do they use the term level of students' mathematical logic intelligence? To test the question, the researchers need to further examine to what extent the student's mathematical logic intelligence and phases of development of the students' mathematics logic can be developed (Mohamed, M. Z. B. et al., 2022; Nurannisa et al., 2021); Tambunan, D. et al., 2019; Šafranĳ, 2016; Haylock, D & Thangata, F., 2007). To the extent to which the students' mathematical logic intelligence can develop and the phases of the student's mathematics logic development, the course involves teachers as facilitators, such as provide meaning with answers and opinions that are acceptable to reason, create logical relationships between different concepts and facts, predict and test following reason, rational in solving mathematical problems, logical in concluding, rational in solving mathematical problems.

As discussed, students can be stimulated to dare to provide answers and reasons why they do so, even at the age of Madrasah Ibtidaiyah students, through stages such as “given a problem, analyzed, then discussed and connected to everyday life.” through approaches like this, we feel that providing mathematical logic learning concepts can be developed using learning media, so that students' mathematical logic intelligence will always increase, over time. the research cited here shows that the use of the problem based learning model is suitable for the development of mathematical logic intelligence in each phase. it is hoped that the findings of this research will contribute to our understanding of mathematical logic intelligence and the development of more advanced mathematical logic.

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