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DEVELOPMENT HOTS SCIENCE QUESTIONS USING *QUIZZY PAPER MODE MEDIA* TO IMPROVE SCIENCE LITERACY OF GRADE IV STUDENTS AT MADRASAH IBTIDAIYAH

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Abstract

The dearth of science literacy and critical material in primary schools necessitates the cultivation of HOTS to equip students with the requisite competencies to navigate the challenges of the 21st century. The objective of this research endeavour is to enhance the practical science literacy of students by utilising HOTS (High-Order Thinking Skills) questions that employ valid Quiz paper mode media. The research method employed is the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), a pedagogical framework that guides the systematic development of educational materials and programs. The research was conducted on a sample of 27 students from Class IV-B MINU Polowijen. The instruments employed in this study include observation sheets, structured interviews, science HOTS questions delivered via quiz paper mode media, student response questionnaires, and initiatives to enhance science literacy. The result of the research is a product of science HOTS questions incorporated into quiz media developed with the ADDIE model. The validation results obtained from media experts were 88%, with a very valid category, material experts were 95%, with a very valid category, and learning practitioners were 89%, with a very valid category. The level of practicality obtained from the student response questionnaire was 91.4%, with a very practical category. The pre-test and post-test results obtained were 44.4% and 80.0%, respectively. The findings of this research demonstrate that the development of science HOTS questions based on Quiz paper mode media can effectively enhance the science literacy and learning outcomes of elementary school students, thereby encouraging teachers to integrate science HOTS questions into the learning process.

Keywords: Development, HOTS, Literacy Skills, Science, Questions

Abstrak

Kurangnya literasi sains dan materi kritis di sekolah dasar menuntut pengembangan HOTS untuk mempersiapkan siswa menghadapi tantangan abad ke-21. Tujuan penelitian ini adalah untuk meningkatkan literasi sains yang praktis dengan membuat soal HOTS IPA menggunakan media Quiziz paper mode yang valid. Jenis penelitian yang digunakan adalah penelitian dan pengembangan (Research and Development) model ADDIE (Analysis, Desain, Development, Implementation, Evaluation). Subjek penelitian yang dilakukan yaitu siswa kelas IV-B MINU Polowijen yang berjumlah 27 siswa. Instrument yang digunakan yakni lembar observasi, wawancara terstruktur, soal HOTS IPA menggunakan media quiziz paper mode, angket respon siswa, dan meningkatkan literasi sains. Hasil penelitian adalah produk soal HOTS IPA yang dimasukkan ke dalam media quiziz yang dikembangkan dengan model ADDIE. Perolehan hasil validasi yang didapatkan dari ahli media sebesar 88% dengan kategori sangat valid, ahli materi sebesar 95% dengan kategori sangat valid, dan praktisi pembelajaran 89% dengan kategori sangat valid. Tingkat kepraktisan yang didapatkan dari angket respon siswa mendapatkan presentase 91,4% dengan kategori sangat praktis dan hasil pre-test dan post-test mendapatkan nilai sebesar 44,4% dan

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80,0%. Penelitian ini menunjukkan bahwa pengembangan soal HOTS IPA berbasis media Quiziz paper mode secara efektif dapat meningkatkan literasi sains dan hasil belajar siswa sekolah dasar, sehingga mendorong guru untuk mengintegrasikan soal HOTS dan media interaktif dalam pembelajaran guna membekali siswa dengan keterampilan abad ke-21 secara lebih praktis dan menyenangkan.

Kata Kunci: *HOTS, Keterampilan Literasi, Pertanyaan, Pengembangan, Sains*

INTRODUCTION

Change reasoning humans in the 21st century have bring challenge new for system education national. Education in Indonesia, which is one of the system education the largest in the world with around 300 million students, 200 thousand institution education, and 4 million teachers, require transformation For facing an increasingly global era dynamic. So far, education in Indonesia has tended to be focus on memorizing fact without deep meaning. Therefore that, it is necessary There is effort For change approach This become more relevant and meaningful (Wijaya et al., 2016). Development knowledge knowledge and technology demand participation active in the world of education in increase quality source Power human. The educational process No only aim For understand theory scientific, but also develop to ability think level tall *(Higher Order Thinking Skills* or HOTS) such as creativity, argumentation, and decision making decision (Sinta et al., 2022).

Higher Order Thinking Skills (HOTS) are ability cognitive students who engage in thinking processes at a higher level complex. Concept This refers to the classification taxonomy Bloom 's cognitive, which distinguishes ability think become two category, namely *Lower Order Thinking Skill* (LOTS) as ability think level basic, and *Higher Order Thinking Skill* (HOTS) as ability think level carry on or high. Division This first introduced by Bloom in framework taxonomy. Based on research by Abraham et al states that HOTS questions are type designed questions in a way structured to encourage student use diverse skills think, especially in matter analyze, synthesize, and create. With approach this, it is hoped understanding student can stored longer in memory them (Abraham et al., 2021) .

HOTS questions on science material, no let go with literacy science because second his each other related and have relationship. Literacy science is ability somebody in utilise knowledge science For recognize problem, composing conclusion based on available evidence, as well as understand and take decision related phenomenon nature and impact changes that occur consequence activity humans (Pratiwi et al., 2019) . In line with study Nugraha who stated that Importance literacy science for student school base related close with effort reach results optimal learning in science learning. Strong linkages between literacy science and achievements learning This demand the implementation of a meaningful learning process, one

of which is through use questions *Higher Order Thinking Skills* (HOTS). The HOTS question is encouraging student For think critical, analyzing, and evaluating information based evidence, which in the end can increase ability literacy science in a way more deep and long lasting memory students (Nugraha, 2022) .

In line with research conducted by Putri et al stated that existence HOTS questions applied to student can train and grow ability think critical analysis students, besides That students can also develop ability creative as well as capable train For skills think logical in solve something existing problems (Putri et al., 2022). This statement is supported by Fani et al who stated that in the real world students will face a problem, so they need to have skills that have been previously acquired and applied in developing strategies to overcome the problems they experience. (Fani et al., 2021).

Through the learning process in class, activities think level tall trained on students For empowered create, argue, and take decision. Through activity this, students can Study about more stages complex from thinking creative and innovative. For advance learning 21st century teachers must changing the old teacher- centered model into a student - centered model (Pratiwi & Aminah, 2019). reach objective this, is required change from the learning model teacher -centered to a student - centered model. In context this, HOTS becomes key For prepare student face challenge complex and diverse. However, the facts on the ground show that literacy science Indonesian students are still below standard international.

PISA data shows that score literacy science Indonesian students in 2018 were ranked 70th out of 78 participating countries. This show that ability Indonesian students for compete at the level international Still need improved (Fuadi et al., 2020). At MINU Polowijen Malang, especially in class IV-B, the learning process Still limited to use questions from book *Power Point* packages and media without sufficient variation. Science Knowledge Nature (IPA) is eye important lessons For develop attitude scientific and thinking creative students (Thalib et al., 2020). So that science learning is more meaningful, necessary tool intermediary who pushes participation active students. Quizizz, a application quiz interactive web -based, can become effective solution. Through Quizizz, in particular paper mode feature, students can involved in quiz interactive, interesting and fun, both both online and offline (Rini & Zuhdi, 2023). Based on background behind this research This aim For develop HOTS questions with utilize Quizizz paper mode to increase literacy science students class IV-B MINU Polowijen Malang. Expected method This can increase interests and abilities student in understand science material in general more deep and meaningful.

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Study This important done Because development HOTS Science questions packaged through the Quizizz Paper Mode media you can become alternative innovative in increase literacy science students, especially in class IV of MINU Polowijen Malang. So far, science learning is still Lots focus on memorization draft without push student think critical and analytical. In fact, for face challenge 21st century, students need equipped ability literacy strong science, namely ability understand, process, and retrieve decision based on information scientific. The use of Quizizz Paper Mode media allows implementation HOTS questions in general attractive and flexible, good in online and offline learning, so can increase participation, understanding, and power remember student to science material in general more in-depth and contextual.

METHOD

Research and development This can produce something product with using the ADDIE development model (Azizah & Syarifah, 2021). The stages of the ADDIE model can seen in figure 1.

Figure 1
Model ADDIE
Source: Document Personal

This design designed For develop HOTS Science questions on the material photosynthesis using quizz paper mode media through systematic ADDIE approach For increase literacy science elementary school students. Subject study This is student class IV-B MINU Polowijen Malang with total of 27 students For conduct a trial product HOTS questions created use quiziz paper mode. On the data collection instrument, to 3 validators consisting of from validation media experts, materials and practitioners learning as well as questionnaire response students. Validation results the will measured with look for mark presentation.

Table 1
Stages Study in development HOTS Science questions use
media quiziz paper mode at elementary/Islamic elementary school level

Stage Study	Activity Study
Analysis	1. The teacher uses the questions available in the textbook 2. Lack of variation in training 21st century skills including science literacy 3. Learning tends to be monotonous and does not utilize ICT in teaching and learning activities, including in the learning evaluation process.
Initial product design	1. Creating material on *Google Sites* to make it easier for researchers to create HOTS questions 2. The aim is to narrow down the material to be discussed in creating questions with cognitive levels C3-C6. 3. The material created through the *Google Sites website* will be discussed before *the post-test is carried out.*
Planning to create HOTS questions	1. Creating question cards to make it easier for researchers to train elementary school science literacy 2. Card creation can provide detailed information on indicators, question material, HOTS categories, question types, question objectives, question texts, and discussions. 3. The design of the question cards helps to explain students' answers through the discussion and discussion that has been outlined. Researchers asked for suggestions from material experts and learning practitioners to make the question cards perfect.
Development	1. Entering questions in the quiziz application is only in the form of question text. 2. If the question card is perfect it can be given to the student
Implementation	1. The media has been validated by validator experts and has been declared suitable for testing. 2. Trial on MINU Polowijen students to improve students' critical thinking
Evaluation	Evaluation of Quiziz learning media for product promotion by providing respondent questionnaires to students

Source: Document Personal

RESULTS AND DISCUSSION

Study This explore development HOTS Science questions using *Quiziz Paper Mode* media For increase literacy science student class IV Minu Polowijen Malang. With use interactive multimedia elements, can become alternative innovative in increase literacy science students, especially in class IV MINU Polowijen Malang. Development HOTS Science questions using *Quiziz Paper Mode* media This using the ADDIE model consisting of the five stages of Analysis,

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Design, Development, Implementation, and Evaluation.

Stage Analysis

Stage First in development media quiziz paper mode for obtain initial data on the problem in learning in class IV - B MINU Polowijen. Researchers find fact that from results interview to the class IV-B MINU Polowijen teacher about problems in the class the that is when the teacher gives question to student teacher only give it to him form question in the form of paper just.

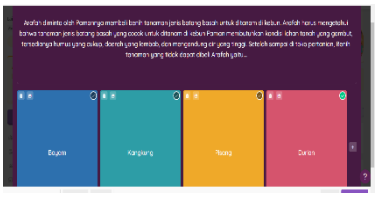
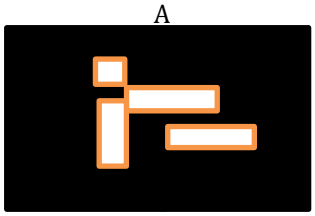
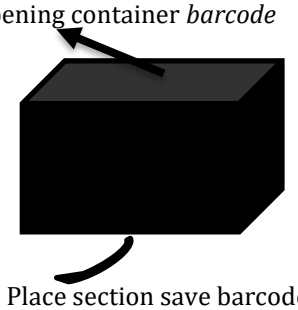
Such a thing can give less effect pleasant for student For do Question. Interview results by class IV-B MINU Polowijen teacher show that teachers still give questions For practice literacy science to student with level cognitive that is still not enough challenged that is from the lowest level C1 to the highest level C3. With Thus, the work process question For practice literacy science student Still Not yet succeed in class level high. While analysis need done For find solution from HOTS questions needed student during the work process. Based on matter said, researchers make HOTS Science questions using quiziz paper mode For practice literacy science students. Quiziz paper mode can make variation latest For involving student in the learning process so that student like do question Because can finish it Study while play.

Stage Design

Media design is made based on results stage previously. At this stage this, researcher designing What just what is needed in make design products that will be developed. The product will be developed in the form of HOTS questions with eye Science lessons for grade IV of elementary school, material questions, reviewing KI and KD, indicators literacy science, category questions, types questions, objectives questions, text questions, discussions and tools For designing question using quiziz media.

Table 2
Design storyboard beginning product

No.	Picture	Information
1.		Product the beginning made namely summarize material Science lessons for grade IV Elementary School in Chapter 1 Subchapters 1 & 2 so that the discussion used No expanding. https://sites.google.com/view/kelas-nama-nisn/kempulan-materi/proses-fotosinthesis-pada-tumbuhan

2.	<table><tr><td>Indikator LS</td><td></td></tr><tr><td>Materi S</td><td></td></tr><tr><td>K. HOTS</td><td></td></tr><tr><td>Tipe Soal</td><td></td></tr><tr><td>Tujuan</td><td></td></tr><tr><td>Teks</td><td></td></tr><tr><td>Bahasan</td><td></td></tr></table>	Card questions created seen from indicator literacy science, materials questions, HOTS categories, types questions, objectives questions, text questions and discussions so that the explanations made detailed.
3.		Questions that have been validated entered to in application quiz
4.	A D 	After question created, printed barcode and printed out according to with need roll call student use paper thick so that it doesn't easy damaged. Example roll call student no. 1
5.	Opening container *barcode*  Place section save barcode	Box for place the question barcode

Source: Document Personal

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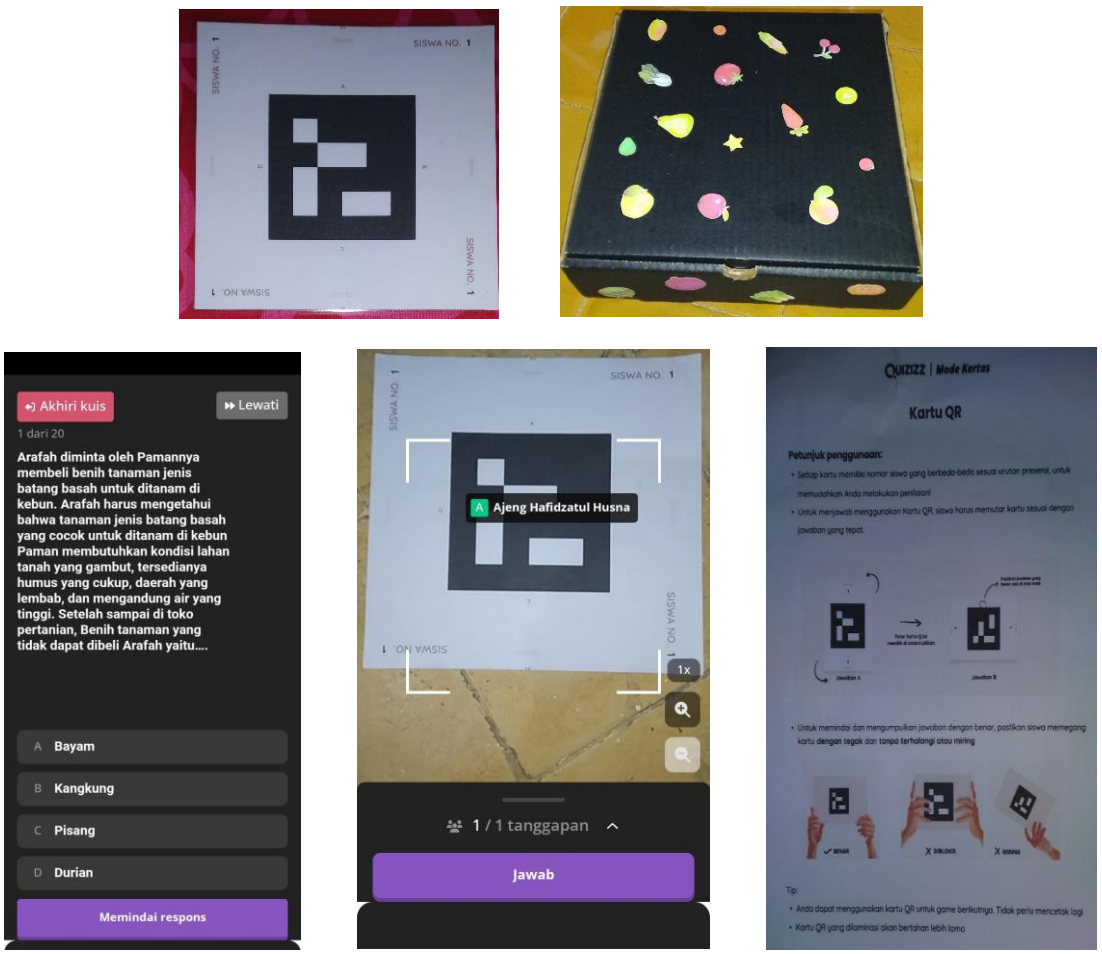

Figure 2
Example Making HOTS Questions HOTS Science Questions Using Media Quiziz Paper Mode
Source: Document Personal

Stage Development

At the stage development, researchers enter questions that have been made through application quiz with differentiate design card existing questions. If card questions created has perfect, then question has made in a way detailed and appropriate with input by experts materials and practitioners learning. The following steps in stage enter question into the Quiz namely : 1) open the Quiziz.com website and log in using account through *E-mail,* 2) click *" teacher"* if want to login as a teacher, 3) enter identity *(username, email and password)* Then click *continue,* 4) if Already Enter, select the + create menu in the section left middle, 5) will appear appearance *"quiz* and *presentation "* then click Quiz, 6) display furthermore There is choice *" filling short, choice double and analysis "* then click *" choice double ",* 7) enter questions in the column provided and enter option answers in the column *"answer option* 1, 2, 3, 4, 5 *"* is required, 8) give check the box column correct answer, and duration workmanship in One

question, then click *"save",* 9) if Already write quiz, click *"finish quiz",* 10) will appear detailed view of the quiz that was created (set class quiz you want shown and eyes selected lesson) then click *save details* (Rusdian.,2021).

After development product has finished, researcher ask the validator to do validation product with fill in questionnaire validation that has been made by researchers. The validation objectives that have been designed is For ensure that products made can done repair For increase quality product become more good. Validation carried out by the validator who controls their respective fields, namely media expert, expert materials and practitioners learning. Media experts do validation quiz *paper mode,* whereas expert materials and practitioners learning do validation HOTS questions created by researchers.

Table 3
Results Media Validator

Aspect Evaluation	Score
Engineering Device Soft	40
Visual display	20
Design learning	28
Score	**88**

Source: Document Personal

On Table 3 total score evaluation validator media expert is 88%. Can concluded that validation expert design in media quiziz paper mode is suitable For developed and applied to elementary school students. Assessment of learning media required For know whether media quiziz paper mode This worthy For implemented for students. Assessment This covering a number of aspects, namely engineering use device soft, visual display, and systematic content from the media.

Table 4
Results Validator expert material

Aspect Evaluation	Score
Design Learning	30
Item question	65
Score	**95**

Source: Document Personal

In Table 4 it can be seen seen Total score second validator assessment is 95%. It can be concluded that materials used For make HOTS Science questions for grade level Elementary school is very decent used.

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Table 5
Results Validator practitioners learning

Aspect Evaluation	Score
Design Learning	30
Item question	59
Score	**89%**

Source: Document Personal

In Table 5 the total score evaluation validation practitioners learning namely 89%. that products made by researchers worthy For tested try it to students. The three validators have assess and provide advice on matter said. Media expert validators provide input For repair box on the barcode paper used students to be more interesting. Expert validator material give input and suggestions for repair HOTS questions created at the appropriate cognitive level. Practitioner validator learning give input For repair incomplete sentences in accordance with Elementary School Science HOTS questions.

Stage Implementation

After the media quiziz paper mode has been validated by the validator and declared valid or worthy used For tested try it to students, stage furthermore conduct a trial student class IV-B MINU Polowijen which consists of of 27 students. Trial This done For practice literacy science students and improve results Study as well as method think student in answer questions at cognitive levels C3 to C6.

The results of the pre-test and post-test show existence significant improvement in ability literacy science student after its implementation development HOTS Science questions using Quizizz Paper Mode media. In the pre-test stage, the average percentage of achievement student only by 44.4%, which indicates that part big student Not yet capable answer question with demands think level high. However, after done intervention through learning based HOTS questions, post-test results increased to 80.0%. Increase This show that use of media and approaches the right question capable push student think more critical, analytical, and reflective to science material studied.

Stage Evaluation

After student do *pre-test post-test* with Quiziz Paper Mode, evaluation done For determine repair products made with considering suggestions and input from students. Researchers give questionnaire respondents to student after do test quizzes displayed on the screen projector and students answer it with *barcode* that has been provided. Development

HOTS questions with use *quiz* as tool help For make it easier student in do questions and provide interest in students. This is in accordance with study Hanifah et al stated that Media is developed only as a support to instill concepts in students. So, during the learning process, experimental activities must still be carried out. (Hanifah et al., 2022) .

Quizizz Paper Mode media also provides contribution in create atmosphere learn more interactive and fun, though in print format. Presentation varied and challenging questions proven capable increase motivation Study as well as involvement student in a way active. In addition, the use of close context with life daily in HOTS questions help student linking science material with situation real, so that support formation literacy more science applicable. With Thus, the results This support findings study previously that HOTS questions developed with approach contextual can increase ability think critical and literacy science student in a way significant.

CONCLUSION

Study This show that development HOTS Science questions based on Quiziz paper mode media systematic through the ADDIE model is able produce instrument valid and practical learning in increase literacy science student school basic. Validation results from the experts show level very high validity, while the practicality test through response students and improvement results Study show effectiveness use of media in learning. Therefore that, integration HOTS questions with interactive media like Quiziz paper mode can become a relevant pedagogical strategy in develop skills think critical and literacy science students, as well as support contextual and oriented learning 21st century.

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