

## Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS) on UM-PTKIN Questions on Islamic Religious Education Materials

Mispani<sup>1</sup>, M. Sayyidul Abrori<sup>2</sup>, Umar Alfaruq A Hasyim<sup>3</sup>, Kushendar<sup>4</sup>, Muslimah<sup>5</sup>

<sup>1,2,3,4</sup> Institut Agama Islam Ma'arif NU (IAIMNU) Metro, Lampung, Indonesia

<sup>5</sup> Institut Agama Islam Negeri (IAIN) Palangka Raya, Indonesia

 mispani.mispani@iaimnumetro.ac.id

### ABSTRACT

This article focused on discussing Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS) on the UM-PTKIN (*Ujian Masuk Perguruan Tinggi Keagamaan Islam Negeri*) Islamic Religious Education Material. It is case prospective students in higher education must be able to think at a higher level (High Order Thinking Skills, HOTS) such as analytical skills, evaluation skills and material creation skills. The method used Prisma Protocol namely identification, screening, eligibility, and inclusion (Alias et al., 2018). Therefore, the provision of college entrance examination tests is an important element in selecting prospective students. The results of this study indicate that the items for the UM-PTKIN PAI material are in the HOTS category and low order thinking skills (LOTS). The material for Akidah Akhlak became the largest contributor and Al-Quran Hadith as the least contributor to the HOTS category questions. The Islamic Religious Education Study Program (PAI) is a study program that is in great demand and its graduates are highly anticipated to be able to sow an understanding of Islam to answer various social, political, and religious challenges in Indonesia. This article provides recommendations for UM-PTKIN policy makers to be able to increase the number of compositions of HOTS questions in subsequent selections in order to improve the quality of PAI student input in the following periods.

**Keywords:** Higher Order Thinking Skills, Lower Order Thinking Skills, *UM-PTKIN Material*

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### INTRODUCTION

The industrial era 4.0, universities must be ready to compete and improve their quality. One measure of the quality of higher education is the accreditation value set by the National Accreditation Board for Higher Education (BAN-PT). BAN-PT assesses the quality of higher education through 9 criteria instruments. The first criterion is the vision, mission, goals and objectives. The second criterion is governance, governance and cooperation. The third criterion is students. The fourth criterion is about Human Resources. While the fifth criterion is finance, facilities and infrastructure. The sixth

criteria assessed by BAN-PT is Education. Research is the seventh criterion. While the eighth criterion is community service. Then the ninth criterion that determines a quality university or not is the output and achievements of the tri dharma (BANPT, 2019). Based on the 2020 UM-PTKIN standard operational procedures, the national committee for new student admissions develops tests through several stages, including: 1) Development of a framework of reference for determining the direction of the stages of developing tests so that targets can be achieved; 2) Development and determination of the grid both the number of questions and the distribution of cognitive levels that fall into the category of higher order thinking (HOT); 3) Writing workshop which aims to improve the skills of prospective question writers by referring to the grid and signs for question development; 4) Writing questions in accordance with established principles and grids; 5) Reviewing the items by the internal team in order to improve the quality of the questions that have been prepared and revising the items on the basis of suggestions from other writers; 6) Review of items and assembling test packages by an external team from the items that have been produced by the writing team; 7) Language alignment by a team of linguists with reference to Indonesian grammar in order to avoid the possibility of using language that is unclear, non-standard, inefficient, and biased in meaning; 8) Randomization of questions to obtain a package of questions; and 9). Finalization is a complete examination of all question packages to ensure that there are no writing errors, answers, and the layout (setting) of the question script.

The UM-PTKIN question paper consists of items based on the development and determination of the question grid covering the cognitive level which is included in the category of higher order thinking skills (HOTS) or higher-order thinking skills. HOTS includes the ability of logic and reasoning (logic and reasoning), analysis (analysis), evaluation (evaluation), and creation (creation), problem solving (problem solving), and decision making (judgment) (Brookhart, 2010). In addition, HOTS also requires thinking skills that are not just remembering (recalling), restating (restate), or referring without processing (recite) (Widana, 2017). One of the most important criteria is the student factor. To realize a quality university that is globally competitive, it must have quality students as well. Quality students can be obtained from the excellent learning process at a university, or from student input factors (Muhammad Sayyidul Abrori & Nurkholis, 2019). What is meant by student input here is that prospective students who enter to become students in a higher education institution must be truly qualified, intelligent and have high critical reasoning power. As stated by Muhammad Fahmi that the recruitment process is a very important form of system control for a university (Fahmi, 2013).

In order to attract students who have high critical reasoning power, there are several paths owned by universities as entrances for prospective students. The various pathways include the Selection for National Academic Achievement of State Islamic Religious Universities (SPAN-PTKIN), Entrance Exams for State Islamic Religious Universities (UM-PTKIN), independent pathways, scholarship pathways, and various other pathways. Take for example one path, namely the UM-PTKIN route. Are the students recruited through this route really good and intelligent students and have high reasoning power?

There are several studies that discuss HOTS and college entrance exam questions. Among them is Zaharil Anasy's research on HOTS (*Higher Order Thinking Skills*) in *Reading Exercise*. Research with content analysis method, made the object of reading

practice essay questions in the *Pathway to English textbook*. Zaharil stated that there is an imbalance in the distribution of high-level skills on reading essay questions in the book. According to him, the lack of well-applied higher order thinking skills, especially skills that are not in the essay reading questions. Furthermore, in this study it was also found that HOTS "analyzes" is more widely used than HOTS for other higher order thinking skills (Anasy, 2016). Another research that discusses HOTS is Nurdinah Hanifah's research entitled *Development of Assessment Instruments Higher Order Thinking Skill (HOTS) in Elementary Schools*. Students will understand a concept if they have higher-order thinking skills. Through assessment, it can be seen whether students have higher-order thinking skills. In order to hone students' thinking skills, test assessment is very appropriate. He stated that why did Indonesian students have low HOTS compared to students from abroad? The answer is because Indonesian students are not trained to hone higher order thinking skills. So that teachers should make assessment instruments that are able to optimize and hone students' higher-order thinking skills. Hanifah also seeks to provide views on the development of techniques for preparing student learning outcomes assessments that contain HOTS (Hanifah, 2019). Not far from previous research, Nadlir and Hanik Yuni Alfiyah also researched HOTS. Their research is entitled *Comparison of the Scientific Approach between the 2013 Curriculum and the Burhani Approach in Improving Higher Order Thinking Skills in Fiqh Subjects*. They juxtapose and compare the burhani approach and the scientific approach or scientific approach in improving higher-order thinking skills in Fiqh subjects. The samples taken were 18 students of MI Haji Hasyim Babat Pakal Surabaya. This research focuses on the implementation of the 2016/2017 academic year. This study found that both approaches, namely burhani and scientific, both can improve higher order thinking skills in terms of gathering information, finding links, rearranging, and developing it to answer questions. This study also compares the achievements of the two approaches. The results stated that the scientific approach of the 2013 Curriculum was higher in achievement when compared to Burhani's approach. However, this applies to all subjects, and PAI is one of them (Nadlir & Alfiyah, 2018).

The next research that examines HOTS is Tri Anjar's work entitled *Readiness of High School Students to take the College Entrance Exam and the Role of School Counselors*. There are various problems when students prepare to take their dream college entrance exam, both physical, material, and psychological problems. Moreover, this was felt by the participants who came from private schools. Students from private schools have a tendency to be low in discipline, and lack enthusiasm or motivation to learn. Of course, this greatly affects their level of readiness to take the college entrance exam and successfully pass it. Tri Anjar seeks to find and explain the readiness of high school students to take the college entrance exam and the role of the BK teacher/school counselor. This quantitative descriptive study was conducted at SMA Muhammadiyah 1 Metro with a total of 212 students. From the data collected through a questionnaire, it was found that the average score of students was 80.53. Of the total students who are not ready to face the college entrance exam as much as 26.84%. The role of the Guidance Counseling teacher in this study was stated by making a secondary school guidance program. There are two kinds of this program, which are carried out individually and in groups or classically. In addition, Guidance and Counseling teachers at SMA Muhammadiyah 1 Metro also hold a program for fostering and developing children's potential. Even BK teachers have improved this program by

collaborating with fellow teachers and guardians of students at SMA Muhammadiyah 1 Metro (Anjar, 2012).

Next, the selection to enter this university became the focus of research by Nur Hasanah and her friends. They conducted a qualitative research entitled *The Effect of the Higher Education Entrance Selection System on the Achievement Index of Students in the Mathematics Education Department, University of Papua (UNIPA)*. To be able to enter UNIPA, there are several paths that can be taken by prospective students. After they enter UNIPA, they will learn many courses and after the learning process, the lecturer gives grades to the courses they take. In this study, Nurhasanah was interested in finding out whether the college entrance path affected the grades or achievement index of students at UNIPA. This research was conducted at the Department of Mathematics Education, UNIPA. From the data collected, reduced, presented, and drawn conclusions. The results showed that there was no effect between the Grade Point Average (GPA) of students and the entrance to UNIPA. UNIPA students' GPA is influenced by their basic ability in mathematical concepts, willingness to choose mathematics education majors, interest in mathematics, and their learning methods. Nurhasanah hopes that the results of this research can be used as input for the department of mathematics education. In addition to this, he also hopes that his research can be used as an evaluation tool to increase student achievement index. For leaders at the UNIPA level, the results of this research can provide suggestions for improving the UNIPA student selection system (Nurhasanah et al., 2018).

There are several similarities between this article and several previous studies, which both discuss HOTS, questions, and preparation for college entrance. However, from previous research, no one has discussed the level of HOTS in the UM-PTKIN questions regarding Religion. Even though this is very important, considering that tens of thousands of prospective students take the test and answer the UM-PTKIN questions every year. The emptiness of this research theme, which prompted the author to examine the HOTS level on the issue of UMPTKIN Islamic Religious Education Materials. In this study the authors focus on two things. First, focus on the HOTS map in terms of UMPTKIN Islamic Religious Education Materials. And the second one focuses on the level of comparison of the HOTS questions in the UM-PTKIN Questions on PAI material which consists of 4 groups of test subjects, namely the Qur'an, Akidah Akhlak, History of Islamic Culture, and Fiqh. This research still only examines the issue of UMPTKIN Islamic Religious Education material, with approach *library research* and *content analysis*.

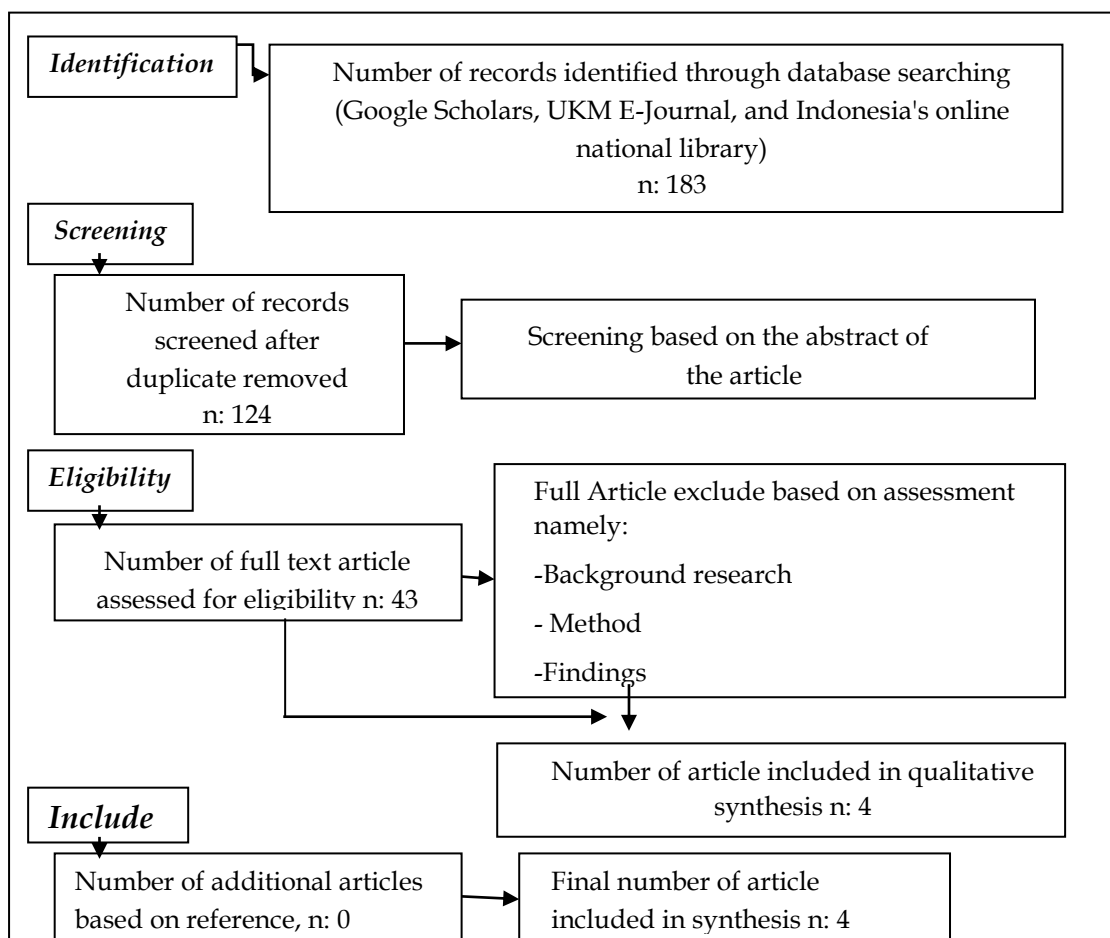
## **METHOD**

The methodology is a systematic review using the PRISMA Protocol as a data collection instrument in the form of articles/previous studies. The PRISMA Protocol has been widely used in the process of selecting relevant articles and there are four steps identified in the PRISMA Protocol, namely identification, screening, eligibility, and inclusion (Alias et al., 2018). At the initial stage, identification, the process of searching for articles using Google Scholar, UKM E-Journal (Scopus), and Indonesia's online national library. To identify articles or journals, the following keywords are used: HOTS and LOTS questions at UM-PTKIN, and material about Islamic religious education at UM-PTKIN. In addition, in the identification process, there are several criteria used to obtain data from (i) articles published in 2010-2021 in the form of journals, proceedings, theses and reports, (ii) using references from articles obtained to

find their relevance in research. , (iii) articles written in Indonesian and English. There are 189 articles obtained from the three search engines. Furthermore, at the screening stage, a review of the contents and abstracts of the articles was carried out to obtain relevant articles for data analysis and analysis in this study after carrying out the screening and feasibility stage in accordance with the objectives of this study.

The Prisma Protocol process framework formulated in a pie chart based on prism-statement.org is as follows:

**Figure 1: Prisma Protocol Model adapted from prisma-statement.org**



From the data obtained after screening using the PRISMA Protocol, from 183 journal articles there are 4 journal articles that answer the background of this research. Because HOTS and LOTS on the level of difficulty of the questions on the entrance exam are only considered as a matter of course. However, these 4 journals break this concept. The existence of HOTS and LOTS questions is not a common problem but is broader than what some preview studies and experts define. There are two main points raised as to the importance of HOTS and LOTS; prepare prospective students who are able to have analytical skills, evaluation skills, and material creation skills.

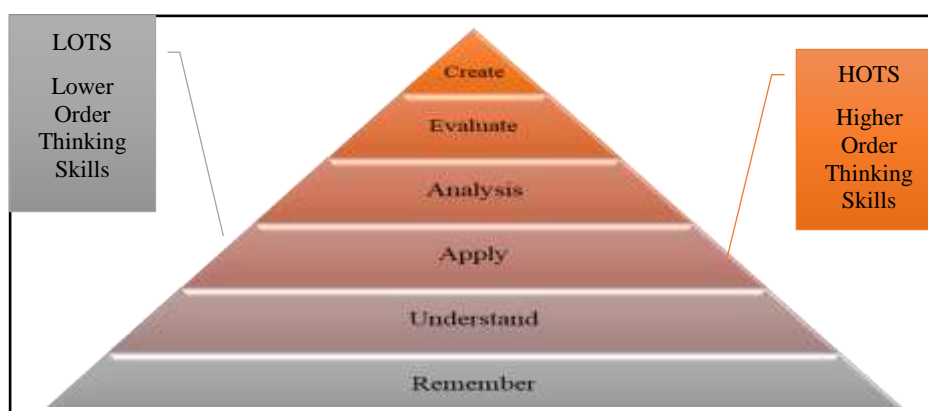
## RESULT AND DISCUSSION

### 1. Getting to know Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS)

Before discussing HOTS, it is better to first discuss the purpose of education (taxonomy). Talking about educational goals, cannot be separated from Bloom's taxonomy. Bloom's Taxonomy refers to a taxonomy created for educational purposes. This taxonomy was first designed by Benjamin S. Bloom in 1956. According to Bloom, educational goals are divided into several domains. Each domain consists of more detailed hierarchies. Educational goals are divided into 3 domains, namely cognitive, affective, and psychomotor. The cognitive domain contains behaviors that emphasize intellectual aspects, such as knowledge, understanding, and thinking skills. While the affective domain contains behaviors that emphasize aspects of feelings and emotions, such as interests, attitudes, appreciation, and ways of adjustment. The psychomotor domain contains behaviors that emphasize aspects of motor skills such as handwriting, typing, swimming, and operating machines (Utari et al., 2011). Over time, Benjamin S. Bloom's thoughts were revised by Anderson and Krathwohl. Anderson and Krathwohl revised and introduced Higher Order Thinking Skills (HOTS) in 2001. This update is very significant, because there is a shift in the use of words in Bloom's taxonomy. Initially, Bloom's Taxonomy used words in the form of nouns, namely knowledge, understanding, application, analysis, synthesis, and evaluation. The noun is converted into a verb so that it becomes remember, understand, apply, analyze, evaluate, and create (Poerwanti, 2015).

Next, Anderson and Krathwohl mapped and ranked Bloom's taxonomy from the lowest level to the highest level. The levels of cognitive thinking skills from bottom to top are remembering, understanding, applying, analyzing, evaluating and creating. The first three levels are also known as lower order thinking, namely remembering, understanding and applying. While the next three levels are top-level thinking, namely analyzing, evaluating, and creating. Bloom's taxonomy on analyzing, evaluating and creating thinking activities are at the same level, namely Higher Order Thinking Skills (Anderson & Krathwohl, 2001). In several references, it is explained that even higher-order thinking has levels, namely analyzing, evaluating, and the highest level is creating, as shown in Figure 1 below (Adams, 2015). Furthermore, Bloom's cognitive thinking level is mapped into Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS) which can be described in the following diagram:

**Diagram 1. Bloom's Taxonomy in the HOTS and LOTS schemes (Irvine, 2017)**



In each level Bloom's taxonomy, there are several indicators that explain each level. First, the level of remembering (Cognitive 1/C1) (Wilson, 2016). In the process of remembering, as explained by Bloom, students will take the required knowledge from long-term memory. If the goal of learning is to develop the ability to retain the subject matter as well as the material being taught, then remembering is the appropriate cognitive category. Second, the level of understanding (C2). The process of understanding is the process of constructing meaning from learning messages, which are conveyed through teaching, books, or computer screens. Learners understand when connecting new knowledge and old knowledge or new knowledge is combined with an existing cognitive framework.

The third level is applying (C3). In level three, cognitive thinking activities apply a certain sequence of steps or procedures to answer practice questions or solve various problems presented. This selection includes two cognitive thinking activities, namely selecting and determining tasks in the form of practice questions and applying various questions in the form of special problems that are not commonly used. Then the fourth level is analyzing. In the process of analyzing this, students will use the process of solving problems into small sub-sections and determining the pattern of relationships between parts and structures globally. This grouping of analytical thinking activities consists of distinguishing or looking for differences, organizing, and attributing.

Meanwhile, the fifth level is evaluating (C5). Evaluating is defined as making decisions based on criteria and standards. The criteria that are often used are quality, effectiveness, efficiency, and consistency. Each of these criteria is determined by the students. The standards used can be quantitative or qualitative. The evaluating category includes the cognitive processes of examining (decisions made based on internal criteria) and criticizing (decisions made based on external criteria). Next is the highest level of higher order thinking skills, namely creating (C6). In the process of creating, Bloom said that students will involve the process of arranging elements into a coherent or functional whole. This creative process also requires students to create new products by reorganizing a number of elements or parts into a pattern or structure that never existed before. The cognitive processes involved in creating are generally in line with previous learning experiences. These cognitive processes are formulating, planning and producing (Puspaningtyas, 2019). In order to make it easier for academics to categorize this level of thinking, Anderson has mapped the operational verbs of Bloom's Taxonomy, from lower-level thinking to higher-order thinking, as shown in table 1 below:

**Table 1. Bloom's Taxonomy Revised by Anderson and Krathwohl**  
(Darmawan & Sujoko, 2013)

No	C1-knowledge	C2-understanding	C3- Application	C4- Analysis	C5- Evaluation	C6-creating
1	Quoting	Estimate	Requires	Analyzing	Consider	Abstracting
2	Mentions	Explaining	Adjusting	Auditing /	Mentions	Explaining
3	Explains	Categorize	Allocate	Create Blueprint	Compare	Arrange
4	Draw	Characterize	Sorting	Outline	Conclude	Collect
5	Counting	Detailing	Applying	Solve	Contrasts	Fund
6	Identifies	Associate	Determine	Characterize	Steer	Categorize

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7	Register	Compares	Commissioning	Make Basic	Register	Compares
8	Show	Counting	Acquiring	Rationalize	Weighing	Combining
9	Labeling	Contrasting	Preventing	Asserting	Retaining	Composing
10	Indexing	Changing	Declaring	Createbasis	Indexing	Changing
11	Pairing	Retaining	Calculated	Correlating	Separating	Constructing
12	Naming	Deciphering	Capturing	Detect	Predicting	Dealing With
13	Marking	Interlacing	Modifying	Diagnose	Judging	Connecting
14	Reading	Distinguishing	Classifying	Diaphrasing	Clarify	Creating
15	Realize	Discuss	Completing	Diversify	Rank	Creation
16	Memorize	Digging	Counting	Selecting	Commissioned	Correcting
17	Mimic	Exemplifying	Build	Detailing To Sections	Interpret	Shooting
18	Noted	Describe	Familiarize	Nominating	Give Consideration	Designing
19	To Repeat	Suggests	Demonstrate	Document	Confirming	Developing
20	Reproduce	Pattern	The Lose	Establish	Measure	Drafting
21	Reviewing	Expanding	Determining	Test	Projecting	Dictate
22	Pick	Summing	Found	Brighten	Detailing	Increase
23	States	Predicting	Describing	Exploring	Grading	Clarify
24	Studied	Summarizing	Rediscover	Drafting	The Spread	Facilitated
25	Tabulate	Outlining	Using	Gather	Recommend	Shaping
26	Encodes		Train	Create Groups	Of Releasing	Formulated
27	Excursions		Digging	Identify	Choose	Generalizes
28	Write		Opens	Illustrates	Summarizes	Grow
29			To Suggest	Summing	Support	Handle
30			Made Factors	Interrupting	Test	Sends
31			Makes The Image	Come Across	Validate	Fix
32			Made A Chart	Analyzing	Proved	Anew Combining
33			Handles	Organizing		Blending
34			Illustrates	Managing		Limit
35			Adapting	Maximizing		Combining
36			Investigates	Minimizing		Teaching
37			Manipulating	Optimizing		Make Models
38			Beautify	Ordered		Mengimprovisasi
39			Operating	Outlining		Create A Network Of
40			Questioning	The Mark/Code		Organizing
41				Prioritizing		Sketching
42				Editing		Refit

From the table above, we know that one of the higher-level thinking level analyzes (C4) is the concluding activity. This concluding ability test can be seen in the 2020 UM-PTKIN question item Akhlak Akidah question number 62 which reads as follows: "In an interview about fostering tolerance of various religious adherents, a resource person gave an example of the real condition of his family. He said, "People who fuss over religion are stupid people, for me religion is the



same. The important thing is that the person lives right. I am a woman of Javanese-Chinese descent, my extended family has various religions, there are Christians, Catholics, Buddhists, Hindus, there are even many who converted to Islam but we have always been in harmony and peace." Question: Your response to this statement is: (a). This opinion generally arises from those who do not want a harmonious life because of the diversity of religions in Indonesia. (b). This opinion shows the level of understanding that is still lacking about the different meanings of tolerance and fanaticism in religion. (c). This opinion obscures the meaning of tolerance and confuses religious teachings. (d). That opinion is a common expectation that followers of different religions should hold to create an atmosphere of mutual respect (<https://Soalumpkin.com>). From this question, the participants were tested for their ability to conclude from a case narrated in the question.

The next level of higher-order thinking is evaluating (C5). This can be seen in the UM-PTKIN test item for Islamic Cultural History question number 75. The question reads as follows: "Muhammad Zakariya al-Razi criticized Galen's theory which states that disease is caused by fluid imbalance or as a punishment from God. This character then develops medicines based on the disease and treats poor patients for free. Baghdad at that time had carried out the examination of the feasibility of practicing doctors. Al Razi's attitude represents a Muslim: ... Answer options: (a). Liberal for freeing poor patients from expensive treatment. (b). Humanist because it prioritizes humans as subjects who must be helped. (c). Secular because it develops medicine as part of worldly science. (d). Critical for rejecting a recognized established theory without presenting evidence (<https://Soalumpkin.com>)." This question requires UM-PTKIN participants to interpret or assess al Razi's attitude. The ability to think in interpreting or judging is included in the higher-order thinking level "evaluating" (C5).

## **2. About UM-PTKIN Islamic Religious Education Materials Many**

Students who have graduated from high school (SMA) or the equivalent want to continue their studies at the college of their dreams. It aims to describe the reality of the relationship between public trust and the results of high school/madrasah graduates. This pattern of trust relationships will not only be limited to individual students, guardians or managers of SMA/Madrasah, but also to other people such as families and society in general (M Sayyidul Abrori & Hadi, 2020). There are many entry paths that prospective students can choose from. Some of them are SNMPTN, SBMPTN, SPAN-PTKIN, UM-PTKIN, independent pathways, scholarships, polytechnics and official services (<https://Pintek.id>). Students can choose one or several pathways at once in one academic year.

The first path is the National Selection for State Universities (SNMPTN). SNMPTN is also known as the invitation line. Applicants who wish to take part in this selection route must be recommended by the school of origin. The assessment model is the school report card assessment. This route can be accessed through the official website [www.snmptn.ac.id](http://www.snmptn.ac.id). The second path is the Joint Selection for State University Entrance (SBMPTN). This pathway is opened with a written test system. Registrants can participate in the selection by registering through the official website [www.sbmptn.ac.id](http://www.sbmptn.ac.id). The next track is the National Academic Achievement Selection for State Islamic Religious Universities (SPAN-PTKIN). This path is an invitation path without a test. Registrants can access the official website at span-

ptkin.ac.id. As for the test path is the UM-PTKIN (State Islamic Religious University Entrance Exam). The official website can be seen at [um-ptkin.ac.id](http://um-ptkin.ac.id).

Next is the independent path. Each campus opens its own path. Usually registration uses an online system, but there are also those who still use the manual by coming to campus to take the registration form. Registration information can be found on the official campus website. The path that is no less famous than the following paths is the New Student Admissions Selection (SPMB). There are several State Universities and Private Universities joined in the selection. SPMB registration information can be accessed through the website [www.spmb.or.id](http://www.spmb.or.id).

The next path is the Polytechnic route. This path is specifically for entry to Polytechnics throughout Indonesia. Usually this path selection is carried out at the beginning of the year and is followed by some of the best Polytechnics in Indonesia. Registration for this polytechnic can be downloaded on the official website [politeknik.or.id](http://politeknik.or.id). The next line is the official line. For applicants who want to go to college, and after college, they immediately work in related fields and institutions, then this path is the right choice. Registration can be accessed through the official website of each official university. The last path is the path that is in great demand by some prospective students, namely the scholarship path. There are lots of scholarships given by both government and non-government. Some examples of scholarships are Bidikmisi Scholarship, DIKTI Scholarship, LPDP Scholarship, PPA BBM Scholarship, Djarum Scholarship and others. The Bidikmisi scholarship can be accessed through the bidikmisi website [belmawa.ristekdikti.go.id](http://belmawa.ristekdikti.go.id). Likewise, other scholarship entry pathways can be accessed through the related unit providing scholarships.

In this article, the author only discusses the questions on the Entrance Examination for State Islamic Religious Colleges (UM-PTKIN). This the author does, because the author will review in detail the questions about Islamic Religious Education. More specifically, the author limits this article to the 2020 UM-PTKIN questions regarding Islamic Religious Education. The 2020 UM-PTKIN questions consist of Basic Ability Tests (TKD) and Field Ability Tests (TKB), namely IPA or IPS. The Science Proficiency Test is intended for those who will take the exact study program/IPA. So it's not those whose high school years were majoring in science. Likewise, Social Studies questions are intended for applicants who choose the humanities or social studies study program, and not those who majored in social studies during high school.

In the TKD questions, there are several questions, namely the Academic Potential Test (TPA), English, Arabic, and Islamic or Islamic Religious Education (PAI). The TPA question consists of 35 questions, in English there are 10 questions, Arabic consists of 10 questions, and Islamic Religious Education has 45 questions. While in the matter of PAI, it consists of several studies, namely Al-Qur'an Hadith, Akidah Akhlak, History of Islamic Culture (SKI) and Fiqh. The number of questions for the Field Ability Test (IPA/IPS) is 30 questions. Furthermore, in this article, we will focus on PAI questions, which consist of 45 questions. In the 2020 UM-PTKIN question, the PAI question occupies serial numbers 56 to 100 on the TKD question. In detail, the description of the 2020 PAI UM-PTKIN questions is as follows:

**Table 2. Overview of the 2020 UM-PTKIN Questions for PAI Materials**

*Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS) on UM-PTKIN Questions on Islamic Religious Education Materials*

No. Urut	Question for UM-PTKIN	Material	Description	Question
1.	56.	Al-Qur'an Hadith	The verse of the Qur'an	The above verse explains the indicators of true faith, which is a combination of ...
2.	57.	Al-Qur'an Hadith	The verse of the Qur'an	The above verse explains about Allah's decree, namely that ...
3.	58.	Al-Qur'an Hadith	The verse of the Qur'an	above provides guidance on how to carry out the behavior of helping to help, namely ....
4.	59.	Al-Qur'an Hadith	Hadith	In that hadith, the Messenger of Allah forbade envy (hasad), because ...
5.	60.	Al-Qur'an Hadith	Al story	Lessons can be drawn from Ali's story is ....
6.	61.	Akhlak Akhlak	Verses of the Qur'an It	can be drawn a relationship that ....
7.	62.	Akhlak Akhlak	Statement about tolerance	Your response to this statement is ....
8.	63.	Akhlak Akhlak	Example of a case	Your response to this case .....
9.	64.	Akhlak Akhlak	The Qur'anic	verse above teaches the most dangerous thing for people who behave in riya, namely .....
10.	65.	Akhlak Akhlak	Narrative	Theologically, the main reason for the emergence of radical movement this is....
11.	66.	Akhlak Akhlak	Narrative	This can happen because....
12.	67.	Akhlak Akhlak	Case examples	News like this needs tabayyun, because....
13.	68.	Morals	Verses of the Qur'an	This teaches a relationship that ...
14.	69.	Morals	Case examples	According to you, Honang's character is....
15.	70.	SKI	History of friends	This story teaches ....
16.	71.	SKI	Story of the Messenger of Allah	The character of Makkiyah's da'wah is this....
17.	72.	SKI	Story of the Messenger of Allah	The character of the da'wah of Medina ....
18.	73.	SKI	The story of Khulafaur Rashidin	The Caliph wants to teach a lesson to ....
19.	74.	SKI	The story of the period of friends	The characteristics of Muslim leadership must be able to behave....
20.	75.	SKI	The story of a Muslim scientist	Al Razi's attitude represents a Muslim ...
21.	76.	SKI	The story of scientist	X has been named as the founder of ushul al fiqh, contained in the book...
22.	77.	SKI	The story of a scientist	The analogy of technological advances in this day and age is ....

Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS) on UM-PTKIN Questions on Islamic Religious Education Materials

23.	78.	SKI	The story of government	Islamic Its ability to acculturate culture created Islamic civilization Indian, for example .....
24.	79.	SKI	Narrative of Islamic teachings	Claims of Islamic locality, as in the following Swahili....
25.	80.	SKI	The story of a friend The	strategy for the spread of contemporary Islam uses the pattern....
26.	81.	SKI	The story of the Messenger of Allah (saw)	The story is relevant for building a da'wah strategy....
27.	82.	SKI	Muslim story	The future of this peaceful tradition is still relevant because the brotherhood of the Indonesian people is based on the principle of ....
28.	83.	SKI	History of Islam in Indonesia	These two publications apply the da'wah strategy .....
29.	84.	SKI	Stories of Indonesian Muslim scholars	If it is associated with a contextual mindset, the establishment of MANPK aims to produce a progressive generation of Indonesian Islamic intellectuals....
30.	85.	SKI	The story of an Muslim scholar Indonesian	The implication of this lecture shows that the ulema of the archipelago have a vision global with capable competition...
31.	86.	Fiqh	The Hadith of the Messenger of Allah (saw)	This hadith implies that dog saliva is unclean...
32.	87.	Fiqh	Examples of cases	Consequences of Dewi's decision not to fast are ....
33.	88.	Fiqh	Legal narrative	The temporary mahram includes .....
34.	89.	Fiqh	Case examples	What do you think should be done by Shukri?
35.	90.	Fiqh	Examples of cases	The amount of zakat that must be issued is ....
36.	91.	Fiqh	Example case of inheritance	Granddaughter gets a share....
37.	92.	Fiqh	Examples of cases	The behavior of Muslims is contrary to the teachings/ wisdom of fasting, namely .....
38.	93.	Fiqh	Examples of cases	of Hajj Zakir's way of performing Hajj is called ....
39.	94.	Fiqh	An example of a case	Bachelor's Attitude is ....
40.	95.	Fiqh	An example of a case	The form of cooperation between the two is ....
41.	96.	Fiqh	Example of case	Kamil's divorced wife has to perform iddah for...
42.	97.	Fiqh	The example of case	Ahmad and Zaki's cooperation is a transaction of
43.	98.	Fiqh	Example of case	The president's attitude is included in the leader's obligations related to ....
44.	99.	Fiqh	Example of case	sale and purchase transaction is considered.... ...
45.	100.	Fiqh	Example of case	J Examples of cases of buying and selling in the form of barter include .... .....

Source: (<https://.Soalumpkin.com>)

3. Measuring HOTS and LOTS on The 2020 UM-PTKIN Questions on Islamic Religious Education Materials

To find out the level of Higher Order Thinking Skills (HOTS) on the 2020 UM-PTKIN questions on PAI material, analysis, mapping and classification must be carried out one by one from the matter. From the description of the explanation of the previous subtitle, a description of the 2020 UM-PTKIN questions is narrated on PAI material. If the questions are mapped based on the cognitive thinking level of Bloom's taxonomy which was revised by Alexander and Krathwohl, it can be seen in the following table (Anderson & Krathwohl, 2001):

**Table 3. Cognitive Thinking Level of UM-PTKIN Questions for PAI**

No. Sort Prob leml	Material	Competence	Level Cognitive Thinking						Category		
			C1	C2	C3	C4	C5	C6	LOTS	HOTS	
1	Qur'an	Summarizes		√						√	
2	Qur'an	Explain		√						√	
3	Qur'an	Determine			√					√	
4	Qur'an	Determining			√					√	
5	Qur'an	Summing				√					√
6	Aqeedah Morals	correlate				√					√
7	Aqeedah Morals	study, finding				√					√
8	Aqeedah Morals	Diagnosing				√					√
9	Morals Aqeedah	Decipher		√						√	
10	AqeedahBehavior	Analyzing				√					√
11	Aqeedah Morals	Summing					√				√
12	Aqeedah Morals	assessing					√				√
13	Aqeedah Morals	correlate				√					√
14	Aqeedah Morals	Summing					√				√
15	SKI	rationalize				√					√
16	SKI	rationalize				√					√
17	SKI	rationalize				√					√
18	SKI	Summing					√				√
19	SKI	Summing					√				√
20	SKI	interpret / judge					√				√
21	SKI	Memorizing	√							√	
22	SKI	correlate				√					√
23	SKI	Exemplifying		√						√	
24	SKI	characterizes				√					√
25	SKI	Summing					√				√
26	SKI	correlate				√					√
27	SKI	Summing					√				√
28	SKI	Summing					√				√

29	SKI	Comparing					√			√
30	SKI	Summing					√			√
31	Fiqih	Explaining		√					√	
32	Fiqih	Predict					√			√
33	Fiqih	Deciding					√			√
34	Fiqih	Deciding					√			√
35	Fiqih	Counting		√					√	
36	Fiqih	Counting		√					√	
37	Fiqih	Deciding					√			√
38	Fiqih	Characterizing		√					√	
39	Fiqih	Summing					√			√
40	Fiqih	Deciding					√			√
41	Fiqih	Nominating				√				√
42	Fiqih	Nominating				√				√
43	Fiqih	Correlate				√				√
44	Fiqih	Summed					√			√
45	Fiqih	Summed					√			√
		Number	1	8	2	15	19	0	11	3 4
		Percentage	2,2 %	17,8 %	4,4 %	33,3 %	42, 2%	0 %	24,4 %	75,6 %

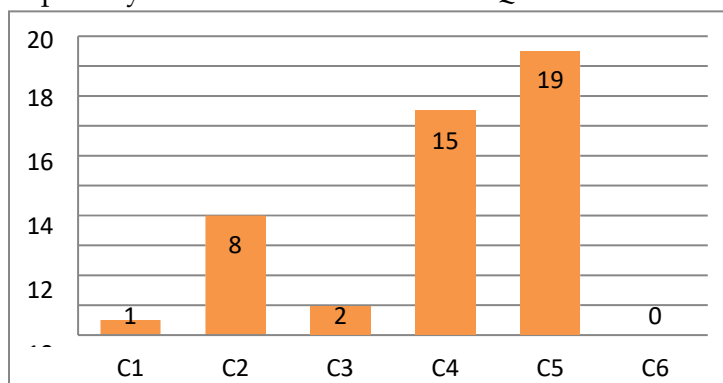
Information Table 3:

C1 = Memorizing C2 = Understanding C3 = Applying C4 = Analyzing

C5 = Evaluating C6 = Creating LOTS = C1, C2, C3 HOTS = C4, C5, C6

From the data above, it is known that the level of competency in UM questions - PTKIN Islamic Religious Education materials spread from C1, C2, C3, C4 to C5. There is not a single question at the C6 competency level. PAI material questions are colored with high-level questions, namely C5 there are 19 questions or reaching 42.2% and C4 level questions consist of 15 items or equivalent to 33.33%. Another low question is level C1, which is only 1 question in the study of the Qur'an and Hadith. The diagram of the competency levels for the UM-PTKIN questions for PAI material can be seen as follows:

Diagram 2. Competency Levels for the UM-PTKIN Questions for PAI Materials



When viewed from the side of the questions with Higher Order Thinking Skill (HOTS) and Lower Order Thinking Skill (LOTS), then From the data previously presented, the UM-PTKIN questions for PAI material have more HOTS than the LOTS questions. The total number of PAI questions in UMPTKIN is 45 questions. As for the HOTS questions, there are 34 questions which are equivalent to 75.6%. While the LOTS-level questions on the UM-PTKIN questions on PAI

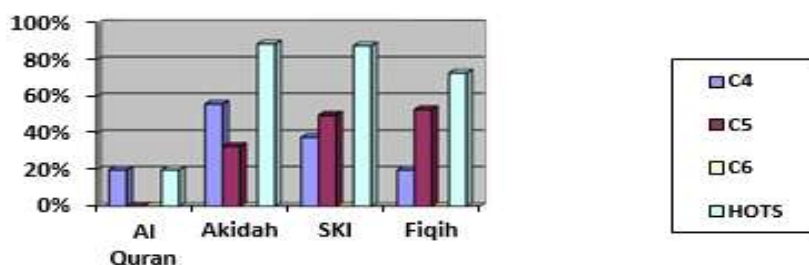
material in 2020 amounted to 11, which is equivalent to 24.4%. The following is a pie chart of the percentage of UM-PTKIN HOTS questions in 2020 for PAI material.

**Table 4. Competency Level of UM-PTKIN Questions for PAI Material Studies in the Field of Science**

Material	Number of Questions	Cognitive Level						Category	
		C1	C2	C3	C4	C5	C6	LOTS	HOTS
Al-Qur'an Hadis	5	0	2 (40%)	2 (40%)	1 (20%)	0	0	4 (80%)	1 (20%)
Akidah Akhlak	9	0	1 (11%)	0	5 (56%)	3 (33%)	0	1 (11%)	8 (89%)
SKI	16	1 (6%)	1 (6%)	0	6 (38%)	8 (50%)	0	2 (12%)	14 (88%)
Fiqh	15	0	4 (27%)	0	3 (20%)	8 (53%)	0	4 (27%)	11 (73%)

From Table 4 above, it can be seen that the 2020 UM-PTKIN questions on PAI material are not all included in the HOTS category questions. The question for the LOTS category is still there, namely Cognitive level 1 (C1), namely memorization, which is contained in 1 question in the field of Islamic Cultural History. As for the questions that are still at the C2 level, there are 8 questions that are spread out on PAI material questions in all fields of scientific study, namely Al-Qur'an Hadith, Akidah, SKI and Fiqh. The C3 level questions found a total of 2 questions, namely questions in the field of study of the Qur'an and Hadith. The C4 level question, namely the HOTS level, consists of 15 questions spread across all fields of PAI material science studies. Soal level C5 atau mengevaluasi berjumlah 19 soal, yakni ada dalam kajian knowledge of Akidah Akhlak, SKI, and Fiqh. There is no C5 level in the study of the Qur'an and hadith. Meanwhile, the C6 level question does not exist at all in all studies in the field of science, both SKI, Al-Qur'an Hadith, Akidah Akhlak, and Fiqh. Competency Level (C1-C6) UM-PTKIN Questions The material for PAI studies in the Field of Science can be seen in the diagram:

**Diagram 3. HOTS Level Map for UM-PTKIN Questions for 2020 PAI Materials per Test Eye**



From the diagram above, it can be seen that the 2020 UM-PTKIN questions for PAI material for the study of Akidah Akhlak are the largest contributor to presenting HOTS questions. The question of Akidah Akhlak which is included in the

HOTS category reaches 89%, followed by a study on the History of Islamic Culture which gives HOTS questions amounting to 88%. The next rank of contributors to the HOTS questions is the PAI material for the study of Fiqh which reaches 73%, and the least is the HOTS question is the study of the Qur'an and Hadith which reaches 20%. While the LOTS questions or low-level thinking are very much in the matter of the Al-Qur'an Hadith which reaches 80%. While the other studies have relatively few LOTS questions, namely Akidah Akhlak 11%, SKI only about 12%, and Fiqh reaching 27%. Of course, this must be done to improve the questions of UM-PTKIN PAI material for the following years.

From the discussion above, the UM-PTKIN questions should use HOTS-level questions and no longer use LOTS questions. The number of LOTS questions that are still visible in some of the 2020 UM-PTKIN questions can be seen clearly from the Al Quran Hadith questions which are still testing the ability to "summarize" UM-PTKIN participants. Besides that, there are also questions that test the ability to "memorize" UM-PTKIN participants as written in the UM-PTKIN questions on the History of Islamic Culture. It is hoped that in the following years the LOTS question will not appear again in the UM-PTKIN questions. The results of this study are relevant to the results of Nurdinah Hanifah's research on the Development of Assessment Instruments *Higher Order Thinking Skill* (HOTS). Through an assessment with a HOTS assessment instrument, it can be seen whether students have higher-order thinking skills. In order to hone students' thinking skills, test assessment is very appropriate (Taufiqurrahman et al., 2018). This is very appropriate to be done by a university in order to attract prospective students through the UM-PTKIN route.

#### **4. Que Vadis HOTS and LOTS on Problems UM-PTKIN**

Thinking is a skill that aims to improve the construction of deeper understanding and conceptually driven. This term contains various meanings (Abosalem, 2016). To illustrate this complexity, the Webster Encyclopedic Unabridged Dictionary (2001) provides many definitions of thinking which include activities that include holding awareness, remembering, making rational decisions, evaluating information, organizing ideas, making plans, evaluating actions, and sharpening sharpness of thinking or deep analysis (Schraw & Robinson, 2011).

The content of HOTS in the UM-PTKIN question is very important considering the atmosphere of human civilization is entering the 5.0 era. The Covid-19 pandemic that has hit various countries, including Indonesia, requires HOTS to filter the rapid flow of incoming information. If the HOTS starting from C1 to C6, especially C6 are not inputted in the UM-PTKIN questions, it is not impossible that students as agents of change will become a generation that is paralyzed both cognitively, affectively and psychomotorically. In this context, the implementation of HOTS in the UM-PTKIN problem finds its significance point.

HOTS briefly contains three aspects, namely content, construct and individual validity. Content validity is carried out so that the product development of UMPTKIN questions does not experience conceptual errors. Construct validity was carried out to ensure that the assessment instrument was able to empower students' HOTS skills. Finally, individual validity (students, lecturers, examiners, and so on) is aimed at the feasibility of the assessment instrument (Walid et al., 2019). The three things above must be evenly distributed on the UM-PTKIN questions. Ideally, the class of college entrance exam questions, both Islamic and public universities, should touch the overall HOTS aspect. However, it turns out that



in the field there are still questions about UM-PTKIN as reported by the data above. Of course this is very sad and worsens the quality of Indonesian education or to borrow Raihani's term, there has been social injustice. in the question of UM-PTKIN (Raihani, 2021).

Centralization of one aspect of HOTS in the UM-PTKIN question, mandates that the UM-PTKIN question as an instrument for recruiting new students must be developed based on the notation of four core abilities in the 2013 curriculum (K13), namely spiritual (KI-1), social (KI-2), knowledge (KI-3), and skills (KI-4). In essence, students construct their own knowledge, understanding and awareness through challenging interactions with the comprehensiveness of UM-PTKIN questions in order to hone their sharpness of thinking and solve life's problems (Fanani, 2018). This implies that the preparation of the UM-PTKIN questions is intertwined with all lines, including the students themselves.

In the context of Islamic education, Umar bin Khattab's friend when writing to the residents of the Hims area, "teach your children swimming, archery and horseback riding". Meanwhile, another saying of the Prophet, 'Uqbah bin 'Amir al-Juhani as stated in Sahih Muslim, "Anyone who has been taught archery and then abandons it then he is not our group or has disobeyed the Prophet". (HR Muslim) (Al-Qayrawani, 1978). Further more, Ali bin Abi Talib's friend explicitly emphasized the importance of educating children according to their times, "educate your children according to their times, because they will experience a different era from yours". Even Ali's statement is "cited" by Socrates, "don't force your children to follow in your footsteps, they were created for life in their time, not yours".

Several messages prophetic, the words of friends and Western philosophers symbolize that education at that time was carried out according to its era. If drawn into the current context, the preparation of UM-PTKIN questions should not dwell on the old paradigm or the centralization of one aspect, but must be comprehensive and adapted to the gradation of individual thinking levels. Students must be applied and trained as often as possible to think at the highest level of HOTS, namely C6 (creating). They as agents of change and future successors of the Indonesian nation must be forged in such a way through questions based on C6 (creating) so that they are able to guide this nation with a new mind, new habit and new personality. That is the essence of the new normal.

Therefore, the even distribution of HOTS aspects from C1 to C6 in the UM-PTKIN question as an entry point for the selection of new students gets its legitimacy from the treasures of Islam, Al-Quran and al-Hadith. The two main Islamic treasures suggest that justice must be the main foundation in human life, including the distribution of HOTS aspects in UM-PTKIN questions. UM-PTKIN questions must be developed and designed as a whole to encourage critical thinking, innovation and creativity, as well as fairness in thinking and behaving. In simple terms, all aspects of HOTS must be delivered distributively, not partialistically. As explained earlier, UM-PTKIN is the entry point for PTKIN to attract quality new students. The UM-PTKIN selection, which has just opened in the new academic year 2021, seems to have to be adaptive to the current context. If not, don't expect PTKIN to be able to improve or even improve its quality, including lecturers and students in order to welcome Indonesia Gold 2045.

As a recommendation from this study, in the following year, the compilers of the UM-PTKIN questions need to increase the level of HOTS questions for PAI

materials, especially the test subjects. Al-Quran Hadith. This is very necessary because about 80% of the Al-Qur'an Hadith questions are in the form of LOTS questions. With the HOTS questions, this is a very good entry point for universities to be able to carry out the educational process as optimally as possible. Moreover, the PAI Study Program at PTKIN is included in the favorite category with high-level enthusiasts. When the UM-PTKIN questions are all at the HOTS level, the quality of the selected students can also be guaranteed. If the incoming input quality, the raw input and process quality of learning in it as well, and ultimately lead to a good quality of graduates and high-quality (high quality). It is expected to have an impact on the improvement of accreditation, universities, and the quality of Islamic education quality nationwide excellent.

In supporting the realization of the changes as expected above, this paper suggests three essential things. First, apply aspects (C6 or create) with a percentage of 70%, aspects of C4-C5 as much as 20%, and C1-C3 as much as 10%. At level C6 (creating) the form of the questions, among others, is about reconstructing, formulating, combining, combining, compiling, connecting. While the level C4-C5 the form of the question contains the following aspects, namely analyzing, criticizing, selecting, concluding, assessing, comparing, studying, rationalizing and clarifying. As for C1-C3 as part of the LOTS, the content of the questions includes the following, mentioning, explaining, implementing, classifying, operating, and similar verbs (Lewis & Smith, 1993).

The composition of HOTS above cites Anderson and Krathwohl as an assessment to remember as well as transfer of knowledge and value. Assessment matter of course is not only focused on aspects of the recall (remembering) alone, but requires the knowledge or in terms of Anderson, HOTS as transfer of knowledge and value (HOTS as the transfer of knowledge and values). Next, HOTS as critical thinking (HOTS as critical thinking). Critical thinking in the sense of logical and relative thinking as well as concern on problem solving. Norris and Ennis mention that the real purpose of the HOTS-based assessment lies in this aspect (Collins, 2014). In this case, prospective students can orchestrate their various knowledge and then criticize it with reasoned arguments. Furthermore, HOTS also functions as problem solving. Today prospective students must be forged as early as possible to be trained to solve problems. Because the era of disruption and the Covid-19 pandemic (new normal) requires a person to be able to overcome various difficulties that exist. So, if the UM-PTKIN PAI questions which consist of Akidah Akhlak, Al-Quran Hadith, Islamic Cultural History, Fiqh, only a few contain aspects related to problem solving, then the ability of prospective students is like a baby who must always be guided. This is certainly not our common hope (Brookhart, 2010). Second, re-evaluating all UM-PTKIN questions, which aspects still contain LOTS rather than HOTS. Based on the data above, the Al-Quran Hadith contains the most LOTS (80%) than HOTS (20%). This matter should be re-evaluated. Then, combing through the questions on the other four PAI materials to ensure the composition of 70% for C6, 20% for C4-C5 and 10% for C1-C3 is implemented correctly and well. Third, the Ministry of Religion as a leading sector as well as a pilot project must form a small team consisting of professors, doctors, academics and evaluation assessment experts to select UM-PTKIN questions and adapt them to the current context, era 5.0 and the Covid-19 pandemic. for example. Another step that can be taken is to provide workshops and training so that relevant stakeholders have the capacity to be actively involved in the

preparation of HOTS questions. The process, said Raihani, will follow the logic of change, namely initiation, implementation and related institutions (PTKIN). Inseparably, the synergy between ministries, institutions and Islamic religious organizations mainstream (Nahdlatul Ulama and Muhammadiyah) is an underpinning factor that should not be forgotten.

The research findings show that the purpose of mapping the level of difficulty of the Higher Order Thinking Skills (HOTS) and *Lower Order Thinking Skills (LOTS)* questions on the UM-PTKIN Questions for Islamic Religious Education Materials is to select prospective students so that in the future they will be able to have analytical skills, evaluation skills, and expertise. create material. Students have analytical skills, as each person's analytical ability is different which is adjusted to a person's level of thinking according to Hart, C., Da Costa, C., D'Souza, D., Kimpton, A., & Ljbusic, J. that analytical skills are content that is included in high-level thinking activities, namely critical thinking (Hart et al., 2021). Furthermore, Nuryanti, L., Zubaidah, S., & M. Diantoro explained that critical thinking is analytical and reflective ability, especially in making decisions (Nuryanti et al., 2018). Thinking as an association process, namely viewing thinking as a strengthening of the relationship between stimulus and response, thinking as well as a psychic activity to find a relationship between two or more objects, an event or an attempt to gain understanding or to solve problems, in analyzing the Difficulty of *Higher Order Thinking Skills (HOTS)* and *Lower Order Thinking Skills (LOTS)* in the UM-PTKIN Questions on Islamic Religious Education Materials, make it a challenge for students to study, by having analytical skills, this can be overcome properly.

Evaluation is one of the capabilities that must be possessed in analyzing and reassessing what is the achievement of performance according to Rombout, F., Schuitema, JA, & Volman, MLL explaining that evaluation is used to analyze judgments about relevance, consistency and practicality in thinking (Rombout et al., 2021). Meneses, LFS also explains that evaluation is an ability that is raised in thinking activities to determine goals and assessment in reviewing the designed concept (Meneses, 2021). The relationship between *Higher Order Thinking Skills (HOTS)* and *Lower Order Thinking Skills (LOTS)*, is seen in efforts to determine what standards are appropriate to set to measure the level of difficulty or weakness in the material made, Adri, J. explains that difficulty Learning is a common thing found by students in learning, it can be identified that we can minimize learning difficulties by determining what are the sources of difficulty and this is of course through an evaluation process (Zainul et al., 2020).

After analysis and evaluation, the other most important part is that students have expertise in creating materials based on previous things, creating is related to creativity according to Li, W. explaining that creativity means skills and thoughts that arise in certain situations, creativity is also related with the latest ideas and findings that lead to thinking to create and discover a novelty (Yang et al., 2021). In creating material, one needs to determine that making and creating requires this, especially those related to making material about *Higher Order Thinking Skills (HOTS)* and *Lower Order Thinking Skills (LOTS)* on the UM-PTKIN Questions for Islamic Religious Education Materials.

## CONCLUSION

From the above description in general, the UM-PTKIN 2020 questions consist of Basic Ability Test (TKD) and Field Ability Test (TKB), namely Science or Social Sciences. In the TKD questions, there are several questions, namely the Academic Potential Test (TPA), English, Arabic, and PAI. PAI material questions consist of studies of Al-Quran Hadith, Akidah Akhlak, History of Islamic Culture (SKI), and Fiqh. There are 45 PAI questions in the 2020 UM-PTKIN questions. Of all the 2020 UM-PTKIN questions, the PAI material contains HOTS level questions and LOTS level questions. Of the total number of PAI questions, there are 45 questions, there are 34 HOTS questions or the equivalent of 75.6%. While the LOTS-level questions on the UM-PTKIN PAI material in 2020 amounted to 11 questions which were equivalent to 24.4%. The most HOTS questions are questions about Akidah Akhlak, while the least HOTS questions are about Al-Quran Hadith. The Akhlaq test items contributed 89% HOTS questions, the Islamic Cultural History test items contained 88% HOTS questions, the Fiqh test items contained 73% HOTS questions, and the Al-Quran Hadith test items contained 20% HOTS questions.

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## AUTHOR CONTRIBUTION STATEMENT

All authors contributed equally in the preparation of the manuscript of this article, all authors have read and approved the final manuscript.

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