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HOTS Questions Validity Test Class VII at MTs Nurul Falah Palembang

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Info Articles

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Abstract

HOTS is a learning evaluation activity that trains students' higher order thinking skills. Based on the results of observations, it showed that students had not been able to work on questions at the HOTS level. This is caused by several things (1) there is no guideline for preparing HOTS questions for teachers (2) the awareness of teachers to make HOTS questions is still very low. Based on this urgency, the purpose of this research is to produce valid hot questions at MTs Nurul Falah Palembang. This research uses the Tessmer model. The formative research type Tessmer development model is adopted as the research model. The self-assessment stage, the formative evaluation stage (prototyping), which includes expert and one-to-one evaluation (low resistance to revision) and small group feedback, and the field test stage are the four stages of this study (high resistance). The results of the research and discussion have been carried out that the validity test after being tested through 3 aspects, namely aspects of language assessment, material and construction that the hots question development product at MTS Nurul Falah Palembang was declared valid.

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INTRODUCTION

Education is an effort made to help a person develop all the potential that exists within himself to become a better human being. The center of education is to make humans more mature (both intellect and mind), have freedom of speech and action and have a sense of responsibility in living their lives (Anderson, 2001).

In living life , especially in the 21st century, a person is required to make adjustments in various aspects of life, including in the learning process. Such as being able to think creatively, critically, communicatively, and being able to solve problems (Bagarukayo, 2012). The problem faced by humans is not just learning to know, but being able to do, learning to be (*learning to be),* and learning to live collaboratively (*learning live together)* .

The educational goals contained in the Basic Law on the National Education System No. 20 of 2003 Chapter II article 3, The purpose of education contained in the National Education System Law Number 20 of 2003 Chapter II Article 3 is to help students develop their potential as human beings who believe and fear God Almighty, have noble character, are healthy, are citizens a country that is knowledgeable, capable, creative, and democratic and responsible.

National Education is used to improve students' abilities so as to form the characteristics expected by national education goals. The process of education requires learning that is adapted to environmental conditions, the needs and characteristics of students so as to produce students who are critical and collaborative.

Collaboration carried out with colleagues in learning can encourage students to think creatively in solving various problems, and be able to manage critical thinking skills well (Jalaludin, 2017). Critical Thinking is included in HOTS. Where HOTS (*Higher Order Thinking Skill)* is an ability to combine ideas, facts, analyze data, explain and be able to conclude and even evaluate as well as being able to create something.

In creating something, a student needs a teacher who is qualified and has been tested. One country that has very good teacher quality is Finland. Finland, formerly a traditional agricultural country, became a developed country supported by science and technology. The excellent quality of teachers is due to the fact that the education system in that country has been prepared as well as possible before they teach.

Teachers are not only required to teach well to students. But more than that the teacher has the responsibility to improve the personal qualities and potential of students, this requires noble personality qualities from the teacher himself (Gunawan, 2003). Hence, teachers are often called spiritual fathers or spiritual fathers for students , because the teacher provides moral education, and shows the good path of truth for students.

Students are required to be able to understand what HOTS (*Higher Order Thinking skills)* are so that they can compete in global competitions that require the ability to think critically, creatively and be able to solve problems. The main objective of HOTS (*Higher Order Thinking Skills)* is that students can think at a higher level and make good and correct decisions. (Goodson, 2013). The ability to think HOTS (*Higher Order Thinking skills)* provides a new challenge and requires that people who learn can apply the information obtained and manipulate answers to get new situations (Kemendikbud, 2017).

Therefore, teachers need to make adjustments with the times , especially related to learning. Learning in the 21st century is better known as the term 4c *(Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation).* In addition to the above abilities that students need to have. An educator also needs to direct problem solving based on cooperation, responsibility, perseverance, trust and attitude (Muaddab, 2011). Moreover, coupled with the rapid development of technology and communication has triggered globalization, which has an indirect

impact on the world of education such as triggering international comparisons between schools, curriculum, student achievement and assessment methods.

To create 4c abilities, an educator needs to carry out a capability-based assessment above. An assessment is needed by an educator to determine the extent to which students' abilities are *cognitive, affective* and *psychomotor* . This assessment can be in the form of questions that must be answered or questions that are orders (Mullis, 2012).

Assessment is one indicator in seeing the success of the process and learning outcomes. From this assessment educators get an idea to evaluate their teaching. The impact is that assessment must be used to educate in accordance with pedagogical principles. An educator needs to understand that student learning progress is an indicator of successful learning (MudyahardjI, 2001). This means that if the educator is not successful in his learning, it also means the failure of the educator himself.

From the results of the 2018 PISA survey assessment, students experienced a decrease compared to 2015 where in 2018 Indonesia was ranked 74th with an average score of 371. Indonesia's PISA ability in 2015 where reading ability scored 397, math ability 386 and science performance ability 403. Meanwhile in 2018 reading ability 371, math ability 379, and science performance ability 396.

This makes the ability of students to solve a problem still relatively low, especially problems related to higher order thinking skills. One of the low abilities of low students lies in the evaluation or assessment carried out by students who still make the usual types of questions, besides that the next problem is the ability of educators to develop instruments of HOTS (*Higher Order Thinking Skill) questions* . The making of this HOTS (*Higher Order Thinking Skill)* instrument will train students in solving problems, increasing the learning achievement of students who demand high-order thinking skills (Budiman, 2014).

Question development was carried out by Rufiana (2016) regarding *higher order thinking skills* , she argued that most math books contain an understanding of 68.01 % , the proportion of presentation questions is around 23.67% which is quite large when compared to reasoning and proof questions around 1.45 %. This small percentage makes students work more on questions in the form of understanding compared to questions of reasoning and proof.

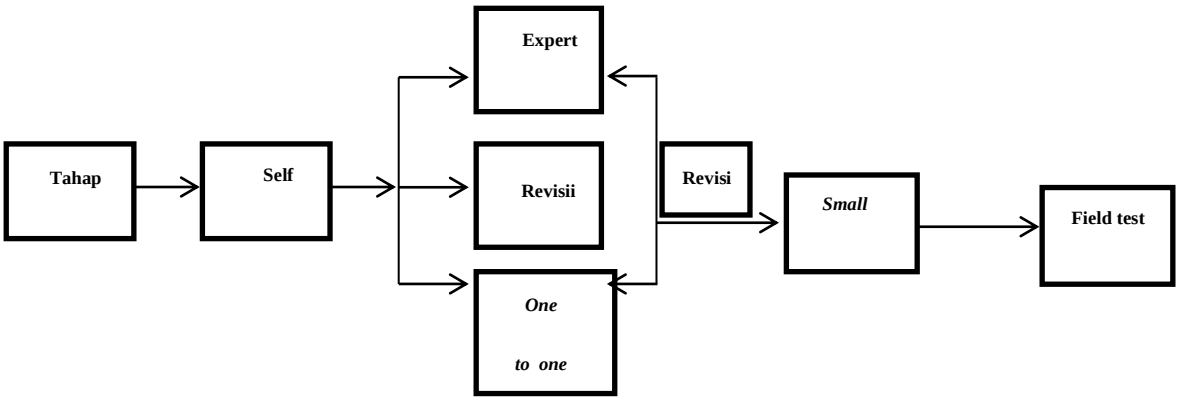
Rahmah (2019), conducted research on class VII junior high school math books. From the results of the research conducted, it was obtained some important information in the cognitive domain, namely C2 (31.07 %), C3 (56.09%), C4 (12.19%), C5 (0.0%), and C6 (0, 0%). So it is highly recommended to improve mathematics books that refer to students' high-level thinking so that they can achieve core competencies and basic competencies.

Researchers made observations on July 20 2022 at MTs Nurul Falah Palembang by distributing a questionnaire to see the ability of students to understand *higher order thinking skills questions* . The observation results show that students do not fully understand the *higher order thinking skills questions* . In addition, researchers also made observations through questionnaires to educators at MTs Nurul Falah Palembang school. From the results of these observations, educators still do not fully understand the development of *higher order thinking skills questions* . This is what encourages researchers to conduct research on development. The research in question is the development of instruments about *higher order thinking skills* on Life Organization material. The resulting product will certainly be very useful for students and educators in learning at school. The reason the presenter took the second semester of science material was because the material was difficult to understand and there was quite a lot of material.

METHODS

This thesis relies on research and development for its findings. The formative research tessmer type development model was adopted as the research model. The *self-assessment* stage , the formative evaluation stage *(prototyping*), which includes expert evaluation and *one-to-one* (low resistance to revision) and small group feedback, and the field test stage are the four stages of this research (high resistance).

In this study, it requires steps that reach the stage of obtaining the final prototype of the test instrument in accordance with the research objectives. In more detail the research procedure can be seen in the image below :



The test instrument can be declared valid if the instrument can measure what it is intended to measure (Arikunto S. , 2012). Valid means true, meaning that the validity of the test instrument does not need to be doubted. The validity used by researchers is language content validation and construction validity. After the test instrument is completed, an assessment will be carried out by the validator as a whole. Data from the assessment by the validator is called data from the instrument validation *on higher order thinking skills* questions , which will then be included in the validation table for *the higher order thinking skills* test instrument .

Value Va	Validity Level
Va = 5	Very Valid
4 ≤ Va< 5	Valid
3 ≤ Va< 4	Pretty valid
2 ≤ Va< 3	Less valid
1 ≤ Va< 2	Invalid

RESULTS AND DISCUSSION

Media expert validation tests, construction and materials have been carried out and the product results have been tested valid. This validation test was carried out by two lecturers, namely Dr. Kurratul Aini, M.Pd and Muh. Isnaini. They are both lecturers from UIN Raden Fatah Palembang. The values given by the validator are as follows:

HOTS Question Instrument Validation Results

No	Aspects Reviewed	Rating result	
		I	II
A	Material		

1.	Conformity of items with indicators	3	3
2.	Formulation of statements/questions and answer keys	3	3
3.	Appropriateness of the material/substance with the purpose of measurement (for the purpose of measuring learning outcomes).	3	2
4.	Appropriateness of material/substance with levels, types of schools and grade levels.	3	2
B.	Construction		
5.	Clarity of the subject matter (stem).	3	3
6.	The specificity of the main questions and the choice of answers.	3	2
7.	Instructions from the subject matter of the answer choices that's right.	3	2
8.	The existence of double negative statements in the subject matter	3	2
9.	Homogeneity of answer choices	3	2
10.	The existence of an alternative answer: "all answers in above is correct" or "none of the answers above are correct" and the like	3	2
11.	Length of alternatives/answer choices	1	3
12.	Order of answer choices in the form of numbers/time.	3	3
13.	Functionality of case/discourse descriptions, pictures, tables or graphics.	3	3
14.	The existence of one answer	3	3
15.	Dependencies between items	3	3
C.	Language Aspect		
16.	The communicativeness of the question sentences	3	2
17.	The use of good and correct sentences, according to the type of language	3	2
18.	The emergence of multiple interpretations of the sentence	3	3
19.	The use of common language/words (not the local language or a new absorption language that is not yet known by all testees).	3	2
	Total	58	B
	Category	50	B

The data obtained from the two experts were then converted into a scale of five according to Khan, (2011), so the results can be seen in the table below:

HOTS Test Instrument Rating Score Categorization

intervals	Mark	Category
X ≥ 60	A	Very good
60 > X ≥ 50	B	Good
50 > X ≥ 40	C	Enough
X < 40	D	Not good

Description:
Yi (average ideal score) = 50
Sbi (ideal standard deviation) = 10
X = Acquisition of score
Ideal max score = 80
Ideal minimum score = 20

Through the use of the perception equation formula according to Borich (1994) the calculation results are obtained as below.

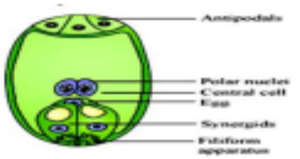
$R = (1 - \frac{A-B}{A+B}) \times 100\%$

Information :
A : 58
B : 50

Level of equation of the expert lecturer's assumption of the HOTS test instrument R = 93%. Based on the results of these calculations, the result is that the R value exceeds 75%, this indicates the eligibility/validity of a HOTS test instrument. Level of equation of the expert lecturer's assumption of the HOTS test instrument R = 93%. Based on the results of these calculations, the result is that the R value exceeds 75%, this indicates the eligibility/validity of a HOTS test instrument.

According to the expert, overall the test is in a good category, but there are several question items that need to be revised. After going through the assessment stage by the expert, then the questions are revised according to the criticism and suggestions from the expert (can be called written verbal data). The written verbal data is used as qualitative data which is described as follows:

A. Expert lecturer I (Kuratul Aini, M.Pd) stated that some of the questions had too long answers for multiple choice types (item numbers 12 and 18).
B. Expert lecturer II (M. Isnaini) expressed several opinions as follows:
    1. The language used is too convoluted so it will be difficult for students to understand (item number 2)
    2. Alternative answers to questions that are too long (item number 4 and 15).
    3. The homogeneity of the answer choices has not been seen (item number 13). Revisions to the questions that were made based on criticism and suggestions from experts can be seen in the table below.

Aspek Revisi	No. Item	Sebelum Revisi	Setelah Revisi
Penggunaan bahasa yang berbelit – belit	2	Pada pembuahan ganda Angiospermae 3 sel di *kalaza* akan membentuk *antipoda*, 3 sel lain yang berada di *mikrofil*, akan berkembang menjadi *ovum* dan dua sel di kedua sisinya akan menjadi sel *sinergid* yang mengapit sel *ovum* tersebut. Selanjutnya sel *antipoda* dan sel *sinergid* akan mengalami *degenerasi* yang diikuti dengan perkembangan buah dan biji. Berdasarkan tahapan dari pembuahan ganda Angiospermae tersebut maka fungsi dari *antipoda* dan sel *sinergid* yaitu . . . A. Sel *antipoda* akan berkembang menjadi inti biji sedangkan sel *sinergid* akan berkembang menjadi daging buah B. Sel *antipoda* akan berkembang menjadi *mesocarp* dan sel *sinergid* akan berkembang menjadi *pericarp* C. Sel *antipoda* akan berkembang menjadi buah sedangkan sel *sinergid* akan berkembang menjadi biji D. Sel *antipoda* berfungsi sebagai pusat nutrisi bagi kantung embrio sedangkan sel *sinergid* berfungsi sebagai sinyal yang memandu tabung *polen*. E. Sel *antipoda* akan berkembang menjadi biji sedangkan sel *sinergid* akan berkembang menjadi buah.	Perhatikan Gambar dari Tahapan Pembuahan Ganda di Bawah ini!  Berdasarkan tahapan dari pembuahan ganda tersebut fungsi dari *antipoda* dan sel *sinergid* yaitu . . .* A. Sel *antipoda* akan berkembang menjadi inti biji sedangkan sel *sinergid* akan berkembang menjadi daging buah B. Sel *antipoda* akan berkembang menjadi *mesocarp* dan sel *sinergid* akan berkembang menjadi *pericarp* C. Sel *antipoda* akan berkembang menjadi buah sedangkan sel *sinergid* akan berkembang menjadi biji D. Sel *antipoda* berfungsi sebagai pusat nutrisi bagi kantung embrio sedangkan sel *sinergid* berfungsi sebagai sinyal yang memandu tabung *polen*. E. Sel *antipoda* akan berkembang menjadi biji sedangkan sel *sinergid* akan berkembang menjadi buah.

perkembangan zigot, dimana zigot merupakan hasil peleburan empat sel *gamet (haploid)* sehingga sel zigot adalah *diploid*.

D. Dalam fase *sporofit*, spora dihasilkan. Sedangkan dalam fase *gametofit*, *gametlah* yang dihasilkan. Spora menghasilkan n atau kromosom *haploid* dan *gamet* menghasilkan 2n atau kromosom *diploid*. Pada tumbuhan paku, fase *sporofit* lebih dominan dibandingkan dengan fase *gametofit*. Karena pada fase *sporofit* ini, tumbuhan paku terlihat bertumbuh. Berkebalikan dengan lumut, fase *gametofit* lebih dominan daripada fase *sporofitnya*. Pada fase *gametofit*, tumbuhan lumut tumbuh, mengalami fertilisasi dan kemudian menghasilkan *gamet*.

E. Generasi *gametofit* tumbuhan paku *(protalium)* merupakan hasil pertumbuhan dan perkembangan spora, dimana spora merupakan hasil pembelahan sel secara *meiosis*. Pembelahahan *meiosis* merupakan pembelahan dari satu sel yang *diploid* yang menghasilkan empat sel anak yang bersifat *haploid*. Generasi *sporofit* merupakan hasil pertumbuhan dan perkembangan zigot, dimana zigot merupakan hasil peleburan dua sel *gamet (haploid)* sehingga sel zigot adalah *diploid*.

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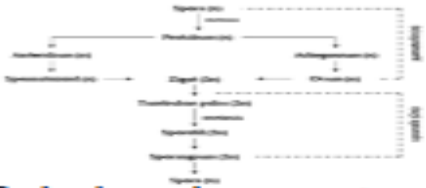
15 Perhatikan bagan *metagenesis* Pteridophyta di bawah ini!



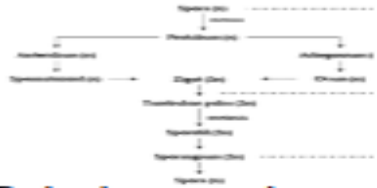
Berdasarkan bagan *metagenesis* Pteridophyta di atas, penyebab generasi *gametofit* tumbuhan paku selalu bersifat *haploid* dan generasi *sporofit* selalu *diploid* yaitu . . .

A. Generasi *gametofit* tumbuhan paku *(protalium)* merupakan hasil pertumbuhan dan perkembangan spora, dimana spora merupakan hasil pembelahan sel secara *mitosis*. Pembelahahan *mitosis* merupakan pembelahan dari satu sel yang *diploid* yang menghasilkan empat sel anak yang bersifat *haploid*. Generasi *sporofit* merupakan hasil pertumbuhan dan perkembangan zigot, dimana zigot merupakan hasil peleburan dua sel *gamet (haploid)* sehingga sel zigot adalah *diploid*.

B. Generasi *gametofit* tumbuhan paku *(protalium)* merupakan hasil pertumbuhan dan perkembangan spora, dimana spora merupakan hasil pembelahan sel secara *meiosis*. Pembelahahan *meiosis* merupakan pembelahan dari satu sel yang *diploid* yang menghasilkan empat sel anak yang bersifat *haploid*. Generasi *sporofit* merupakan hasil pertumbuhan dan perkembangan zigot, dimana zigot merupakan hasil peleburan dua sel *gamet (haploid)* sehingga sel zigot adalah *diploid*.

C. Generasi *gametofit* tumbuhan paku *(protalium)* merupakan hasil pertumbuhan dan perkembangan spora, dimana spora merupakan hasil pembelahan sel secara *meiosis*. Pembelahahan *meiosis* merupakan pembelahan dari satu sel yang *diploid* yang menghasilkan delapan sel anak yang bersifat *haploid*. Generasi *sporofit* merupakan hasil pertumbuhan dan

Perhatikan bagan *metagenesis* Pteridophyta di bawah ini!



Berdasarkan bagan *metagenesis* Pteridophyta di atas, penyebab generasi *gametofit* tumbuhan paku selalu bersifat *haploid* dan generasi *sporofit* selalu *diploid* yaitu . . .

A. Generasi gametofit berasal dari pembelahahan *mitosis* pembelahan dari satu sel *diploid* yang menghasilkan empat sel anak bersifat *haploid*. Generasi *sporofit* berasal dari hasil peleburan dua sel *gamet (haploid)* sehingga sel zigot *diploid*.

B. Generasi *gametofit* berasal dari pembelahahan *meiosis* yang bersifat *haploid*. Generasi *sporofit* berasal dari peleburan dua sel *gamet (haploid)*.

C. Generasi *gametofit* tumbuhan paku *(protalium)* merupakan hasil pembelahan sel secara *meiosis* merupakan pembelahan dari satu sel *diploid* yang menghasilkan empat sel anak (*haploid*). Generasi *sporofit* merupakan hasil peleburan dua sel *gamet (haploid)* sehingga sel zigot bersifat *diploid*.

D. Generasi *gametofit* berasal dari *meiosis*. Generasi *sporofit* merupakan berasal dari peleburan empat sel

E. Dalam fase *sporofit*, spora dihasilkan. Sedangkan dalam fase *gametofit*, *gametlah* yang dihasilkan.

mitosis. Apabila dalam keadaan lingkungan yang cocok kotak spora akan terbuka sehingga spora akan terlepas dan jatuh pada tempat yang cocok. Spora yang kecil *(haploid)* akan berkecambah menjadi suatu *protalium* yang disebut dengan *protonema*. *Protonema* ini terdapat kuncup-kuncup yang tumbuh dan berkembang menjadi tumbuhan lumut.

D. *Arkegonium* berbentuk gada yang akan menghasilkan *spermatozoid*. Bentuk *anteridium* seperti botol menghasilkan ovum. Jika dibuahi akan menjadi zigot yang berkembang menjadi embrio yang tumbuh menjadi *sporogonium*. Di dalam *sporogonium* terdapat kotak spora. Kotak spora akan memproduksi spora (*1S4emad* spora) dengan pembelahan *mitosis*. Apabila dalam keadaan lingkungan yang cocok kotak spora akan terbuka sehingga spora akan terlepas dan jatuh pada tempat yang cocok. Spora yang kecil *(haploid)* akan berkecambah menjadi suatu *protalium* disebut dengan *protonema*. *Protonema* ini terdapat kuncup-kuncup yang tumbuh dan berkembang menjadi tumbuhan lumut.

E. *Anteridium* akan menghasilkan ovum dan *Arkegonium* akan menghasilkan sel sperma. Sel sperma berenang menuju *anteridium* dan terjadi pembuahan, membentuk zigot yang akan terus berkembang menjadi embrio *(haploid)*. Kemudian tumbuh menjadi *sporogonium*, di dalam *sporogonium* terdapat *sporangium*. *Sporangium* memproduksi spora (S spora dengan pembelahan *mitosis*), kemudian terlepas. Spora akan terlepas dan jatuh pada tempat yang cocok. Spora yang kecil *(diploid)* akan berkecambah menjadi *protonema*. *Protonema* tumbuh dan berkembang menjadi tumbuhan lumut.

C. *Arkegonium* berbentuk botol yang akan menghasilkan ovum. Bentuk *anteridium* seperti gada/bulat menghasilkan induk sperma berbentuk spiral panjang yang terdiri atas inti dan dua bulu cambuk. Jika dibuahi akan menjadi zigot yang berkembang menjadi embrio yang tumbuh menjadi *sporogonium*. Di dalam *sporogonium* terdapat kotak spora. Kotak spora akan memproduksi spora (*1S4emad* spora) dengan pembelahan

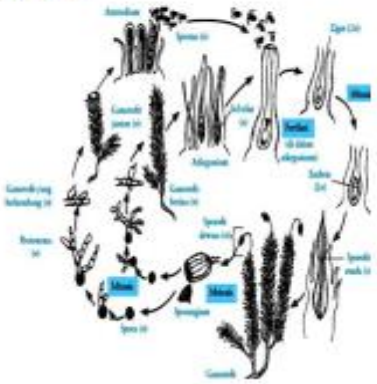
Tahapan *metagenesis* lumut di atas apabila dibuat dalam bentuk kalimat menjadi . . .

A. *Anteridium* akan menghasilkan sejumlah jantan berflagela (sel sperma). *Arkegonium* akan menghasilkan ovum. Sel sperma berenang menuju *anteridium* dan terjadi pembuahan membentuk *zigot* yang akan terus berkembang menjadi embrio *(diploid)*. Kemudian tumbuh menjadi *sporangium* di dalam *sporangium* terdapat *sporogonium*. *Sporogonium* memproduksi spora *(184etrad)*, kemudian terlepas. Spora akan terlepas dan jatuh pada tempat yang cocok. Spora yang kecil *(haploid)* akan berkecambah menjadi *protalium*, *Protonema* tumbuh dan berkembang menjadi tumbuhan lumut.

B. *Anteridium* akan menghasilkan *spermatozoid* dan *Arkegonium* akan menghasilkan ovum. *Spermatozoid* berenang menuju *arkegonium* dan terjadi pembuahan, membentuk zigot yang akan terus berkembang menjadi embrio *(diploid)*. Kemudian tumbuh menjadi *sporogonium*, di dalam *sporogonium* terdapat *sporangium*. *Sporangium* memproduksi spora (4 spora dengan pembelahan), kemudian terlepas. Spora akan terlepas dan jatuh pada tempat yang cocok. Spora yang kecil *(haploid)* akan berkecambah menjadi *protonema*, *Protonema* tumbuh

Tahapan yang kurang tepat dari siklus *metagenesis* tumbuhan lumut yang telah dibuat oleh Rino di atas yaitu . . .

A. *Arkegonium* seharusnya menghasilkan *ovum* dan *anteridium* seharusnya menghasilkan *spermatozoid*.
B. *Zigot* seharusnya tumbuh dan berkembang menjadi *sporogonium* dan *sporangium*
C. *Zigot* seharusnya tumbuh dan berkembang menjadi *embrio*
D. Spora seharusnya tumbuh dan berkembang menjadi *embrio*.
E. Spora seharusnya tumbuh dan berkembang menjadi *protalium*

Panjang alternatif/ pilihan jawaban	4	Amati siklus *metagenesis* lumut di bawah ini!  Rino mendapat tugas dari gurunya untuk membuat siklus *metagenesis* tumbuhan lumut. Siklus *metagenesis* yang telah dibuat oleh Rino yaitu sebagai berikut.

Kehomogenan pilihan jawaban	13	Jenis-jenis daun pada tumbuhan paku dapat dilihat pada foto di bawah ini!  Berdasarkan foto tersebut maka penyebab daun *tropofil* disebut sebagai daun steril dan daun *sporofil* disebut sebagai daun fertil yaitu . . . F. Daun *tropofil* memiliki klorofil sedangkan daun *sporofil* tidak memiliki klorofil G. Daun *tropofil* termasuk ke dalam *mikrofil* sedangkan daun *sporofil* termasuk ke dalam *mukrofil* H. Daun *tropofil* mampu melalukan	Jenis-jenis daun pada tumbuhan paku dapat dilihat pada foto di bawah ini!  Berdasarkan foto tersebut maka penyebab daun *tropofil* disebut sebagai daun steril dan daun *sporofil* disebut sebagai daun fertil yaitu . . . A. Daun *tropofil* khusus melalukan fotosintesis sedangkan daun *sporofil* berfungsi untuk menghasilkan spora.*

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perkembangbiakan sedangkan daun *sporofil* tidak mampu melalukan perkembangbiakan. I. Daun *tropofil* termasuk ke dalam *mukrofil* sedangkan daun *sporofil* termasuk ke dalam *mikrofil*. J. Daun *tropofil* tidak mampu melalukan perkembangbiakan sedangkan daun *sporofil* mampu melalukan perkembangbiakan	B. Daun *tropofil* termasuk ke dalam *mikrofil* sedangkan daun *sporofil* termasuk ke dalam *mukrofil* C. Daun *tropofil* mampu melalukan perkembangbiakan sedangkan daun *sporofil* tidak mampu melalukan perkembangbiakan. D. Daun *tropofil* termasuk ke dalam *mukrofil* sedangkan daun *sporofil* termasuk ke dalam *mikrofil*. E. Daun *tropofil* tidak mampu melalukan perkembangbiakan sedangkan daun *sporofil* mampu melalukan perkembangbiakan

Note: The * mark indicates the revised part

After the revision, the validation questions were immediately tested at MTs Nurul Falah Palembang.

CONCLUSION

Based on the results of the research and discussion that has been carried out by researchers regarding the development of HOTS questions on science material at MTs Nurul Falah Palembang, their validity has been tested after being tested through 3 aspects, namely aspects of material assessment, construction and language which show that the questions are valid or feasible to use. Validator 1 gets a score of 58% and validator 2 gets a percentage of 50% with a valid category and is worthy of being tested at MTs Nurul Falah Palembang.

REFERENCES

Anderson, LW, and Krathwohl, DR (2001). A Taxonomy of Learning, Teaching, and Assessing : A Revision of Bloom's Taxonomy of Educational Objectives. New York : Longman.

Bagarukayo, E. (2012). Then the impact of learning driven constructs on the perceived higher order cognitive skills improvement: Multimedia vs. text. International Journal of Education and Development using Information and Communication Technology, (8), pp.120-130.

Jalaluddin. 2017. Philosophy of Islamic Education from Age to Age. Jakarta: Raja Grafindo Persada.

Khan, WB & Inamullah, HM (2011). A Study of Lower-order and Higher-order Questions at Secondary Level. Canadian Center of Science and Education Asian Social Science, (7), 9.

Gunawan, AW (2003). Genius Learning Strategy: Practical Instructions for Implementing Accelerated Learning. Jakarta: Gramedia Pustaka Utama.

Ministry of Education and Culture. (2017). Guidelines for Implementing 21st Century Skills in the 2013 Curriculum in Senior High Schools. Jakarta: Directorate of High School Development, Directorate General of Elementary and Secondary Education.

King, FJ, Goodson, L., & Rohani, F. (2013). Higher order thinking skills. Retrieved January 8, 2021 from http://www.cala.fsu.edu/files/higher_order_thinking_skills.Pdf .

Muaddab, H. (2011). Quality assurance in teacher certification. Accessed January 6, 2021 http://Netsains.Net/2011/10/Jaminan-Mutu-dalam-Sertifikasi-Guru/.

Mudyahardjo, R. 2001. Educational Philosophy : An Introduction. Bandung: Rosakarya Youth.

Mullis, IVS, Martin MO, Foy P., & Arora A. (2012). TIMSS 2011 international results in mathematics. Boston: TIMSS & PIRLS International Study Center.