An analysis of cognitive assessment readability toward biology learning outcome and process evaluation course

A Maizeli1*, S Nerita2, and A Afza2

1 Departemen Pendidikan Biologi, Sekolah Tinggi Keguruan dan Ilmu Pendidikan, Jl. Gunung Pangilun, Padang, Indonesia
2 Departemen Pendidikan Biologi, Sekolah Tinggi Keguruan dan Ilmu Pendidikan, Jl. Gunung Pangilun, Padang, Indonesia

*Corresponding author’s email: bioannika@gmail.com

Abstract. Knowledge-based assessment which is constructed into mid-term exam items is validated by expert lecturer as good validity as the verdict. Readability analysis was conducted as the next step to see how practical knowledge assessment based on KKNI is by some students who have completed Biology process evaluation and study result courses with high, average, and low competency. Items readability helps us to see the students’ ability to comprehend items redaction to answer them. The purpose of this research is to analyze KKNI-based knowledge-based assessment. The research method used in this research is analytical descriptive. Mid-term and term test items, as well as knowledge-based assessment readability questionnaire, are used as research instruments. The data analysis technique used is the percentage formula. The result shows that the Knowledge-based assessment readability analysis questionnaire is easy enough to understand 74%. Readability based on respondent's questionnaire is very good with 92.23% as a result. Easy to use aspect is 96.15%; time allocated 86.55%, and the visual aspect 100%. In a conclusion, the readability of KKNI-based knowledge-based assessment of the Biology Evaluation Process and Learning Outcome is easy to understand and able to be used by the student in answering mid-term and end of semester test items.

1. Introduction
Assessment is an appraisal to measure one's ability during the learning process. According to William stated that assessment is the bridge between teaching and learning [1]. To measure student's knowledgeability, the right assessment instrument is needed [2]. The instrument needs to be aligned with the study material learned during a learning activity. Study material learned in Biology Evaluation Process and Learning Outcome course consist of basic concept evaluation, learning outcome appraisal, authentic appraisal, learning outcome appraisal technique and instrument, constructing and analyzing behavioral learning outcome, knowledge and skills, written test subject outline, validity, reliability, difficulty index, differentiator, option effectivity, and minimum completion criteria. All of these study materials will be tested in mid-term and end of semester examination.
KKNI-based knowledge-based assessment construction as mid-term and end of semester item tests has been executed and stated as valid. As the next step, we will need to see how practical knowledge assessment is by measuring the readability of the assessment. Items readability comes from "terbaca". Ke-an affix in "Keterbacaan" means everything related to the word being said and referred by the root word. Saying that "Keterbacaan" means text or passage is readable not only in structural form but also creates meaning. Readability is about the text that can be read quickly, easily understood and remembered [3].

The purpose of readability analysis being done for knowledge assessment is to see how well the students can answer test items correctly. Students who are able to answer the questions correctly mean that they understand a sentence or question redaction, able to read and understand table, picture or graphic displayed in the test. According to Adjat Sakri as quoted by Widharyanto [4] readability is related to a combination of ketedasan and kejelahan. Ketedasan means the correlation between readability and language and kejelahan related to text format readability. Knowledge assessment as mid-term test items covers basic concept evaluation, study result appraisal, authenticity appraisal, learning outcome technique and instrument, behavior learning outcome design and analysis, knowledge and skill, written test outline design. Mid-term test items cover knowledge learning outcome design material, students are expected to be able to design questions in synthesis, analytics, and evaluation level on digestive system material. Before constructing the question, students are expected to understand digestive system study material which covers digestive organ structure and function, digestive process, digestive system abnormalities and disorders and how to treat them. As the next step, students are asked to construct questions in synthesis, analytics, and evaluation level. Question items are about designing the skill outcome of learning outcome materially. Students are expected to be able to design psychomotor appraisal on KD 4.10 about how to deliver analysis results on life-style influence on digestive system structure and coordination function abnormalities which cause nervous system and hormonal disorder on human-being based in literature study [5]. Before designing a psychomotor appraisal, students have to master the nervous and hormone system study material. Question items are related to subject outline material, students design subject outline material on environmental pollution. To be able to do that, students were asked to understand environmental pollution first. After that, they were asked to create a subject outline material on environmental pollution.

The students should certainly be able to understand about the midterm test and final examination test that had been given, therefore the lecturers could be able to determine the ability of students with good knowledge. The problems that had been facing were in the lectures of the evaluation process and biology learning outcomes, the knowledge assessment which was already designed was not able to measure the ability of students of their knowledge yet. This was because there were several editorial materials were made had not been clear that there were some questions that contained double meanings and problems associated with the table was not yet clear that only a few students were able to read and understand the tables, pictures or graphics contained in the question. Based on the weakness of it is composing about a need to create the knowledge assessment and need to analyze readability assessment of knowledge in the lecture of the evaluation process and biology learning outcomes of, so it would seem that the assessment likely has language which is clear and easy to be understood by students to answer the questions. This research aims to analyze KKNI-based knowledge-based assessment in Biology Evaluation Process and Learning Outcome lecture.

2. Methods
This is analytical descriptive research. This method is used to describe analysis results on knowledge-based assessment in Biology Evaluation Process and Learning Outcome lecture. Instruments being used
in this research are mid-term and end of semester question items for Biology Evaluation Process and Learning Outcome study material. There are 6 mid-term question items and 5 items of end of semester items. Besides, the researcher also used a readability questionnaire for both of the questionnaire items to see items construction. The questionnaire covers easy to use, time used to answer and layout aspects. Data analysis for a readability level of the score from the acquisition and data analysis based on a questionnaire distributed by respondents are using formula suggested by Purwanto [6] as per below.

\[ NP = \frac{R}{SM} \]  

(1)

After data are obtained, data grouping is done with variable criteria as per below.

- 86 % - 100 % : (very good)
- 76 % - 85 % : good
- 60 % - 75 % : enough
- 55 % - 59 % : poor
- \( \leq 54 \% \) : very poor

3. Result and Discussion

Knowledge-based assessment as mid-term and end of semester item questions for Biology Evaluation Process and Learning Outcome lecture readability testing results is 74% with enough criteria. This shows that students are able to understand knowledge-based assessment very well so that it is can for them to answer question items. This is showed by students' ability to answer mid-term test question items based on relevant theory. This happens because question items are sorted from the easiest to the hardest, materials were sorted based on learning order, and the item weight is clearly stated to motivate students to answer the items (item weight matches item level). Knowledge-based assessment readability also supported by questionnaire results obtained from respondents about its construction which covers easy to use, time to resolve and display aspect shown in Table 1 and Figure 1.

**Table 1.** Knowledge-based assessment in Biology Evaluation Process and Learning Outcome Construction Questionnaire Result

| Aspect                | Practitioner | Average | Assessment criteria |
|-----------------------|--------------|---------|---------------------|
|                       | 1 2 3        |         |                     |
| Ease of use           | 96,15 96,15 96,15 | 96,15   | Very good           |
| Time used to answer   | 100 83,33 58,33 | 80,55   | good                |
| Layout                | 100 100 100   | 100     | Very good           |
| **Average**           | **92,23**    |         | **Very good**       |
According to Table 1 and Figure 1, it is showed that average knowledge-based assessment based on questionnaire readability submitted by the respondent is 92.23% very good. Knowledge-based assessment is easy to use the average for 96.15%, time to resolve average 80.55% and display aspect obtained average 100%. Percentage in easy to use aspect shows that this knowledge-based assessment has clear item instruction so that students are given clear direction to answer the question so that they are able to do it easily. Question item point is stated clearly, sentences used in questions do not have double meaning so that students would not find them ambiguous and the readability of knowledge assessment is good. The questions made involve analytical, critical, evaluative and creative. Statement Sunaryo [7] Ability of evaluation is the ability assessment to solutions, work procedure, processes and determine suitable criteria according to standards and effectiveness in any problem. Creative ability is the ability to combine elements to form a new and unique structure, design ways, and find answers to more than one thing [8]. This will support developing Higher Order Thinking Skills (HOTS). Higher Order Thinking Skills is a skill demented in the 21st century. This result of the literature review shows that HOTS is one of the main goals in education and becomes one of the top five variables that can improve student achievement [9]. On the other hand, Ahmad et al. [10] stated that HOTS is a broader thinking skill, not just to remember, understand, and the ability to apply a concept but also the ability to think for analyzing a concept, evaluate and even to create a concept.

Item question keywords are not formulated using uncertain words for instance: should, generally, sometimes, so the question items are found ambiguous by the students in reading and understanding them. Each question items use words and language according to The Great Dictionary of the Indonesian Language of the Language Center. Sentences are made communicative so that they are easy to understand. Looking at the time needed to resolve items, the item total is appropriate with allocated time. The allocated time given in this assessment fit the item's difficulty and students were able to finish all items in a given time. The display aspect of this instrument was seen as a clear item layout and easy to read. Picture, graphic, and diagram provided in the item are clear and well function, also looked professional. According to [11] problem could be understood if the editorial matter is clear and the language should be by the understanding possessed by the student. Where material can be understood by students, it means that the material has met the standards of legibility.
4. Conclusion
Readability of knowledge assessment is easily understood by students and can measure students’ knowledge skills.

5. References
[1] William D 2013 Assessment: The Bridge Between Teaching and Learning *Voices From The Middle* 21 2 15-20
[2] Nufus Hayatun dkk 2017 Pengembangan Instrumen Penilaian Sikap Berbasis Kurikulum 2013 Pada Pembelajaran Kimia SMA Jurnal Pendidikan Sains Indonesia 5 1
[3] Alwi, Hasan dkk 2003 *Kamus Besar Bahasa Indonesia* Jakarta: Balai Pustaka
[4] Widharyanto B, Dewi R, Krismawati S 2016 Keterbacaan Wacana Buku Teks Ekspresi Diri dan Akademik untuk SMK dengan Grafik Fry Tes Klos dan SMOG: Studi Kasus Di SMK N 1 Cilacap dan SMK N 4 Jurnal Kependidikan 2016 28 2
[5] Permendikbud 2014 *Standar Isi Kompetensi Inti dan Kompetensi dasar Kurikulum 2013*
[6] Purwanto N 2013 *Prinsip-prinsip dan Teknik Evaluasi Pengajaran* Bandung: PT Remaja Rosdakarya)
[7] Sunaryo W 2012 *Taksonomi Kognitif* Bandung: Rosda Karya
[8] Brookhart S M 2014 Buckingham Questions and Tasks
[9] G S Pratama and H Retnawati 2018 *J. Physics of Conference Series* 1097 012147
[10] S Ahmad, R C I Prahmana, A K Kenedi, Y Helsa, Y Arianil, M Zainil 2017 *J. Physics of Conference Series* 943 012053
[11] Andriana Winda 2012 *Analisis Keterbacaan Teks Buku Pelajaran Kelas III SD Studi Kasus Untuk Teks Bahasa Indonesia IPA dan IPS* Skripsi FIB UI

Acknowledgements
The authors would like to thank STKIP PGRI Sumatera Barat for giving permission to conduct research and thank Ristek DIKTI for providing research grants.