

DEVELOPING THE SEARCH, SOLVE, CREATE, AND SHARE (SSCS) - BASED STUDENT WORKSHEETS IN BIOLOGY LEARNING

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ABSTRAK

The SSCS learning that is collaborated with student worksheets can enhance students more actively in learning because this process can facilitate students in finding and building knowledge to solve problems. The method applied a Research and Development (R&D) adapted from Borg and Gall model. This study was only carried out until the development stage. The results showed that the SSCS-based student worksheets according to material experts containing the aspects of content eligibility of 85.19% with an excellent/eligible category, the presentation eligibility of 85% with an excellent/eligible category, and the SSCS components of 85.26% with an excellent/eligible category. Meanwhile, according to design experts containing the aspects of cover design of 90% with an excellent/eligible category, the cover typography of 100% with an excellent/eligible category, the content design of student worksheet of 87.50 with an excellent/eligible category, and the content illustration of student worksheet of 81.25% with an excellent/eligible category. Based on the teachers' responses showed an excellent/eligible category, with total score of the teachers' assessment of 92.17%. The results of students' responses based on individual tests of 78.13% with an excellent category, small group tests of 78.24% with an excellent category as well as the limited field tests of 81.48% with an excellent category.

Introduction

Biology is a branch of science that studies nature and the phenomena that occur in it through a series of scientific processes which include observation, making hypotheses, experiments, and data evaluation based on scientific attitudes (Trianto, 2010). Biology is concerned with systematically finding out and understanding about nature, so that biology is not only the mastery of a collection of knowledge in the form of facts, concepts and principles but also a process of discovery. The material of Biology includes various processes that occur in living things in everyday life and is composed of many concepts that are interrelated with one another (Ramadan, 2018).

The problem that exists in the world of education in Indonesia is the limited teaching materials or learning tools that facilitate students in enriching experiences, building student active knowledge and supporting problem-solving abilities. The limitations of learning tools will certainly affect the quality of learning, especially biology learning. Therefore, teachers who are creative, professional, and entertaining are needed, so that they are able to create a conducive learning climate, a challenging learning atmosphere, and are able to teach with fun (Horng et al., 2015)

Based on the interview on February 19, 2019 with one of the biology teachers at SMA Negeri 11 Medan showed that the student worksheets used so far was purchased from the publishers. They already contain complete materials, but the activities presented cannot facilitate the role of students in learning to find and understand the concept of the materials through the activity instructions in it. This type of worksheets contains more questions that can be answered only by copying the existing material summaries, but they have not provided the opportunity for students to act directly in the problem-solving process by conducting investigations and finding solutions to existing problems. They also do not train students to hypothesize and prove their hypotheses, so that they are not able to encourage students to do science process skills because of the textual workflow. The student worksheets should contain a guide for students that is used to support teaching and learning activities which are important for students to build their own knowledge through investigations or problem solving (Trianto, 2010).

Furthermore, the questionnaires that have been distributed to 40 tenth graders at SMA Negeri 11 Medan turned out that 85% of them stated that the use of student worksheets was very necessary in concept discovery of Biology learning, 35% of teachers applied the practice method in learning biology and 8% of students suggested that invites learning outside the classroom such as exploring the surrounding nature and outdoor studies as well. This is very supportive if the student worksheets are usable in the learning process because it can help activate students, they will understand the concepts being taught and also the innovation of student worksheets is needed that can overcome these problems by developing the Search, Solve, Create and Share (SSCS)-based student worksheets.

(Andayu, S., Susilawati and Haryati, 2018) suggests that the SSCS learning model is a problem-solving learning model where there is an activity to identify and find solutions to a problem, so that the learning activity feels meaningful for students. The SSCS learning model involves students actively in learning because this will facilitate students in finding and building knowledge to solve problems and provide opportunities for students to explore information (Andayu, S., Susilawati and Haryati, 2018). The use of SSCS-based student worksheets can provide assistance to teachers to develop the active students in solving problems of Biology learning, starting from identifying problems (search), planning to solve problems (solve), making problem solving results (create), and associating the results of problem solving (share) so that students not only rely on existing knowledge, but prioritize the process of acquiring knowledge (Sujiarto,

H., and Sukmiati, 2017).

The SSCS learning model also has advantages and disadvantages in learning activities. The advantages are students are faced with real problems given by the teacher at the beginning of learning, so that students feel interested in learning; students often study in groups and teachers provide more opportunities for students to solve their own problems; and students' activities in the SSCS learning model varied greatly from discussions, conducting experiments, and presentations that will make students more enthusiastic and do not get bored of attending lessons. While the shortcomings/disadvantages of this model according to students are still not used to applying the SSCS learning model, so they only listen and record information given by the teacher or from their friends (Saputra, A., Sumarjono, and Purwaningsih, 2014). From the aforementioned information, the search, solve, create and share (SSCS)-based student worksheet are very useful in enhancing students' biology learning.

Research methods

The method applied a Research and Development (R&D) adapted from Borg and Gall model (1983). The stages of this model are as follows: (1) data collection; (2) product planning; (3) product development; (4) product validation of material and design experts; (5) product revision; (6) teacher responses; (7) product revision; (8) individual tests; (9) product revision; (10) small-scale tests, product revision; (11) limited scale tests; (12) product revision; and (13) final product in the form of student worksheets that are ready for use. However, this study was only carried out until the development stage and the product has not been implemented. This was because that this study wanted to focus on the process of product development process. The instruments were interview lists, the sheets of student needs analysis, material and design validation, teacher responses as well as student responses. The interview lists and the sheets of students' initial needs analysis were used as preliminary data for the needs of conducting research, while this validation sheet was used to determine the eligibility and responses of SSCS-based student worksheets from the validation of material, design, and user validators (teachers and students).

Results and discussion

The results answered the research that aimed at testing the eligibility of SSCS-based student worksheets in biology learning for the tenth graders at SMA Negeri 11 Medan. These worksheets also need to carry out their eligibility tests regarding the material, design, grammar or sentences that were deemed inaccurate which would be corrected in the worksheets. These worksheets would be tested for their eligibility from the 3 material expert validators, 2 design validators, a biology teacher, and students as well.

A. The Data Analysis of the Material Validators' Assessment

Based on the results of the validation of 3 material validators containing 3 assessment components including the content eligibility which has a mean

percentage of 85.14%, the presentation eligibility of 85%, and the SSCS component of 85.26%. This means that the worksheets that have been developed met the eligibility rules and learning needs. For more details, the result of empirical graph data acquisition was presented in Figure 1

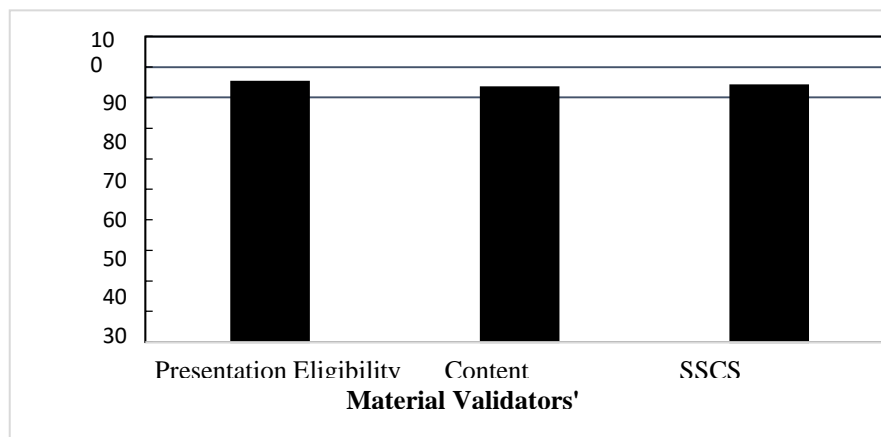


Figure 1
The Mean Percentage of SSCS-based Student Worksheets Assessment in Biology Learning of the Material Validators

Based on calculations using the Azwar formulae (2014), the student worksheet has been declared eligible because it has met the indicators of the National Education Standards Agency (NESAs) with intervals of $83.3 < X < 99.9$. Although the worksheets were declared eligible, there were several revisions of the material validators; in the content eligibility, there were several things that had to be revised, for example indicators such as the suitability of the level of students' difficulty and cognitive development who were seen as still lacking because the sentences still used high language and hard to understand. (Prastowo, 2012) suggests that worksheets should be designed attractively and use language appropriate to the child's level of development. In the presentation eligibility, there were several things that must be improved; the type of letters used must be compatible, the order of numbering and writing must be in accordance with the correct writing standards, the presentation of the table must be written briefly so that it was easily understood by students. This was also in line with (Putri, D., 2015) states that interesting worksheets can help motivate students because the presentation uses writing, colors and images that match the material. So, it could help students understand the material and are excited in opening the worksheets.

In the SSCS component, there were also a number of things that need to be improved; the presentation of sample figures or redaction of information related to SSCS-based questions that must be more informative and applicable. These worksheets do not only contain a summary of the materials and questions, but also contain more activities that involve the role of students in finding and solving problems independently. Students will obtain their knowledge more meaningfully, students usually forget quickly in learning if only given verbal explanations,

remember if given examples and understand if given the opportunity to try to solve problems (Sijabat, 2016).

B. The Data Analysis of the Design Validators' Assessment

Based on the results of the validation of 2 design validators, they showed that the mean percentage of all sub-components of the design aspect assessment of 89.69% with an excellent category. In the design eligibility which consisted of the cover design had a mean percentage of 90%, the cover typography had a mean percentage of 100%, the content design had a mean percentage of 87.50%, and the content illustration had a mean percentage of 81.25%. Calculations using the (Azwar, 2014) mentions that the worksheets have been declared eligible because they have met the indicators of the National Education Standards Agency (NESAs) with intervals of $83.3 < X < 99.9$. For more details, the result of empirical graph data acquisition was presented in Figure 2.

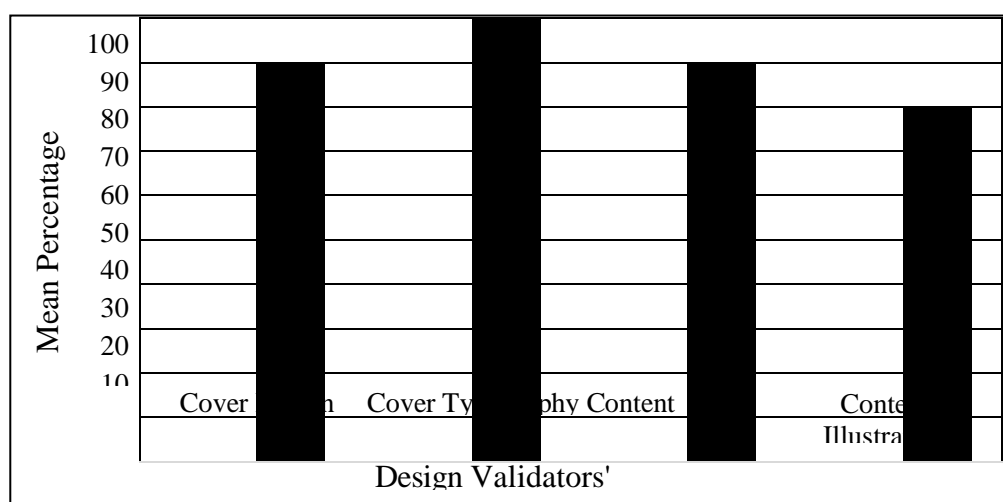


Figure 2
The Mean Percentage of SCSs-based Student Worksheets Assessment in Biology Learning of the Design Validators

Although the worksheets were declared eligible, there were several revisions from the design validators that there was no room for students identity on the cover, no notes or suggestions for improvement, too many spaces, some images were unclear, the images were not innovative products but were downloaded results. The worksheet design must be varied, interesting and equipped with pictures as illustrations so as not to appear monotonous so that it could attract students' interest to learn it. This is also in line with (Mujiarti, 2014) which states that the images used should be able to help explain the words conveyed. Therefore, the image must have good quality, in the sense that it has a purpose, relevant, clear, containing the truth, authentic, actual, complete, simple, interesting, and provides suggestions about the truth itself. Worksheets that are designed should be as attractive as possible starting from the use of color, clarity and attractiveness of images to make it easier for students to understand the content of the worksheets (Basri, 2019)

C. The Data Analysis of Biology Teachers Assessment

The results of the analysis of 3 biology teachers showed that the mean score was 92.17 with an excellent/eligible category. The assessment of the first Biology teacher obtained an excellent/eligible category. The assessment of the second Biology teacher obtained an excellent/eligible category as well as the assessment of the third Biology teacher obtained an excellent/eligible category. For more details, see Table 1.

Table 1.
The Result of the SSCS-based Worksheets Assessment in Biology Learning of the Biology Teachers

No.	Teachers	Amount	Mean
1.	First Teacher	79	81,42
2.	Second Teacher	77	98.75
3.	Third Teacher	65	96,33
Total Score		221	276.50
Mean Score			92.17

The Assessment of Biology teachers was carried out to determine the eligibility of SSCS-based worksheets in biology learning for the tenth graders at SMA Negeri 11 Medan based on 10 indicators; the display of worksheets, the quality of material coverage presentation, the quality of practices inside the worksheet, the quality of worksheets on students' learning activities, and the SSCS-based learning components.

Based on calculations using the (Azwar, 2014) the student worksheets have been declared eligible because they have met the indicators of the National Education Standards Agency (NESA) with intervals of $84 < X < 99.9$. Even though the student worksheets were declared eligible, there have been several revisions from Biology teachers such as adding maps in each material concepts, the topic of fungi reproduction to be further elaborated in the form of diagrams or pictures, and providing questions in the form of dichotomous keys of each material.

This was also in line with (Rahmi, 2017), understanding the concepts was meaningful learning, the learning process was not just memorizing concepts or facts, but it was also an activity to connect concepts to produce complete understanding and to achieve learning purposes.

D. The Data Analysis of Individual, Small Group and Limited Field Tests

The results of individual tests sampled 6 students showed that they were in a good/eligible category with a mean percentage of 78.13%. The small group tests sampled 22 students showed that they were in a good/eligible category with a mean percentage of 78.24%. The limited field tests sampled 54 students showed they were in a good/eligible category with a mean percentage of 81.48%. For more details, the result of empirical graph data acquisition was presented in Figure

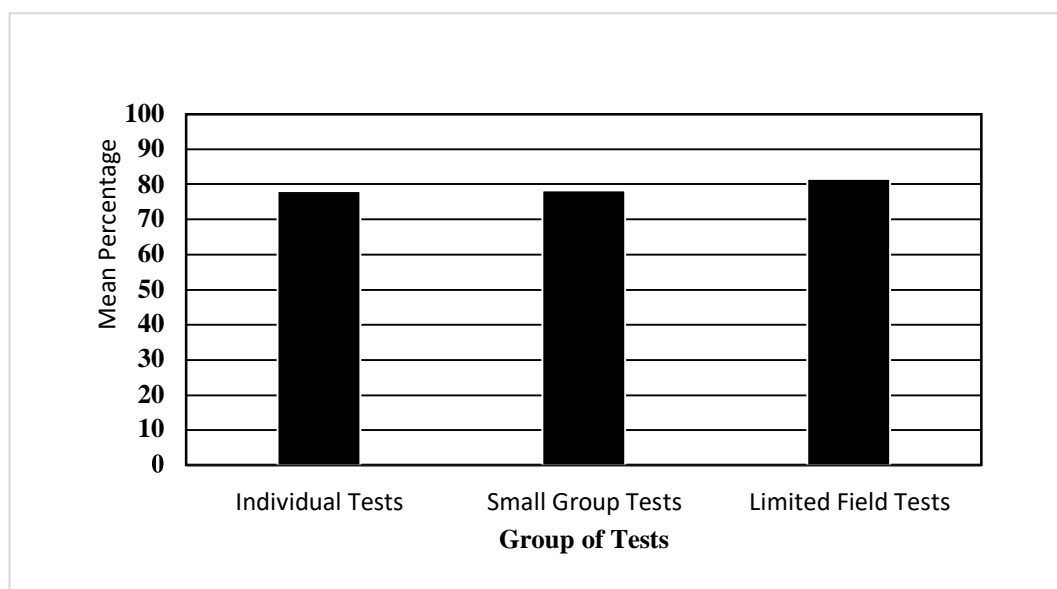


Figure 3
The Mean Percentage of SSCS-based Student Worksheets Assessment in Biology Learning of the Individual, Small Group and Limited Field Tests

This finding was in line with the previous study conducted by (Yuliasuti, N., Pujayanto and Ekawati, 2014) suggested that the percentage level of assessment during limited field tests increasing or was greater than the small group tests for all aspects that have been assessed. However, this finding was not in accordance with the further study from Putri and (Widiyatmoko, 2013)(Widiyatmoko, 2013) state that the percentage level of eligibility in small group tests was greater than limited field tests for all aspects that have been assessed. The difference in the percentage of assessments for small group tests with limited field tests was due to the previous SSCS-based worksheets that have been revised in accordance with validators and students' responses to small group or limited field tests, so that when limited field tests were carried out, the students assessed that SSCS-based worksheets were very interesting and could be applied in the second semester of Biology learning process. This difference was also due to the increasing level of intelligence of students who assessed the the SSCS- based worksheets.

Conclusion

Based on results of the study, it could be concluded that the validation of the assessment consisting of content and presentation eligibility as well as the SSCS components on the student worksheets that have been developed according to 3 material validators obtained an excellent/eligible category. The mean percentage of the content eligibility from the material validators' assessment was 85.14%, the presentation eligibility was 85%, and the SSCS components was 85.26%. The validation of the assessment consisting of cover design and typography, worksheet content design, and

content illustration according to 2 design validators obtained an excellent/eligible category. The mean percentage of the cover design was 90%, the cover typography was 100%, the worksheet content design was 87.50%, and the content illustration was 81.25%. The result of

3 Biology teachers' responses on the product obtained an excellent/eligible category with a total percentage of 92.17%. The results of students' responses consisting of individual tests totaling 6 students were 78.13% with a good/eligible category, the small group tests totaling 22 students were 78.24% with a good/eligible category and limited field tests totaling 54 students were 81.48% with a good/eligible category.

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