



The Development of Student Team Achievement Division (STAD) Online Learning Tools to Improve Students' Analytical Ability

Umni Layyinatasy Syifa [✉], Nur Rahayu Utami¹

¹Biology Departement, FMIPA, Universitas Negeri Semarang, Indonesia

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Abstract

Analytical skills are thinking to solve issues with reasons and relate problems that arise with previous issues. This capability is one of the focus goals of 21st century education. A Covid-19 pandemic causes learning to take place online and remotely. Automatically learning devices must be made conditionally and accordingly. Teachers need to apply a learning model with appropriate learning resources, not only with conventional methods (lectures), to analyze the biology material presented. The learning model chosen to improve students' analytical skills was the Student Team Achievement Division (STAD). This study aimed to describe the characteristics and analyze the feasibility level of developing the STAD Model online learning tool. The research design used a modified Research and Development (R&D) method. The research was carried out online at the Odd Semester of the Academic Year of 2020/2021. The subjects in this study were 15 students of twelve graders of Mathematics and Natural Sciences. They have received material on Human Reproductive Systems and 2 Biology Teachers at SMA N 1 Dempet. The research's object was online learning tools in the form of syllabus, lesson plan one sheet, and worksheets based on the STAD learning model of Human Reproductive System Material. The data analyzed descriptively, qualitatively, and quantitatively. Data analysis techniques included validation questionnaires by validators and analysis of students' and teachers' readability of learning devices. The results showed that the characteristics of the learning tools developed in this study were online syllabus, lesson plans, and student worksheets; STAD Model-Based; lesson plans one sheet. The materials presented were Human Reproductive System Material; The learning objectives were equipped with audience and behaviour elements and had a mission to improve students' analytical skills. The analysis results showed that the developed syllabus and lesson plans were considered very valid, with a percentage of 94.2% and 95%. The student worksheets was included very valid criteria in terms of material with a percentage of 89% and terms of media by 85%. The readability questionnaire results showed that the average percentage of teacher's responses was 93% and student's responses were 79%. It concluded that the STAD Model online learning tool to improve students' analytical skills was included in the very valid criteria and very suitable for use in the biology learning process of Human Reproductive System Material.

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[✉]Correspondence Address:

D6 Building 1st Floor Jl Raya Sekaran Gunungpati Semarang

E-mail: ummielsyifa862@gmail.com

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INTRODUCTION

The quality of education in Indonesia will increase if students can connect all learning with the problems, they face in everyday life to face competition in the era of globalization. Some factors come from within students that affect learning achievement, namely analytical skills. The ability to analyze is in the domain of cognitive processes at the fourth level after remembering (C1), understanding (C2), and applying (C3). This ability is one of the focus goals of 21st century education (Osborne, 2013). The human reproductive system material is exciting to learn because it is closely related to everyday life. It can also bring up contextual problems that stimulate students to analyze a problem and develop their thinking skills, especially in adolescence characterized by curiosity in various things, including sexual problems. Therefore, parents' and teachers' roles are important in assisting adolescents in seeking appropriate reproductive health information.

The observations' results showed that students' analytical skills tend to be low because, in the biology learning process, the teacher only uses conventional methods (lectures), which causes most students to learn the material by memorizing, not understanding. Students who completed the KKM on human reproductive system material at SMA N 1 Dempet in the 2018/2019 Academic Year were 53% and 56% in the 2019/2020 Academic Year. During learning, teachers rarely made learning tools such as syllabus, lesson plans, and student worksheets because the school has provided them. Learning in class often took place, rarely according to the lesson plans, were used as a reference. The Covid-19 pandemic causes learning to occur online and remotely, so teachers need to make learning tools fun and motivate them.

Students' analytical skills tend to be low in the learning process. The teacher stated that many students were still less able to analyze every process in the human reproductive system material. If it did not include pictures and schemes, students could not analyze every concept of the material. The students' interview showed that in learning human reproductive system material, the teacher presented the material (lecture). When asked about the reproductive system material, students answered that the human reproductive system was a system that discusses the reproductive process in humans, including the structure of the reproductive organs and their functions. But when asked further about the process involved, students had difficulty answering. Students complained about the learning resources used, namely worksheets, because the appearance was less attractive, so that students were less enthusiastic in learning. Learning was not entirely student-centered and still dominated by teachers (teacher-centered).

From this problem, it was necessary to develop online learning tools. The syllabus, lesson plans one sheet, and student worksheets were based on the STAD learning model of human reproductive system material to improve students' analytical skills. The development of learning devices was significant in the learning process because, with appropriate learning tools, students will acquire complete knowledge and skills so that learning becomes meaningful (Widiyanti, 2019). The STAD learning model was selected because, with this model, students could build knowledge and skills together through group discussions. The STAD learning model was a cooperative learning model developed by Robert Slavin and his friends at Jhon Hopkin University. Students in a certain class were divided into groups of 4-5 people. Each group must be heterogeneous, consisting of men and women from various ethnicities, nations, religions, customs, and races (Mahin, 2019). Through the STAD learning model, students learned from experience and actively solved problems given by the teacher. Interaction in groups allows students not to hesitate to ask their friends to analyze the subject matter (Malino, 2019).

In this research, the researcher developed learning tools in the form of syllabus, lesson plans, and worksheets online. Permendikbud Number 65 of 2013 stated that the syllabus was a reference for preparing a learning framework for each subject study material. A good syllabus must include subject identity, school identity, KI, KD, indicators, subject matter, learning activities, time allocation, assessment, and learning resources. The used syllabus to develop the lesson plans. Developed one sheet of lesson plans based on the Ministry of Education and Culture Circular Letter Number 14 of 2019. Concerning Simplification of the Learning Implementation Plan, there were three core components of the lesson plan: learning objectives,

learning steps (activities), and learning assessment (assessment). The other components were complementary. The printed student worksheets teaching materials in the form of paper sheets containing materials, summaries, and instructions on implementing learning tasks that must carry out by referring to the essential competencies that must be achieved (Ekantini & Wilujeng, 2018).

The product specifications developed in this research were the STAD model design which requires preparation before learning activities were carried out, including preparing learning devices and a group division. Syllabus products, one sheet of lesson plans, and student worksheets were applied to synchronous learning through zoom meetings, google classrooms, or online chat. A student said that his analytical skills could improve if he follows the STAD model online learning and works on worksheets. If students did not participate in the STAD online learning model and cannot answer the questions on the LKS well, it means that the students could not analyze problems. This research's development assumption was that most teachers and students could operate computers and smartphones and access the internet properly. Lecturers of material experts, media experts, and biology teachers at SMA N 1 Dempet had the same understanding of the criteria for the quality of good biology learning tools. The limitations of the development in this research were the online learning tools developed only in the form of syllabus, lesson plans, students' worksheets and were limited to human reproductive system material and just up to small-scale trials with four validators, namely a material expert lecturer, a media expert lecturer, and two biology teachers at SMA N 1 Dempet.

Based on the description of the problems above, research was carried out on the developing online learning tools of the STAD model to improve high school students' analytical skills, included syllabus, lesson plans, and student worksheets.

RESEARCH METHOD

This research was conducted online at SMA Negeri 1 Dempet in the Odd Semester of the Academic Year of 2020/2021. The subjects in this study were students of twelve graders of Mathematics and Natural Sciences. They have received material on human reproduction systems and two Biology Teachers at SMA Negeri 1 Dempet. This research's object was biology learning tools in the form of syllabus, one sheet of lesson plans, and student worksheets based on the STAD learning model of human reproductive system material to improve students' analytical skills. The research design used a modified R&D method (Sugiyono, 2017). In this research, the data analysis method was descriptively qualitatively and quantitatively. Qualitative descriptive analysis for online learning device development includes syllabus, one sheet of lesson plans, and student worksheets. Quantitative descriptive analysis of the data on the validation of learning devices and the teachers' and students' readability of learning devices. Assessed learning devices from the learning tools' feasibility level developed from the validation and readability level.

RESULTS AND DISCUSSION

This research purpose was to describe the characteristics and analyze the feasibility level of developing the STAD model of online learning tools to improve students' analytical skills.

Characteristics of the Syllabus, Lesson Plans, and Student Worksheets based on the STAD learning model to improve students' analytical skills

Each school and teacher have their style in arranging learning tools to have their characteristics. The characteristics show the special characteristics of each learning device that has been made. Learning tools include the syllabus, lesson plans, and student worksheets based on the STAD learning model developed online using the modified R&D method (Sugiyono, 2017). This opinion in line with Rasifirdani's (2013) argument that developing learning devices must follow a certain stage called learning devices' development.

Permendikbud Number 65 of 2013 states that the syllabus was a reference for preparing a learning framework for each subject study material. The syllabus preparation still uses the rules from Permendikbud Number 22 of 2016, but in the development process, it adjusted to the learning model used, namely the STAD learning model. The syllabus component consists of subject identity, school identity, time allocation, KI and KD, indicators, subject matter, learning activities compiled online, assessments, and learning resources. The syllabus was limited to the material on the human reproductive system KD 3.12 and 4.12.

The developed lesson plans from the syllabus to direct student learning activities to achieve basic competence (KD). The role of lesson plans was crucial in guiding teachers to carry out their duties as educators in serving the learning needs of students (Harahap & Nazliah, 2019). The lesson plans design consists of one sheet. The lesson plans components consist of subject identity, school identity, subject matter, time allocation, learning objectives equipped with the audience and behaviour elements learning models using the STAD model, learning media, learning resources, and assesment that written efficiently. The STAD learning syntax applied in this research was consecutively preceded by the teacher's delivery of information, guiding study groups, and evaluating and giving awards. The teacher presents information through the explanation of PowerPoint and video slides by teacher. Then students discuss in groups to work on worksheets and other assignments given by the teacher. The group guidance process runs during the learning process, then evaluations were held in quizzes and tests. Quizzes and tests were done individually without the help of friends. At the end of the lesson, an award was given to the group with the highest score based on the criteria. The whole process was expected to improve students' analytical skills to impact student learning outcomes positively.

The learning model chosen was the STAD learning model. This model was applied to every learning device developed. The STAD learning model's choice was based on the demands of the 2013 curriculum, which states that learning must be student center in nature. The STAD was cooperative and student-centered learning. It makes students play a more active role, interact with fellow students, and participate in various investigative activities and solve problems. This model was a collaborative learning model in which small group learning with different levels of ability work together to complete learning objectives (Gambari & Yusuf, 2017). In line with Khan & Inamullah (2011), this statement stated that the STAD model could positively contribute to students' understanding, improving students' analytical skills, collaboration skills, learning experiences, and developing students' positive character. Organizing students into study groups motivates students to compete fairly with other groups. Besides, student motivation will increase with awards for groups categorized as good, great, and super. In the end, it would have an impact on the achievement of optimal learning outcomes (Purwanti *et al.*, 2018).

Developed the student worksheet products based on the chosen learning model, namely STAD. The student worksheets's purpose of complementing the syllabus and lesson plans developed. This opinion in line with Jefriadi *et al.* (2018), which states that the function of worksheets in the learning process was as a teaching material that makes it easier for students to understand the material provided. The student worksheets developed include titles, basic competencies to be achieved, learning objectives, concept maps, subject matter, tools and materials needed to complete assignments, brief information in the form of callouts, individual assignments, group assignments, evaluation questions, quizzes, and reports to be done. The student worksheets' preparation considers the use of language, sentence structure, vocabulary, level of difficulty, and student characteristics. The design made it as attractive as possible. It does not look monotonous so that students do not quickly feel bored and enthusiastic in studying human reproductive system material.

Analysis of the Feasibility Level of the Syllabus, Lesson Plans, and Student Worksheets based on the STAD learning model to Improve Students' Analytical Ability

The learning device's appropriateness was assessed from the validation questionnaire results by the validator and the teacher and students' level of readability. Learning devices were valid if there was a consistent relationship between each component of the learning tools developed with the applied learning model's characteristics (Fatmawati, 2016). The syllabus and lesson plans were validated by three validators,

namely expert lecturers and two biology teachers at SMA N 1 Dempet. The Syllabus and lesson plans validation analysis results by the three validators can be seen in Table 1.

Table 1 Results of the Validation Analysis of the Syllabus and Lesson Plans

Learning Tools	Percentage			Average (%)	Criteria
	Validator 1	Validator 2	Validator 3		
Syllabus	92,5	95	95	94,2	Very Valid
Lesson Plans	90	97,5	97,5	95	Very Valid

Based on Table 1, the Syllabus validation was 94.2%, meaning that the syllabus developed was included in the very valid criteria and can be used in the learning process. Improvements to the syllabus, among others, regarding the writing of sex education films need to be given information so that students did not misunderstand, and included skills assessment in the syllabus. The lesson plans developed was considered very valid by the three validators with a percentage of 95% with a slight improvement in the learning process. The validator provides input so that the writing was not made colorful, just the important points. Another suggestion was in the lesson plan. At the beginning of the lesson, there should be activities to train students to relate to the previous material. This research aimed to determine the extent to which students understand the material that has been previously studied. These activities can be in the form of questions and answers, quizzes, etc.

Student Worksheets based on the STAD learning model were validated by two expert lecturers, namely material experts and media experts. We can see the content validation analysis results in the student worksheets by material expert lecturers in Table 2.

Table 2 Results of the analysis of student worksheets validation by material experts

No.	Aspect	Score Maximum	Score Obtained	Average (%)	Criteria
1.	Contents	28	25	89	Very Valid
2.	Language	12	10	83	Very Valid
3.	Presentation	24	22	92	Very Valid
Total Score		64	57	89	Very Valid

Based on Table 2, the percentage of material validation in the student worksheets was obtained by 89% by the UNNES Biology Material Expert. The material in the student worksheets developed was included in the very valid criteria. Marlina *et al.* (2015) state that the validation carried out by material experts aims to test the content/material in terms of depth and breadth and the suitability of the material presented. The media expert's assessment or validation of the student worksheets was carried out twice. At the time of the first assessment, there were still many worksheets that needed to be improved in terms of presentation, both in terms of layout, font selection, callout writing, the number of images, and colour selection. Riduwan's (2013) state that research designs developed to perfect previous research and continue to make revisions to obtain a good product. After being revised, the student worksheets revalidated using the validation sheet provided. We can see the results of the analysis of student worksheets validation by media expert lecturers in Table 3.

Table 3 Results of analysis of student worksheets validation by media experts

No.	Aspect	Score Maximum	Assessment 1	Assessment 2
1.	Presentation	36	24	31
2.	Usability	12	7	10
Total Score		48	31	41
Average (%)			64	85
Criteria			Valid	Very Valid

Based on Table 3, the results of the final validation of student worksheets by media experts obtained with a percentage of 85%, meaning that assessed the developed worksheets in terms of the media, including in the very valid criteria. After made repairs, the device developed then tested. The small-scale trial involved 15 students of class XII MIPA 2 on the biology teacher's recommendation at SMA N 1 Dempet. These 15 students consisted of five students with high abilities, five students with moderate abilities, and five students with low abilities who had received material on the human reproductive system. The condition determined student criteria from the report card of the midterm assessment learning outcomes. The implementation of small-scale trials carried out online, considering the conditions due to the Covid-19 pandemic so that learning took place over a distance. Small-scale trials were taken through teacher and student response questionnaires. Questionnaire for teacher and student responses aims to determine the feasibility and shortcomings of the developed worksheets.

Asmara *et al.* (2015) explain that good worksheets were worksheets that meet the techniques and requirements for preparing worksheets. The biology teacher at SMA N 1 Dempet stated that the material contained in the student worksheets was very suitable for KD and learning objectives, the material was easy to understand, the material was according to the level of education, the language used was communicative and easy to understand, the choice of letter-size was correct, the instructions or how to do the questions and exercises in the worksheets were clear, the composition of colours and images was very clear, and the developed worksheets can stimulate students' analytical skills. They can be used to support biology learning system material human reproduction. Students' suggestions that the pictures on the worksheets can be clarified more so that they could easily understand.

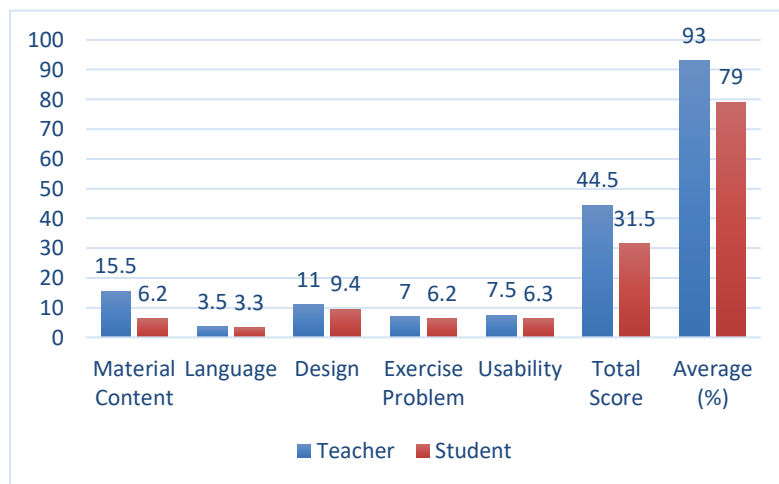


Figure 1 Teacher and Student Response Questionnaire Results

Based on Figure 1. it was known that the average percentage of readability by teachers was 93%. Students were 79%, meaning that student worksheets based on the STAD learning model were very suitable for biology learning in human reproductive system material feasibility assessment, including aspects of material content, language, design, and practice questions usability. After a small-scale trial was carried out, there were suggestions from teachers and students. The teacher recommends that for the questions in the student worksheets, multiply the HOTS criteria. Besides, also increase the number of reference sources. After receiving feedback and input from small-scale trials, the product was revised. This research aimed to improve and improve product deficiencies so that they were suitable for use. In this research only until small-scale trials so that after being revised, the final product was obtained, namely the finished product in the form of biology learning tools including syllabus, one sheet of lesson plans, and student worksheet based on the student team achievement division (STAD) learning model to improve the students' analytical skills that had stated. Feasible and can be used in learning biology in high school.

CONCLUSION

Based on the results and discussion, the researcher concluded that the characteristics of the learning tools developed in this research were: (1) Syllabus, lesson plans, and student worksheets were online; (2) Learning tools based on the STAD learning model; (3) Lesson Plans consists of 1 sheet; (4) The material presented was Human Reproductive System Material; (5) Learning objectives equipped with audience and behaviour elements; (6) Student Worksheets based on STAD learning model; and (7) Have a mission to help improve high school students' analytical skills. The development of online learning tools based on the STAD learning model, including syllabus, lesson plans, and worksheets, was included in very valid criteria and very suitable for high school's biology learning process.

REFERENCES

- Asmara, R., E. Susantini & Y.S. Rahayu. 2015. Pengembangan Perangkat Pembelajaran Biologi Berorientasi Pendekatan TASC (*Thinking Actively in Social Contexts*) Untuk Melatihkan Keterampilan Berpikir Kreatif Siswa. *Jurnal Pendidikan Sains Pascasarjana Universitas Negeri Surabaya*. ISSN: 2089-1776. Vol 5(1).
- Budiman & I. Arif. 2018. Pengembangan Perangkat Pembelajaran Biologi Model Inkuiri Terbimbing Berkarakter Budaya Lokal "Nggahi Rawi Pahu" Untuk Melatihkan Kemampuan Berpikir Kritis Siswa SMA. *BIOEDUKASI*. e-ISSN: 2442-9805 & p-ISSN: 2086-4701: 109-123.
- Ekantini, A & I. Wilujeng. 2018. The Development of Science Student Worksheet Based on Education for Environmental Sustainable Development to Enhance Scientific Literacy. *Universal Journal of Educational Research*. 6(6): 1339-1347.
- Fatmawati, A. 2016. Pengembangan Perangkat Pembelajaran Konsep Pencemaran Lingkungan Menggunakan Model Pembelajaran Berdasarkan Masalah Untuk SMA Kelas X. *Jurnal EduSains*. ISSN: 2338-4387. Vol 4(2).
- Gambari, A.I. & M.O. Yusuf. 2017. Relative Effectiveness of Computer Supported Jigsaw II, STAD, and TAI Cooperative Learning Strategies on Performance, Attitude, and Retention of Secondary School Students in Physic. *Journal of Peer Learning*. 10: 76-94.
- Harahap, R. D & R. Nazliah. 2019. Analisis Rencana Pelaksanaan Pembelajaran (RPP) Biologi Kurikulum 2013 Kelas X Semester 1 Tahun Ajaran 2016/2017 di MAS Islamiyah Guntung Saga Kualuh Selatan Kabupaten Labuhanbatu Utara. *JURNAL BIOLOKUS*. p-ISSN: 2621-3702 & e-ISSN: 2621-3758. Vol 2(2): 194-200.
- Jefriadi, J., Y. Arda & R. Sumarmin. 2018. Validity of Students Worksheet Based Problem Based Learning for 9th Grade Junior High School in Living Organism Inheritance and Food Biotechnology. *IOP Conference Series: Materials Science and Engineering*. 335(2018) 012088: 1-6.
- Khan, G.N & H.M. Inamullah. 2011. Effect of Student's Team Achievement Division (STAD) on Academic Achievement of Students. *Asian Social Science*. Vol 7(12): 211-215.
- Mahin. 2019. Peningkatan Prestasi Belajar Matematika Melalui Pembelajaran Kooperatif Tipe STAD Pada Siswa Kelas III di SDN Siwalanrejo. *Reforma: Jurnal Pendidikan dan Pembelajaran* (ISSN: 2621-4172). Vol 8(1): 127-133.
- Malino, A.I. 2019. Peningkatan Hasil Belajar Kimia Siswa Kelas XI IPA Semester II SMA Negeri 1 Rantepao dengan Memberikan Umpan Balik Kuis dalam Model Pembelajaran *Student Teams Achievement Division* (STAD). *JP-3*. Vol 1(3): 1-14.
- Marlina, R., B. Hadigaluh & Yokhebed. 2015. Pengembangan Modul Pengetahuan Lingkungan Berbasis Potensi Lokal Untuk Menumbuhkan Sikap Peduli Lingkungan Mahasiswa Pendidikan Biologi. *Jurnal Pengajaran MIPA*. 20(1): 94-99.
- Osborne, J. 2013. The 21st Century Challenge for Science Education: Assessing Scientific Reasoning. *Thinking Skill and Creativity*. Vol 10: 265-279.
- Purwanti, E., W. Prihanta., Muizzudin & F.H. Permana. 2018. Penerapan (STAD) Dipadu Mind Mapping Berbasis *Lesson Study* Untuk Meningkatkan Motivasi dan Pemahaman Konsep. *JINoP (Jurnal Inovasi Pembelajaran)*. Vol 4(1). p-ISSN: 2443-1591 & e-ISSN: 2460-0873: 26-34.
- Rasifirdani. 2013. *Berbagai Model Perangkat Pembelajaran*. Yogyakarta: Ar-Ruz Media.
- Riduwan. 2013. *Skala Pengukuran Variabel-variabel Penelitian*. Bandung: Alfabeta.
- Sugiyono. 2017. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Surat Edaran Permendikbud. 2019. *Penyederhanaan Rencana Pelaksanaan Pembelajaran*. Jakarta: Kemendikbud
- Widiyanti, F. 2019. Pengembangan Perangkat Pembelajaran IPA Berbasis Literasi Sains di SD Negeri Kedungkelor 02. *Jurnal Waspada FKIP UNDARIS*: 24-32.