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Constructivist Biology Learning Experiences Profile of Senior High School Students in South Sulawesi

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Abstract: This study aims to describe the constructivist Biology learning experience of high school students in South Sulawesi. The research subjects consisted of 525 students from 7 districts/cities in South Sulawesi. The method used in this study was a descriptive survey using a closed questionnaire instrument and a Likert scale. The data collection technique used a Google Forms platform that contained a questionnaire. The data obtained were processed using descriptive and inferential analyses. The results showed that the constructivist biology learning experience of students in South Sulawesi included learning personality indicators of 64.20%, reflection thinking of 68.89%, problem solving and investigation relevance to daily life of 69.55%, collaborative learning of 71.00%, discussion of 72.75%, teaching scaffolding of 68.29%. Then a very low correlation coefficient value is shown in the learning personality indicator with problem solving investigation of 0.15. The strong correlation coefficient value on the collaborative learning indicator with discussion is 0.60. The findings of this study indicate that the overall constructivist learning experience of students in South Sulawesi is still moderately low and the correlation coefficient between the dominant indicators is still weak. Therefore, efforts are needed to improve the constructivist Biology learning experience to optimize learning effectiveness.

Keywords: Biology; Constructivism; Learning experience; South Sulawesi; Student

Introduction

Biology is a basic science that underlies the understanding of life. The basics of Biology can be built through logic and principles that can lead to of a better understanding of the life of living things (Sikorav, Braslau, & Goldar, 2021; Ashraf & Sarfraz, 2016). Biology is also an underlying science of living things that is indispensable for interpreting life (Bonner, 2015; Ikegami, 2009). Studying Biology is not only a basic knowledge of life. However, it can provide avenues for further research and applications in other fields. Therefore, the relationship between biology and various fields can provide many benefits for life. Biology also has a role in the development of 21st Century skills.

The role of Biology in developing 21st century skills is essential. Biology can develop 21st century skills through providing learning experiences for students in training the skills of critical thinking, creativity, communication, and collaboration or 4C skills (Listiana et al., 2016; Usman et al., 2021; Dewi & Arifin; Marlina et al., 2025). Training students in implementing biological science in everyday life can improve 4C skills (Haviz et al., 2018). Case-based biology teaching can also improve students' critical skills (Suwono et al., 2017; Hamiyati et al., 2021). Active learning in collaborating in biology learning can improve students' 4C skills (Juanda, 2022; Ramdani, & Susilo, 2022; Rehiara et al., 2024; Kamila, et al., 2024; Tanta, 2024; Adnan et al. 2024). Biology learning can hone critical thinking skills that can be done with experimental data analysis activities and discussions. In addition, creative skills can be trained through scientific project activities, in addition to communication and collaboration skills can be improved through presentations and compiling project reports. However, there are still many challenges in learning Biology.

The challenges of learning biology in South Sulawesi such as learning objectives are still at a low level of thinking, learning indicators are still dominant

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at the supporting level, the use of conventional learning models, learning methods that are less fricative, the lack of use of learning media integrated with technology (Aldi et al., 2023). Teacher-center learning methods that can cause students to be passive in learning (Yuen & Hau, 2006; Bailey, 2008). Lack of student involvement in learning activities can also be a challenge for Biology teaching (Kahu, 2013; Ahmadi, 2023). Active student involvement in the learning process is also lacking both offline and online (Werang & Leba, 2022). Biology materials are still considered difficult for students to understand (Yusrizal, 2016; Muttaqiin, 2020). In addition, the lack of use of various learning media and the lack of ability to correlate various technology-based media can be a challenge in conventional Biology learning (Lange & Costley, 2020). Therefore, a constructivist approach is needed as an alternative in answering these challenges. The challenges of learning biology in South Sulawesi such as learning objectives are still at the low level of thinking, learning indicators are still dominant at the supporting level, the use of conventional learning models, learning methods are less fariativ, there is still a lack of use of technology-integrated learning media (Aldi et al., 2023).

The constructivist approach is a learning philosophy that emphasizes that individuals construct their knowledge and understanding. Through interaction with the environment and their experiences. Meanwhile, the purpose of learning according to the constructivist paradigm is based on three focuses: process, transfer of learning, and how to learn (Adnan, 2014). Knowledge is not simply transferred from teacher to student, but it is the student who gives meaning to what has been learnt. The formation of this meaning must be in accordance with the learning experience that has been experienced (Gitakarma & Tjahyanti, 2012). The constructivist approach makes the teacher serve as a facilitator who guides students to explore the knowledge gained from learning experiences (Guzzini, 2000; Hadi, 2024).

The benefits of constructivist learning are providing learning experiences and linking the knowledge that students already have in such a way that learning is a process of knowledge formation, providing various alternative learning experiences, integrating learning with realistic and relevant situations involving concrete experiences, constructing learning so that it illustrates social transmission, namely interaction and cooperation of a person with other people and their environment, utilizing various media so that learning becomes effective, involving students emotionally and socially (Adnan et al., 2014). The implementation of constructivist learning in the classroom is based on seven principles of constructivist learning which consist of personalized learning, reflective thinking, relevance to everyday life, collaborative learning, discussion, problem solving and investigation, teaching scaffolding (Haruthaithanasan, 2010).

Previous research on the effectiveness of constructivist approaches in science learning is very effective in improving student learning outcomes (Christensen & Hooker, 2000; Taber 2006; Adak, 2017). In addition, constructivist approaches in science learning are effective in building concept understanding, building learning experiences, and building social skills among students (Bächtold, 2013). Constructivist approaches effectively improve concept understanding and encourage positive attitudes to continue to be passionate about learning science (Liang & Gabel, 2005). The implementation of a constructivist approach in science learning can help students to build understanding, remember, and apply biological concepts in everyday life (Fitria, 2021). Students' critical thinking skills can be improved using the constructivist approach (Nurpatri et al., 2021).

The quality of education in South Sulawesi in of science is still low (Adnan et al., 2021). The ability to think at a higher level in Makassar city is still relatively low (Almunawwarah et al., 2021). In general, the level of learning motivation of junior high school students in Makassar City in Indonesia is sufficient and needs to be improved (Adnan et al., 2012). The results of formulating of learning objectives developed by teachers in the province of South Sulawesi are still dominantly low-level thinking (Aldi et al., 2022; Nurhidaya et al., 2023). Learning in South Sulawesi is still classified as teacher-centered, resulting in a lack of implementation of active learning (Muchtar et al., 2021). Therefore, based on the condition of Biology education in South Sulawesi, there is potential for developing more innovative Biology learning, one of which is the constructive approach.

The novelty of this research can provide an overview of the experience of high school students in South Sulawesi in learning Biology using a constructivist approach. Then, identify factors that affect the success of implementing the constructivist approach. Analyzing the relationship between various indicators of the constructivist approach. This research is expected to advance education in Indonesia, especially in transforming Biology learning using the constructivist approach. This paper focuses on examining students' learning experiences with the constructivist approach.

Method

This research uses quantitative data using the survey method (Cresswell, 2015). The survey method is used because it allows for obtaining data from a large number in a relatively short time and is useful for

providing an overview of the data to be obtained. The survey was conducted using a Google Forms platform containing a questionnaire. The data that has been obtained is then analyzed using descriptive quantitative and inferential analysis. Data analysis in this study was descriptive and inferential statistical analysis. Descriptive statistical analysis was used because it can interpret students' constructivist Biology learning experience. This includes calculating the percentage value of constructivist Biology learning experience which includes indicators of learning personality, reflective thinking, problem solving and investigation, relevance to everyday life, collaborative learning, discussion, and teaching scaffolding. Descriptive statistical analysis was used to describe indicators of students' constructivist Biology learning experience. Descriptive analysis categories include; ($91 \leq X \leq 100$) very good, ($81 \leq X < 90$) good, ($71 \leq X < 80$) moderately low, ($61 \leq X < 70$) low, ($X < 60$) very low (Aldi et al., 2024).

Inferential statistical analysis using Spearman correlation test using interval scale. The Spearman correlation test is used because it shows a significant relationship or correlation between one constructivist Biology learning experience and another (Atler et al., 2015; Creswell, 2015; Djatsa, 2019). The step in conducting the spearman correlation test is to calculate the average percentage value of each indicator of students' constructivist Biology learning experience which includes indicators of learning personality, reflective thinking, problem solving and investigation, relevance to everyday life, collaborative learning, discussion, and teaching scaffolding. The results of the calculation of the average percentage are then carried out the Spearman correlation test which refers to table 1 below.

Table 1. Categories of Correlation Coefficient Values (Creswell, 2015)

Attention	Learning Community
0.00-0.19	Very Low
0.20-0.39	Low
0.40-0.59	Moderately low
0.60-0.79	Strong
0.80-1.00	Very Strong

The research method used was descriptive survey. A descriptive survey was used to describe the characteristics of students' constructivist Biology learning. The type of instrument used is a questionnaire. The questionnaire has 60 that ask about the experience of students' constructivist learning paradigm. The questionnaire used a Likert scale of very good, good, sufficient, not good, and very bad. The questionnaire was used to reveal students' various constructivist Biology learning experiences. This instrument has been validated by learning evaluation experts by assessing the Constructivist Biology learning experience questionnaire.

The target of this research is students in South Sulawesi who are at the senior high school level. The students involved in this study were 525 students. The students came from 7 districts/cities in the South Sulawesi Province of Indonesia: Pinrang, North Luwu, Maros, Gowa, Takalar, Pare-pare and Makassar. The reason for sampling from 7 districts/cities in South Sulawesi is based on Leedy et al. (2019) which includes representation of crossovers and involvement of students from different regions. This will provide a more comprehensive reflection of the variation that characterizes education in South Sulawesi. Furthermore, the coverage of different districts can represent how variations in different social and economic conditions can affect students' learning abilities. Furthermore, the inclusion of samples from different regions allows the results to be generalized to the population of secondary school students in South Sulawesi. Data diversity can be increased if data is collected from different regions. Then, to see the potential of active learning through students' constructivist Biology learning experience. The following is a flowchart of the research in the picture below.

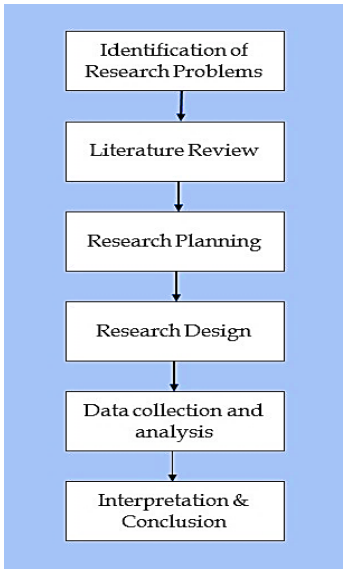

Figure 1. Research flow chart

Result and Discussion

Based on the results of the profile analysis of constructivist Biology learning experience of high schools in South Sulawesi. This is done by collecting data from students, which consists various constructivist Biology learning experiences. This includes learning personality, problem-solving and investigation, relevance to daily-life, relevance to daily-life,

collaboration learning, discussion, teaching scaffolding. The following results of the Biology learning profile analysis can be seen in Figure 2.

Descriptive Analysis

Learning Experiences of High School Students in South Sulawesi

Based on the figure 2, the constructivist Biology learning experience of high school students in South Sulawesi. The higher value in the constructivist learning experience is learning discussion which is 72.75%. The low value is in problem-solving and investigation, which is 60.68%. This shows that students are more dominantly interested in discussing the material studied in class. Discussion in learning is useful for students to express opinions, propose, refute other people's opinions, and make suggestions to solve problems (Askell-Williams & Lawson, 2005). Small group-based discussions can improve students critical thinking skills and active participation from various student backgrounds (Hajhosseini et al., 2016; Pollock et al., 2011). Student discussion activities develop various skills that lead to constructing their knowledge (Andersen, 2013). However, learning is less emphasized in gathering information, so students do not play an active role in problem-solving and investigation. Problem-solving and investigation can support students' understanding of the learning content studied. Therefore, what is missing still needs to be optimized. Optimizing it can provide a learning experience to students in a constructivist paradigm that can have a very beneficial impact (Donovan & Schmitt, 2014). Problem-solving can challenge students, help them discover new information, increase learning activities, and help students develop knowledge and provide learning experiences (Tian & Zheng, 2023). Problem-solving can be a mental process based on investigative data to find a conclusion (Fernandes et al., 2023). Problem-solving and investigation can promote meaningful learning, integrate knowledge, skills, and application in relevant contexts, and improve students' critical thinking, interest and motivation (Guzzini, 2000). The process of investigating to solve problems improves the quality of learning (Ifenthaler & Widanapathirana, 2014). Gathering information benefits learners by supporting reflection, confirming effective teaching practices, and providing effective feedback on learning strategies (Wieman, 2014). Collecting data benefits for learners such as finding patterns or facts learned to solve problems (Kyritsi et al., 2019). The investigation process has various benefits namely students can map the data collected and prove the truth of the facts (Westberg & Leppien, 2018). Problem investigation activities can provide collaborative encouragement for students to solve problems, and provide learning opportunities for active in learning (MacGillivray & Pereira-Mendoza, 2011).

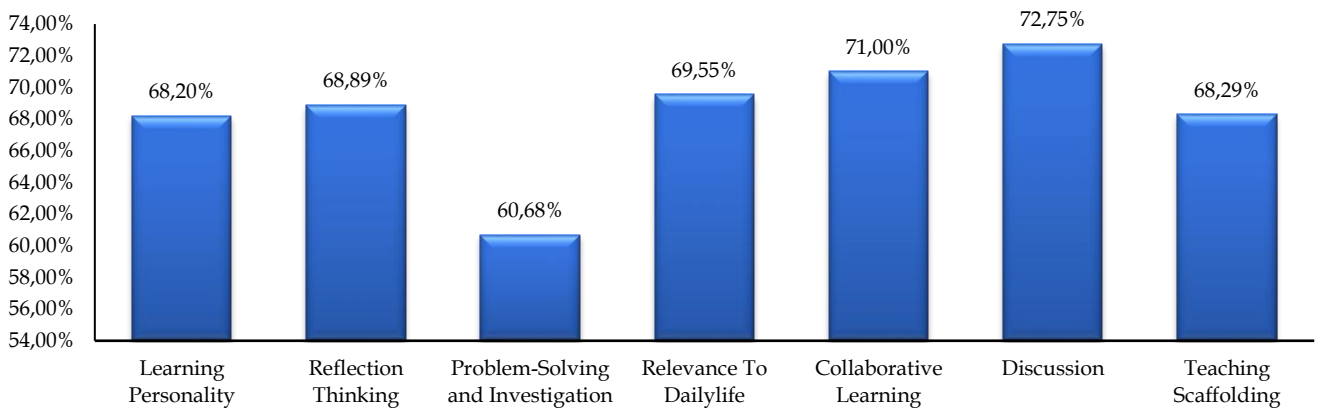

Figure 2. Percentage of students answer

Inferential Statistical Analysis of Students' Constructivist Biology Experience

Before conducting inferential test activities, first conduct a prerequisite test. The prerequisite test used is the normality test. The normality test aims to explain whether the sample is normally distributed. Based on the results of the prerequisite test, it was found that each of the probability values of One-Sample Kolmogorov-Smirnov, on seven constructivist Biology learning experiences from 7 districts/cities in Sulawesi were smaller than 0.05. Therefore, each sample to be analyzed inferentially is not normally distributed. Based on this, the difference test analysis used is the non-parametric Spearman correlation test. The purpose of the Spearman correlation test is to see a significant relationship or correlation between one constructivist Biology learning experience and another (Atler et al., 2015; Djatsa, 2019).

Table 2. Non-Parametric Test (Spearman Correlation)

Correlations									
			Learning personality	Reflection thinking	Problem-solving and investigation	Relevance to daily life	Collaboration learning	Discussion	Scaffolding
Spearman's rho	Learning personality	Correlation Coefficient	1.00	0.294	0.15	0.24	0.22	0.28	0.22
		Sig. (2-tailed)	.	0.00	0.00	0.00	0.00	0.00	0.00
		N	525	525	525	525	525	525	525
	Reflection thinking	Correlation Coefficient	0.29	1.00	0.213	0.32	0.32	0.37	0.32
		Sig. (2-tailed)	0.00	.	0.00	0.00	0.00	0.00	0.00
		N	525	525	525	525	525	525	525
	Problem-solving and investigation	Correlation Coefficient	0.15	0.21	1.00	0.21	0.16	0.24	0.42
		Sig. (2-tailed)	0.00	0.00	.	0.00	0.000	0.00	0.00
		N	525	525	525	525	525	525	525
	Relevance to daily life	Correlation Coefficient	0.24	0.32	0.21	1.00	0.39	0.34	0.25
		Sig. (2-tailed)	0.00	0.00	0.00	.	0.00	0.00	0.00
		N	525	525	525	525	525	525	525
	Collaboration learning	Correlation Coefficient	0.22	0.31	0.16	0.39	1.00	0.60	0.31
		Sig. (2-tailed)	0.00	0.00	0.00	0.00	.	0.00	0.00
		N	525	525	525	525	525	525	525
	Discussion	Correlation Coefficient	0.28	0.37	0.24	0.34	0.60	1.00	0.50
		Sig. (2-tailed)	0.00	0.00	0.00	0.00	0.00	.	0.00
		N	525	525	525	525	525	525	525
	Scaffolding	Correlation Coefficient	0.22	0.32	0.42	0.25	0.31	0.50	1.00
		Sig. (2-tailed)	0.00	0.00	0.00	0.00	0.00	0.00	.
		N	525	525	525	525	525	525	525

The Table 2 shows that there is a correlation between Biology learning experiences in each indicator with other indicators. This is evidenced by the alpha significance value which is smaller than 0.05. Then for the correlation coefficient value which is in the very low category, it is shown in the learning personality indicator with problem solving of 0.15. On the contrary, the very weak correlation between learning personality and problem solving proves that the learning personality factor does not have a strong relationship with problem solving ability in the context of Biology learning experience. The strong correlation coefficient value on the indicator of collaborative learning with discussion is 0.60. This means that the stronger the intensity of collaborative learning, the higher the intensity of discussion. Therefore, this result indicates that interaction and cooperation in collaborative learning contribute significantly to discussion, while the learning personality indicator may be more influenced by other factors outside problem solving.

The ability of Biology learning experience in South Sulawesi Indonesia is still in the low category. The instrument in the form of a questionnaire given by students includes indicators of learning personality, reflection thinking, relevance to daily-life, collaborative learning, discussion, problem-solving and investigation and scaffolding. When the various indicators are examined, it is clearly found that it is necessary to improve the constructivist Biology learning experience of high school students using a constructivist paradigm.

The constructivist paradigm emphasizes that individuals construct their knowledge and understanding. Through interaction with the environment and their experiences (Adnan, 2014). Students, in this case are actively involved directly in building their own knowledge or meaningful ideas by connecting new information with previous knowledge. This implies that students have their own way of learning and student-centered learning methods (Haruthaithanasan, 2010).

The percentage of students white a constructivist Biology learning experience in this case learning personality, reflection thinking, relevance to daily-life, collaborative learning, discussion, problem-solving and investigation, scaffolding is still quite low. In addition, the low percentage of students who can carry out

problem-Solving and Investigation cannot be separated from the teachers who teach in the classroom. This indicates that there are variations in student responses in the questionnaire of constructivist Biology learning experiences are inconsistent with Figure 2. Teachers also play a role in arousing students' learning motivation and learning outcomes. Through rewarding, competitive learning, praise, desire to learn, interest in and goals (Howard-Jones & Jay, 2016).

Based on the research results in Figure 2, it shows that students' constructivist biology learning experience on the learning personality indicator 64.20% is quite low. These results indicate that, in general, teachers in South Sulawesi are generally still quite low in presenting learning personality activities that can challenge students to think in learning. Learning personality provides learning experiences such as managing learning independently and collaborating (Haworth, 2016). Learning personality benefits students' accuracy and self-management in learning (Dörrenbächer & Perels, 2016). Learning personality functions in building learning to achieve learning goals and solving learning problems (Vasile, 2011).

The reflection thinking indicator is 68.89% which is classified as low. This finding shows that in general teachers in South Sulawesi are still quite low in providing reflective thinking learning experiences for students. Reflection thinking provides the benefit of providing challenging things to arouse curiosity to students (Zhang et al., 2017). Challenges can provide a condition for learning interaction between students and encourage them to explore the content to be learned (Thurmond, 2003). The stimulus domain in constructivist Biology learning can be observed, such as displaying a phenomenon, the provision of phenomena can also stimulate students to express questions or problems, students (Adnan, 2014). Factors that can influence the learning experience of constructivist biology in the realm of reflection thinking can be through the teacher's pedagogical mastery, teacher experience in teaching and teacher creativity.

The problem solving and investigation indicator of 60.68% is quite low. This finding indicates that in general teachers in South Sulawesi are still quite low in presenting learning experiences that are problem-solving in nature to students. Problem-solving can optimize independent learning, communication and problem-solving (Hmelo-Silver, 2004; Morales-Mann & Kaitell, 2001). Problem-solving can provide positive benefits to students in learning (Roll et al., 2014). Problem-solving can increase students' motivation to learning (Gunn et al., 2012). Learning motivation can benefits meaningful learning as a general trait or situation-specific state (Adnan et al., 2012). The process of gathering information or investigation improves the quality of learning (Ifenthaler & Widanapathirana, 2014; Donovan & Schmitt, 2014). The benefit of information gathering or investigation is that students can map the data collected. These benefits can make it easier for students to understand the information obtained according to the material studied (Tian & Zheng, 2023). Some factors influence information gathering, which include thinking skills, information literacy, and an interactive learning environment for gathering information.

Students' constructivist biology learning experience on the relevance to daily life indicator 69.55%, is quite low. This proves that teachers in South Sulawesi are relatively good at presenting learning experiences that are relevant to students' daily lives. Relevance to daily life can make students active in learning because it integrates concepts with the real environment (Tian & Zheng, 2023). Relevance to daily life can impact meaningful learning nuances such as students are no passive and directly involved in the learning process (Guzzini, 2007).

The collaborative learning indicator of 71.00% is classified as quite low. The findings indicate that, in general teachers in South Sulawesi are generally good at collaborating in learning. Factors that influence collaboration in students include spaces for collaboration in the classroom, student motivation to collaborate, positive attitudes toward collaboration, and the learning environment. Collaboration trains cooperation between students builds positive attitudes and good cooperation to train higher-order thinking skills (Lu et al., 2021). Collaboration can also serve to help each other between students who are good and those who are less able to understand concepts (Roberts, 2016).

Students' constructivist biology learning experience on the discussion indicator was 72.75%. The results of this study explain that teachers in South Sulawesi are generally good at creating learning experiences through discussions for students. The discussion has benefits for students to be actively involved in learning and train critical thinking skills (Pollock et al., 2011). Critical thinking is beneficial for students in improving critical thinking skills along with peer interaction (Hajhosseini et al., 2016). Discussion can lead students to gain new knowledge through interaction between students (Caballé et al., 2008; Schaefer et al., 2020; Smith et al., 20096).

Students' constructivist biology learning experience in the scaffolding indicator is 68.29% which is classified as low. This finding indicates that in general, students in South Sulawesi are still quite low given scaffolding by teachers in learning. Scaffolding helps students create an effective environment to optimize their argumentation skills (Ustunel & Tokel, 2018). Scaffolding helps students

to improve student performance in learning (Choi et al., 2019; Jiang & Elen, 2011). Scaffolding can challenge students in the learning process that involves meaningful discussions and provides motivation to students (Dewi & Iswandari, 2016).

Based on the results of the correlation test between constructivist biology learning experiences, the learning personality domain has a higher correlation value with Reflection Thinking of 0.25 with a low category. This shows that the two learning experiences have a low relationship. This is in line with the findings of Ghanizadeh (2017) which state that there is a correlation between self-management and reflective thinking ability. This correlation helps train students to actively involve themselves during the learning process and build reflective thinking skills. Then for constructivist biology learning experience, the learning personality domain has a lower correlation value with problem-solving and investigation of 0.148 with a very low category. It indicates that the two learning experiences have a weak relationship that needs to be improved. Learning personality can influence students to solve problems in the investigation process (Handican & Jamna, 2023). Nevertheless, my findings show that there is a relationship between the two aspects, but there is still a need to improve the relationship between the two aspects in order to obtain a more optimal one.

The results of the correlation test between constructivist biology learning experiences on the Reflection Thinking indicator have a correlation with Discussion which is 0.37 with a low category. This shows that the two learning experiences have a low relationship. Reflection Thinking can improve discussion skills among students and build a conducive learning community (Rodgers, 2006). The constructivist view of learning can assist students in Reflection Thinking to produce optimal learning outcomes (Lundgren et al., 2017). Then, for the constructivist biology learning experience, the Reflection Thinking domain has a lower correlation value with Problem-solving and investigation of 0.213 with a low category. This indicates that the two learning experiences have a weak relationship. Reflection Thinking plays an important role in improving the quality of learning (Razavian et al., 2016). However, the findings I obtained have a weak relationship between Reflection Thinking and problem-solving investigation. Therefore, optimizing Reflection Thinking with problem-solving and investigation is necessary to improve students' learning experience.

Constructivist Biology learning experience in problem-solving and investigation has a higher correlation value with scaffolding of 0.415 with a moderate low category. This illustrates that the two learning experiences have a fairly good relationship. Constructivist learning point of view as a process of dynamic change in conceptual aspects accommodated by active problem-solving activities (Drigas & Karyotaki, 2016; Soong, 2008). Scaffolding has been important in optimizing students' problem-solving ability (Astutik, 2020). Therefore, the aspects of Problem-solving and investigation with scaffolding have a close relationship dimension so that there is a close chorealisation. But from my findings, the relationship between the two aspects is still quite good. Therefore, it is still necessary to optimize meaningful learning experiences in problem-solving and investigation with scaffolding so that student learning in South Sulawesi is more optimal. Then, the constructivist Biology learning experience in problem-solving and investigation has a lower correlation value with Collaboration Learning of 0.16 low category. This indicates that the two learning experiences have a weak relationship. Problem-solving and investigation can improve students' ability to ask questions in discussions with teachers and peers (Suwono & Wibowo, 2018). This is not in line with my findings, which still show a low correlation between problem-solving and investigation and collaboration Learning. Therefore, there is still a need to improve the constructivist learning experience of both aspects for students in South Sulawesi.

Based on the results of the correlation test between constructivist biology learning experiences, the Relevance to daily life domain has a higher correlation value with Collaboration Learning of 0.42 with a moderately low category. This illustrates that the two learning experiences have a fairly good relationship. Relevance to daily life-orientated learning combined with Collaboration Learning can improve learning outcomes (Nokes-Malach et al., 2015). The findings of my research results, although they have a correlation but are low, therefore it is necessary to optimize the constructivist biology learning experience in the Relevance to daily life domain combined with Collaboration Learning to support the achievement of student learning outcomes.

Constructivist Biology learning experience in the Collaboration Learning domain has a higher correlation value with discussion of 0.60 with a strong category. This illustrates that the two learning experiences have a good relationship. Constructivist learning experiences encourage collaboration learning activities to build a concept and improve the quality of discussion (Gibson, 2013). This is in line with my findings regarding both aspects of the learning experience. But it still needs to be optimized to achieve maximum results. Constructivist Biology learning experience in the Discussion domain has a lower correlation value with problem-solving and investigation of 0.22 with a low category. Through in-depth discussion, activities can improve problem-

solving results (Zheng et al., 2020). Nevertheless, my findings show that there is a relationship between the two aspects but, it is still necessary to increase the correlation between the two aspects in order to obtain maximum results.

The result of correlation test between scaffolding indicator and Discussion is 0.50 with moderate category. This illustrates that the two learning experiences have a fairly good relationship. A constructivist learning experience with the help of teacher scaffolding can encourage Collaboration Learning during the Discussion process and make students achieve maximum learning outcomes (Lim, 2010). Based on this, my findings regarding constructivist biology learning experiences in both aspects still need to be optimized. It can develop students' communication skills. Then for constructivist biology, learning experience in scaffolding has a lower correlation value with learning personality of 0.22 with a low category. This indicates that the two learning experiences have a weak relationship. Scaffolding plays an important role in improving students' learning personality in learning (McLoughlin, 2002; Rasmussen, 2001). Nevertheless, my findings show that there is a relationship between the two aspects but, there is still a need to improve both aspects in order to obtain maximum results.

The novelty of this article is that there are findings that can provide a deeper understanding of the constructivist Biology learning experience. Especially providing learning personality, reflection thinking, problem-solving and investigation, Relevance to daily-life as much as, collaboration learning, Discussion, Teaching scaffolding. This finding can explain that the learning experience of constructivist biology in students in South Sulawesi is still sufficient, so it needs to be optimized in a more optimal direction.

Factors that influence the success of implementing constructivist approaches include teacher skills and competence in training problem-solving and investigation experiences that still need to be improved, support facilities such as teaching materials and technology still need to be optimized. Student involvement in discussion and collaboration activities still needs attention, and contextual-based learning in everyday life is minimal. Analysis of the relationship between various indicators of constructivist approaches such as learning personality, reflection thinking, problem-solving and investigation, Relevance to daily life as much as, collaboration learning, Discussion, Teaching scaffolding are interconnected and contribute to the success of learning.

The research that has been done has limitations and even weaknesses because it does not provide any treatment to the research target. This research was conducted naturally regarding any Biology learning experience that students have. The results of this study provide an important contribution to the Indonesian government's consideration of including constructivist principles in the national curriculum that focus on active, deep and constructive learning experiences. Prepare students who are given specialized treatment so that all students are as expected. The most appropriate form of treatment is through constructivist-based learning. Develop teacher training programmers to focus more on the principles of constructivist learning and further research to evaluate the long-term impact of constructivist approaches.

Conclusion

The ability of Constructivist Biology learning experience of high school students in South Sulawesi is still quite low. The results of this study illustrate the percentage of high school students who are classified as low in the learning personality indicator which is 64.20%, reflection thinking 68.89%, problem-solving and investigation 60.68%, Relevance to daily life is 69.55%, collaboration learning at has a value of 71.00%, Discussion has a value of 72.75%, Teaching scaffolding has a value of 68.29%. The total average of students' constructivist learning experience of 67.90% is moderately low. Therefore, the learning experience of constructivist biology still needs to be improved to be very good. The results of the Spearman correlation infrential test show a close relationship on each indicator of students' constructivist learning experience of 0.353 which is classified as low. The impact of this research is a study that emphasizes the need to include constructivist principles in the national curriculum. Policy makers need to support Constructivist Biology learning experiences in South Sulawesi. Teachers need to get used to providing constructivist Biology learning experiences for students. In addition, this study can provide support for teacher empowerment through various ongoing training, forums or workshops related to constructivist learning. Through the application of constructivist learning experiences, students can be actively involved in learning, learning is more meaningful and student-centered, improving critical thinking and problem-solving skills, and preparing students for the future. The limitation of this study is that this research was only conducted in the South Sulawesi region. Therefore, the results cannot be generalized to all regions in Indonesia. Furthermore, the instruments used in measuring constructivist learning experiences may have limitations in exploring more specific aspects of student engagement in learning. This study only measured the constructivist learning experience at one point in time, it cannot see how the

students' experience can influence students' long-term development.

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Author Contributions
S.A.: conducted data collection at school, conducted data analysis activities, and wrote the manuscript. A. and A.A.A: reviewed the instrument and research results.

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There is no conflict of interest.

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