

Investigation Of Early Study Stage For Young Researcher

Diah Ambarumi Munawaroh^{1*}, I Nyoman Sudana Degeng², Henry Praherdhiono³, Dedi Kuswandi³

¹ Doctoral Student, Instructional Technology Department, The State of Malang University, Indonesia.

² Professor at Instructional Technology Department, The State of Malang University, Indonesia.

³ Department of Instructional Technology, The State of Malang University, Indonesia.

* E-mail: diah.ambarumi.1801219@students.um.ac.id

Abstract

This study aims to demonstrate the early stages of learning research for students aged 13-15 years. The learning consists of (a) the formulation of a research learning environment, (b) the process of students getting authentic research ideas, and (c) students' actions to compile their simple research design. This study used a qualitative approach, while the data collection was through in-depth interviews, direct observation, and documentation of 24 students and 3 teachers who were randomly selected. The data analysis process was carried out using data reduction techniques and data presentation. Data validity involves credibility, transferability, dependability, and confirmation degree. The data collection process included participant observation (for three months, 3-4 days a week, and 3-6 hours per day). The results revealed that (1) the discovery of the research learning environment of researchers aged 13-15 years started from peer motivation and reinforcement of material from teachers about scientific thinking, scientific behaviour, and research ethics; (2) the process of achieving ideas involves treatment to help students to be more sensitive to their environment as inspiration for their ideas and finding relevant reference sources of information; (3) young researchers are able to formulate research designs by making research schedules and logbooks as a reference for writing down all their research notes; (4) teaching research in secondary schools requires teacher guidance to help students achieve basic research competencies.

Keywords : Young Researcher, Environment, Research Idea

INTRODUCTION

Research in Indonesia has been conducted by university students; the current phenomenon nowadays is the middle school students aged 13-15 years who have the potential and achievements in research competitions at the national and international levels. Several madrasah (Islamic School) in Indonesia have included research activities in the classroom learning curriculum as a forum for interest and talent to develop the ability to conduct research from an early age. According to Piaget in Santrock, adolescent operational thinking occurs between the ages of 11 to 15 years by organizing observations, experiences, ways of thinking, and incorporating new ideas with additional information for more in-depth

understanding (Santrock, 2011).

Morris Meister (1918) in Sevan G Tazian explained that experience in a scientific investigation could accommodate and develop the quality of students who are aware of information, are technically skilled, socially responsible, produce projects, and are able to experiment directly (Terzian, 2012). The involvement of children is not a research participant but as a researcher or partner in the research process, including designing research questions (Kellett, 2005), data collection (O'Brien & Moules, 2007), analysis and reporting (Coad & Evans, 2008), and the dissemination (Tisdall et al., 2008). The United Nations Convention on the Rights of the Child (UNCRC) 1989 under the United Nations recognized that children have the right to express

their views in their own world (Alderson, 2000; Christensen & Prout, 2002; Laura, 2007; Thorne, 1993).

The learning process in schools implies that professional teachers are required to be able to carry out learning that balances the cognitive, affective, and psychomotor dimensions. Degeng (2013) says that teachers must be able to "orchestrate" the class for the implementation of a learner-centered learning process, so that they are able to construct knowledge and learning experiences with their environment (Setyosari, 2009). Gagne (1985) defined the creation of a psychological and sociocultural environment/condition that can trigger (stimulus situations) students to interact (Gagne, 1985). Brown et al. (2003) explained the importance of the relationship between individuals and the social environment in building one's knowledge. Social interaction between individuals and others is the most important factor that can trigger a person's cognitive development (Brown et al., 2003)

The learning of adolescent researchers above is interesting to study empirically; it is about the phenomenon of teacher experience in creating a learning environment and the stages of students getting original research ideas according to facts and data from relevant theories.

This research's focus describes the initial stages of managing a study of a group of students aged 13-15 years in participating in learning activities for adolescent researchers. The sub-focus of this research is how to create a research learning environment, how students get research ideas, and how students can frame the research design.

LITERATURE REVIEW

Students as researchers

Sevan G Terzian explained that Junior High Schools (SMP) are very suitable for research activities that aim to increase creativity, cooperate in groups, have the ability to produce projects (Terzian, 2012). According to Morris Meister, research learning in Junior High Schools is very appropriate in accommodating juvenile delinquency because its activities tend to be playing, producing projects, direct experimentation, and laboratory practice (Meister, 1918).

Young Children as Researcher (YCAR) describes four research behaviors: exploration,

finding solutions, conceptualizing, and basing decisions on evidence (Murray, 2016), by combining sensory information to identify the reasons chosen (Tversky & Kahneman, 1973). Article 12 of the UNCRC explained that children of all ages are able to enjoy the right to express their views freely according to their maturity (Laura, 2007). Recognition of children as experts in their own lives (Alderson, 2000; Christensen & Prout, 2002; Mayall, 2000) is an initiative to involve children as participants and researchers (Johnson et al., 2008; Jones, 2004; Nieuwenhuys, 2001) there is a growing body of literature on the role of children and adolescents as researchers (Alderson, 2000; Boyden & Ennew, 1997).

Action research includes finding, establishing the truth, understanding problems raised by a group of students through the school board, exploring issues through investigation, gathering evidence (data), analyzing, interpreting, reaching conclusions, making recommendations, making decisions, and providing benefits (Cheminais, 2012). According to Helen Hedges, "the children's theory of working together explains that when children are testing and exploring ideas, it means that they are building a new knowledge" (Hedges, 2014).

Students are able to become great researchers by producing their own knowledge if the teacher can facilitate the curriculum as researchers so that students achieve their goals as creative students (Kincheloe & Steinberg, 2002). How do we encourage students to become researchers? This question is crucial for teachers in fostering student research because we often encounter students who are continually educated to be passive data recipients.

Environmental Utilization

The environment provides opportunities for students to learn a lot (Griffin, 2004). The learning environment is all learning resources that support the learning process both from inside and outside the learner, such as the classroom, the school environment, residence, nature, culture, and surrounding community. The teaching and learning process is defined as a change in behavior due to individual experiences with their environment based on four main elements. They are individuals who actively participate in the learning process and facilitate learning, teachers who act as guides to make the learning process easier and more

meaningful, lesson plans that are followed during the learning process, and the environment (social and physical) where learning is (Kiriktas & Eslek, 2017).

The learning environment outside the school is a learning environment that arouses students' interest, excitement, and curiosity to learn about concept-case phenomena in everyday life. This condition keeps their attitude and motivation alive, allows them to learn, explain by discovering concepts related to science through daily activities. It also aims to teach by helping students discover concepts and cases, encouraging investigations, and facilitating supportive observations (Council, 2009; Yildirim, 2020).

The learning and research environment cannot be separated; students are involved as active members of the research community (Brew, 2003). Outdoor education is a multidimensional process that presents a study of learning activities constructed outside the place as a community and natural order (Bunting, 2006). This process is continuous and shows itself in integrating life and learning at all levels (Ford, 1986).

RESEARCH METHODS

The qualitative method is a research procedure that produces descriptive data in written words of observed behavior (Moleong, 2010). The resulting data is in the form of words, pictures, and human behavior. This research was conducted at the State Yuniior Madrasah Batu City, East Java Province, Indonesia. The data collection technique used observation, interviews, and documentation of 24 madrasah students (aged 13-15) divided into 12 groups drawn randomly and two research teachers.

Data analysis techniques with data reduction and data presentation (D. Sugiyono, 2013). The validity of the data uses the degree of trust (credibility), transferability (transferability), dependence (dependability), certainty (confirmability)(Moleong, 2010). This study's data collection process involved participant observation (3 months, 3-4 days per week for 3-6 hours per day). This research was conducted from January 2020 to March 2020. Before data collection, the researchers spent two days adapting to familiarize themselves with students.

RESEARCH RESULT

Learning young researchers is a scientific research process for adolescents in classroom learning activities, from finding research ideas to producing written works through the research process. This learning was first given to students aged 13-15 years as the foundation for instilling a scientific way of thinking and acting based on evidence.

Creating a Research Learning Environment

Creating a learning environment at MTsN Batu city is divided into three basic activities for adolescent researchers: peer motivation, delivery of basic material attitudes, and scientific thinking and activities outside the classroom.

1. Peer Motivation

One of the activities in creating a learning environment is to motivate adolescent researchers. This activity is one of the keys to carrying out research learning for ages 13-15 years. Peers in this activity are called Club Senior, it is 9th grade students who have performed well in youth research competitions at the national and international levels. Club Senior has the task to motivate other students to share experiences while carrying out research projects, how to do trials, fun when experiencing experimental failure, and challenges when participating in competitions. The main research actors are students, so intrinsic and extrinsic motivation is very important by arousing their curiosity and interest. The extrinsic motivation was obtained from parents at home, teaching teachers and peers in learning once a month in the third week. The following is the documentation of the researchers when participating in routine peer motivation activities:



Figure 1. Creating a Research Learning Environment by Peer Motivation

Robert S. Slavin explained that intrinsic and extrinsic motivation is very helpful in learning activities. The teacher tries to make the material

presented attractive and increases learners' curiosity (Slavin, 2019). Motivation can be defined as a force that helps people focus on certain goals, moves them, helps certain manifest behaviours, stimulates and directs actions to achieve goals, maintains appropriate intellectual or physical efforts, and provides a continuation of action (Yildirim, 2020).

Based on the results of observations and interviews, students explained that they were very happy to get motivated experiences and insights from high-achieving senior research activities. Students who participate in the activity ask questions about challenges around research and how to face and handle the obstacles when carrying out the data collection process and conducting trials. For example, Naura (14 years) gave an argument: it seems like researching is fun and fun, ma'am (after hearing from peers about their research reviews).

The researcher confirmed to the head of the madrasah, Mr Sudirman, that this motivational activity was very useful in sharing the use of their research results. The results of researchers' observations, peer motivation has a positive impact on arousing enthusiasm from within. Motivation is one of the most important elements of effective learning (Slavin, 2006) as an internal process that activates, guides, and maintains behaviour over time (Gauthier, 2014; Schunk, 2012).

Previous research has shown that intrinsic and extrinsic motivation affects learning behaviour and learning achievement (Tokan & Imakulata, 2019). Environmental factors produce a level of focus of attention and stimulus for learners to make a unique contribution (Choi & Cho, 2020). Affective factors (Yildirim, 2020) correlate with strategy learn online and digital applications (Saraçoglu, 2020).

Motivation is a research dependent variable and one of the important affective characteristics that impact teaching and learning (Lazowski & Hulleman, 2016; Yildirim, 2020). Learners need to be motivated to learn scientific concepts better, promote success, and develop scientific process skills. Teachers must realize the importance of motivation by considering affective factors such as learning motivation during the educational process and creating a suitable learning environment for students to increase affective traits (Yildirim, 2020).

2. Attitude and Scientific Thinking

A scientific attitude is an essential human trait that has curiosity, emphasizes the value of caring, and respects science's value. Education has a vital role in instilling scientific attitudes to students from an early age, fostering students' personal intelligence and emotional maturity (Hunaepi, 2016). The realm of scientific attitudes determines a student's success in achieving completeness in the learning process (Anderson & Anderson, 2002; Sutrisno, 2021).

Instilling scientific attitudes for beginners aged 13-15 years are carried out by teachers by conditioning research learning through the introduction of scientific attitudes, ethics, and ways of thinking. In the next activity, the teacher conditions the students in the classroom by motivating the importance of thinking scientifically, being scientific, and understanding scientific ethics as the basic foundation for beginners. Ms. Umroh (38 years) explained that as an adolescent researcher, students must have the ability to be scientific, for example, honesty, not feeling the most correct, able to accept other people's opinions, be objective and be able to copy information correctly. Mr. Iswanto (55 years) explained simple scientific abilities for adolescents. For example, students must be sensitive to the environment, respond to problems in the environment, communicate ideas, and share research results with others. Ms. Nurvida (30 years) said students also need to understand simple scientific ethics such as not plagiarism, respecting other people's research, and producing simple original research (a source for adolescent research teachers at the state MTsN Batu city).



Figure 2. Creating a Research Learning Environment by providing Attitude and Scientific Thinking

Teaching-learning teachers aged 13-15 years said it was very important to instill scientific

thinking from an early age through research activities. At least, students were used to filtering the information received and did not easily believe hoax news. Research learning activities are a forum to develop students' talents and interests in scientific research for adolescents. Aims to train students in planning, conducting, and compiling scientific research reports for learners. The State MTsN Batu teaching teacher instills an attitude to students that research can be wrong, but cannot lie (Umroh, Iswanto, and Nurvida).

The importance of 21st-century skills such as creativity, critical thinking, problem-solving, and cooperation are competencies that shape the need for "universal literacy" to survive in the 21st century (Akgündüz et al., 2015). Scientific thinking is logical and empirical thinking integrated into higher-order thinking skills such as critical thinking, creative thinking, metacognition, problem-solving, decision-making, and determining the quality of individual students. The scientific attitude includes: 1) curiosity; 2) concern; 3) vigilance; 4) trust; 5) self-confidence; 6) open thinking; 7) flexibility; 8) respect the opinions of others; 9) think fairly; 10) honest; 11) caution; 12) willingness to revise views and reflection on honesty indicates a change in the quality of a person's thinking (Facione, 2011).

Scientific attitude is the attitude shown by scientists when they carry out scientific activities in acting and solving a problem systematically through scientific steps, including honest, open, tolerant, skeptical, optimistic, brave, creative, critical, appreciating people's work others are forward-looking (P. D. Sugiyono, 2016).

3. Activities outside the classroom

In the next activity, the teacher invited students to leave the classroom to observe the madrasah environment. The location of the state MTsN Batu city is located between agricultural fields and mountains. Researchers participate in learning activities outside the classroom. The teacher invites students to observe all objects, plants, activities at school (friends, teachers, traders, farmers) in the environment around the madrasah that they want to know and have not used. Ms. Umroh (38 years) stimulated students by taking plant leaves that are scattered under the tree and observing them. For several minutes there was no response from students. Teachers make acting strategies by picking up objects in the madrasah (Islamic school)

environment to arouse their curiosity. The learners approached and asked what made the teacher interested in the Bintaro fruit seeds.

Ms umroh : Have the seeds of this Bintaro plant been used before?

Naura : In my opinion, the school gardeners sweep and burn them in the garbage dump.

Teacher : Has this plastic used been used before??

Bintang : Yes, it has been used, It has been used as a potted plant or taken by garbage picker.

Teacher : Do you know the content of the snacks that you eat every day?

Lazuardi and Aal : We never thought about the content of the snacks we ate.

Learning is helping students to get information, ideas, skills, ways of thinking to change their behaviour (Joyce & Weil, 2003). Participatory research is conducted with children and not with children (Christensen & Prout, 2002). Adults are mediators in providing roles (Shier, 2001).

The teacher uses local environmental wisdom as a research resource as a challenge at the research project stage, getting original ideas, the level of participation in groups, and research results. Research builds 'knowledge and understanding', where 'truth' is linked to the honesty, thoroughness and reliability of the approach (Willmott, 2006).

The learning environment outside of school in science teaching has a significant influence in developing student motivation to learn science (Yildirim, 2020). Teachers believe that learning activities outside of school contain the knowledge and improve memory by integrating learning into life (Topcu, 2017).

The Process of Getting the Research Ideas

The process of coming up with research ideas consists of environmentally sensitive trends and original research ideas through literacy. The activity steps are as follows:

1. Sensitive to the surrounding environment

We are interested in children aged 13-15 years in coming up with independent research ideas. Teachers allow students to observe any objects according to their interests such as cakes, plants,

animals, trash, plants, or the activities of farmers, students, traders and teachers. The teacher provides a stimulus by taking and observing the scattered on the school grounds:

Teacher: Look at the chameleon clinging to the tree! Do you think the chameleon is fascinating?

Nabila (13 years old): I think the chameleon is just as usual ma'am, but I like to observe it when it changes colour.

Star (13 years): Why do chameleons change colour when attached to objects?

Hilman (14 years): I want to give additional information from the internet, chameleons can change colour because, on the skin of the chameleon, there are various pigments or dyes, such as red and yellow pigments in chameleon skin, and different other colours.

Teacher: Good information, Hilman. Does anyone want to research this chameleon? Try to convey your ideas.

Izzah (13 years): I am looking for information with a notebook, and I will read it aloud. Pigments are found in chromatophores cells so that when they are about to express their mood, the chameleon's brain sends signals to chromatophores cells then the dye or pigment moves to change the colour of the chameleon's skin.

Zulia (14 years): I have listened so far, and what interesting from this chameleon is its colour change. How if we calculate the time interval for changing the colour in a chameleon?

Mellinda (13 years): Zulia! That is a brilliant idea! The chameleon may stick to each colour at different intervals (smile too); for example, red and green have different time intervals.

Teacher: Your ideas are excellent, please you observe all the objects, plants and any activities around you that you want to know, then imagine what these objects can be used for and what benefits that they have?



Figure 3. Documentation of Process in Getting the Research Ideas by Sensitive to the surrounding environment

This activity involves high-level cognitive abilities because it involves language and understanding the thoughts of others. In learning activities, there is a mediation process of teacher stimulation and responses from students. This activity involves behaviour and the environment by conditioning learning by the teacher through clear stimulus and instruction. Learners utilize the senses, such as eyes, ears, and thoughts. Akerson explained that learners could derive research ideas through explicit reflective strategies, including in urban, suburban, and informal science settings (Akerson et al., 2011).

This activity requires the involvement of the teacher in providing direction at the beginning of the lesson because this is the first time students get to know the research process. From a behaviourist perspective, the teacher's job here is to create an atmosphere that allows students to build the expected competencies. Students are also able to convey ideas with good communication. The social and cultural environment influences the formation of students' cognitive and thinking.

Degeng explained that learning conditions would be stated complete if all materials, tools, information and the environment that affected students' abilities were included in special objectives (Degeng, 2013). According to Hurlock 1978, sensitivity is a certain period that needs to be directed so that it does not hinder development. Sensitivity is a feeling of being sensitive and reacting to certain stimuli where other people are unable to perceive what we see. Hanafin (1999) stated to encourage critical thinking, inquiry-oriented and heuristic-based learning, independently directed and unstructured (Hanafin, 1999). The role of the family, school, and community environment provides a meaningful and highest role in the formation of environmental care for students (Tamara, 2016).

2. Finding Reference Sources of Information

Interview in the madrasah area with Amanda (14 years) and Intan (14 years). They were observing gardeners pulling weeds in the schoolyard; they are interested in weeds growing in the school area and get information from gardeners that this type of weed is grinting grass. So far, it is used as animal feed. Aal (13 years) and Adam (14 years) were interested in armyworms in corn plants. They observed farmers applying chemical fertilizers and found several armyworms on these crops. Aal said he wanted to find environmentally friendly organic fertilizers as well as armyworm repellent that could help farmers.

Interview with Naura (13 years) and Aqila (13 years). They are interested in the Chinese ketepeng leaves that live around their house and have not been used. Naura said, "I heard from local people that these leaves could be used for skin diseases. Incidentally, my classmates, many of the pesantren children, are affected by scabies. But, I don't know for sure how this leaf is used for it. Interview with Naura (14 years) and Aulia (15 years), they were interested in ettawa goats on the farm next to their house. Their interest arose when several times they bought goat's milk and ran out of milk stocks. Why can't goats produce much milk?

Ainun (13 years) and Azzam (13 years) are interested in the many teenagers playing the art of bantengan culture and joining clubs in the state Batu city art studio. Ainun said that she wanted to know why many of her friends are interested in the art of banteng, even though in her opinion, it is just ordinary art, not cool, just an ordinary ornament that is played together. What thing that makes these teenagers interested in joining the banteng art club. She would like to find information in several art studios and the Batu City Tourism Office.

Students need to learn unique things that come from local wisdom so that they can get original research ideas. Moreover, they live in an environment with a different cultural background. This uniqueness will be an asset for students to solve complex problems through simple research for children in Indonesia. This uniqueness is associated with literacy to obtain the correct information. The teacher asked students to open their laptops and connect to the school's internet Wi-Fi. Students who do not bring laptops can use computer laboratory facilities to find information. The teacher asked students to write down the findings in

notebooks as logbooks. Following are activities to find referral sources accompanied by group discussions:



Figure 4. Documentation of Process in Getting the Research Ideas by Finding Reference Sources of Information

Information skills are known as metacognitive abilities, and the ability to understand student information, being able to obtain information and use it (Yousaf & Akhter, 2018). The development of knowledge and technology changes the teaching and learning environment to be independent, active, responsible with a guided inquiry approach to information and communication skills (Ormancı & Çepni, 2020). Information literacy is very important for any research program. Students have a better understanding of reviewing the latest scientific literature, designing experiments, collecting and analyzing data, and disseminating their findings in written and oral formats (Yeagley et al., 2016). In Sevan G Terzian (2012), according to Morris Meister (1918), he said that experience in meaningful scientific investigations could accommodate and develop quality in students who are aware of information, were technically skilled, and socially responsible as well as produce projects and were able to experiment directly (Terzian, 2012).

DISCUSSION

The activity of formulating a simple research design by creating a research schedule and logbook is as follows:

1. Develop a Research Activity Schedule

An activity schedule is a way of entering a structured selection of routines, providing a schedule for specific daily events or activities. Activity schedule taking is done when people are allowed to choose the order of events in the schedule (Morrisett, 2015). After each student gets a research idea, the teacher asked students to make a research schedule. In this activity, students in groups with the teacher's direction

make their research schedule. This activity schedule is very simple by including the column number, day, date, type of activity and information whether it has been carried out or not. The steps taking are written in the activity column, while the information about the targets have been met or not. Learners discuss the design that will be carried out on this simple schedule. Here's an example of a schedule framed by a young researcher:

Figure 5. Research Activity Schedule developed by Young Researcher

The teacher explained the activities of how to arrange research schedules, taught students to work together in groups, has good communication, taught acceptance of other people's opinions, looks for solutions through discussion and respects others. Ms Umroh (38 years) explained that making a student research schedule makes it easier for students to carry out the stages of the research process if the schedule cannot be done on time, the students need to write it in the description column. According to Nurvida (30 years), the schedule makes it easier for students to carry out the sequence of activities they will carry out until the research is complete.

Michael Eric's previous research found that activity schedules affect completing school assignments in order, on time, data reliability, and social validity (Morrisett, 2015). Activity schedules are proving to be a great resource in helping students understand the main domain of research (Knipe et al., 2018). Social change adds to a positive understanding of the effectiveness of different activity schedules on student academic achievement (Childers, 2018). Teacher training, teacher preparation, and student activity schedules have a significant effect on the progress of mastery and student achievement (Stockard, 2020).

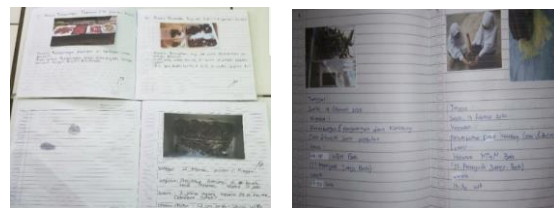
2. Creating a Research Activity Logbook

In this activity, students are taught to make simple logbooks; it is writing books as notes on daily research activities. Logbooks are very

important for adolescent research activities as control and control contained in a report covering processes, stages, activities and so on (Darmalaksana, 2018). The logbook for students aged 13-15 are made here simply by listing their research activities along with the type of activity, day, date and time of the research activity.

Mr Iswanto (55 years) explained that one of the logbook functions is to monitor student activities in the form of a research diary, how students find problems as the background of the research. Ms Nurvida (30 years) said logbooks made it easier for students to write their work, as a parameter for their research design. Ms Umroh (38 years) emphasized it that logbook is very useful for adolescent researchers as a reference for writing their research proposals, in designing research, because student activities are contained in the logbook.

The teacher teaches students to make simple logbooks to monitor activities and write down research designs and experiments and observations made. The following is an example of a logbook of student work:



Michael D Sublett's research explained that the assignment of notebooks results in increased student knowledge, and there is feedback from the teacher. Notebook writing encourages better thinking and allows students to learn about themselves (Sublett, 1991). Notebooks are useful in helping students become aware of new roles in a system (Chateau & Candas, 2015; Chateau & Zumbihl, 2012) and can map progress and have many advantages (O'Shaughnessy et al., 2017).

CONCLUSION

This study aims to describe the early stages of managing research learning for the ages of 13-15 years. The results showed: First, creating a learning environment for young researchers aged 13-15 years requires teacher conditioning (starting with peer motivation by the senior club, strengthening the initial material from the teacher about ethics, thinking and being scientific) as the basic foundation of learners. Dewey and Friere explained that students' scientific attitudes can be raised through interactive activities based on local wisdom so that they can foster flexibility, a curiosity of students' interest in learning (Gautreau & Binns, 2012). Second, the process of achieving ideas involves helping students to be more sensitive to their environment as inspiration for research ideas and to find reference sources for relevant information. Students need to learn unique things that come from local wisdom so that they are able to get original ideas from environments with different cultural backgrounds. This uniqueness will be an asset for students to solve complex problems through simple research for children in Indonesia. Third, learners are able to frame research designs by making research schedules and logbooks as research reference parameters that help write down all notes on research activities. Logbooks are very useful for adolescent researchers as a reference parameter for writing proposals, designing research, monitoring student activities, because all student activities are contained in the logbook and make it easier for students to write their work coherently and sequentially. The use of logbooks is a must in researching at the Indonesian Research Institute of Sciences (LIPI, 2019). Secondary school research learning requires the role of the teacher in providing direction for basic research competencies for students.

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