

# Learning Difficulties of High School Students in Understanding the Material of Human Reproductive Systems Triggering Misconceptions

Naning Wahyuni<sup>1)\*</sup>, Hadi Suwono<sup>2)</sup>, Umie Lestari<sup>2)</sup>

<sup>1)</sup>SMAN 8 Malang

<sup>2)</sup>Biology Education-Universitas Negeri Malang

Jl. Veteran 37, Kota Malang-65145, Jawa Timur, Indonesia. E-mail: naningsman8mlg@gmail.com\*

**Abstract:** Human Reproductive System is a basic concept in biological sciences that is related to daily life and interesting for high school students. Complicated learning materials make it difficult for students to construct their knowledge and understand the concepts. Survey research using a questionnaire was conducted to determine the causes of difficulties for high school students in understanding the Human Reproductive System concepts. Respondents were grade XII science students and two teachers. The data obtained were analyzed descriptively. The research findings indicate that students' difficulties are due to (1) the extensive usage of scientific terms, (2) abstract concepts, (3) monotone, and (4) inadequate sources of information. The implication of this result is that teachers are required to elaborate appropriate strategies and textbooks to lead students getting accurate knowledge.

**Key Words:** learning difficulties, senior high school students, human reproductive system, teacher, textbook, misconception

**Abstrak:** Sistem Reproduksi Manusia merupakan konsep dasar dalam ilmu biologi yang berkaitan dengan kehidupan sehari-hari dan menarik bagi siswa SMA untuk dipelajari. Namun, kompleksitas materi seringkali membuat siswa kesulitan dalam membangun struktur pengetahuan dan memahami konsep. Penelitian survei dengan menggunakan instrumen kuesioner dilakukan untuk mengetahui penyebab kesulitan siswa SMA dalam mempelajari materi ini yang berpotensi memicu miskonsepsi. Responden adalah siswa kelas XII IPA dan guru. Data yang diperoleh dianalisis secara deskriptif. Temuan penelitian menunjukkan bahwa kesulitan siswa disebabkan karena: 1) terdapat istilah asing yang sulit dimengerti dan diingat, 2) beberapa sub konsep bersifat abstrak sehingga sulit dipahami dalam konteks nyata, 3) cara guru menyampaikan materi terlalu monoton dan tidak menarik, 4) sumber informasi yang kurang memadai. Implikasi dari penelitian ini adalah guru perlu mengembangkan strategi pembelajaran yang menarik dan memilih buku teks yang baik sehingga siswa memperoleh pengetahuan yang akurat.

**Kata kunci:** kesulitan belajar, siswa SMA, sistem reproduksi manusia, guru, buku teks, miskonsepsi

## INTRODUCTION

Students are unique individuals. Each student comes to school with initial knowledge (pre-conceptions) based on prior experience (Fairbanks, 2011; Maigoro, Nansoh, & Pam, 2017; Tanner & Allen, 2005). The pre-conceptions conveyed by students can be appropriate or not in accordance with the existing validated concepts. Pre-conception construction error in students is normally caused by their peers, environment, , family, teacher errors in explaining the concept (at previous levels of education), language of

instruction, inappropriate teaching in the past, and unverified statement from inaccurate resources (Maigoro et al., 2017; Oztas & Oztas, 2016; Wenning, 2008).

Each student has a different learning ability. It is due to uncertain thing occurs in the learning process which obstructs maximum learning outcomes (Dal-yono, 2015). Students' behavior, attitude, skill, knowledge, physical condition, and learning needs greatly influence students in performing certain learning activities (Bahar & Polat, 2007). Learning difficulties can occur to students at any time. Students' percep-

tions and thoughts, the nature of the topic being studied, the teacher's style of teaching, student learning habits, and learning resources used can cause learning difficulties in high school students (Bahar & Polat, 2007; Çimer, 2012). The difficulties experienced by students in understanding the concept and building a cognitive frame of mind must be taken into account since it has the potential to trigger misconceptions (Yip, 1998).

The human reproductive system is a concept that deals with daily life context. It is one of the difficult concepts for students (Hakan, 2013; Tekkaya, Özkan, & Sungur, 2001). The scope of the problem in the concept is very complex and diverse, since it is not only about biological issue, but also personal and social issues (Hamani et al., 2007; Šorgo & Šiling, 2017). Insufficient knowledge about the Human Reproductive System in high school students will lead to several vital issues such as unwanted pregnancy, sexual aberrations, and sexually transmitted diseases (Hadjichambis, Georgiou, Paraskeva-Hadjichambis, Kyza, & Mappouras, 2016; Pratomo, 2018). Based on the above explanation, this study aims to: (1) identify concepts that are considered difficult by students in the Human Reproductive System, (2) identify the causes of student difficulties in studying the material of the Human Reproductive System.

## METHOD

This study used a survey method (Cohen, Manion & Morrison, 2011) with a questionnaire approach. Questions on the questionnaire include students' responses in learning the Human Reproductive System, students' difficulties in learning Human Reproductive System, and the source of students' information in studying the Human Reproduction System. This study took 15 students of class XII IPA 8 Malang Senior High School (consisting of seven male students and eight female students) with the age of 17–18 years and had already acquired Human Reproductive System lessons as research respondents. The researcher also conducted interviews with two teaching teachers of the XI IPA class of SMA Negeri 8 Malang (consisting of one male teacher and one female teacher) to obtain supplementary data about the possibilities of students' difficulties in learning Human Reproductive System. Data obtained were analyzed quantitatively (percentage) and qualitatively (descriptive statistics).

## RESULTS

### Students' Responses in Learning The Human Reproductive System

Based on the results of the interpretation of the questionnaire given to 15 student respondents, it is known that 100% of students stated that the Human Reproductive System is an interesting topic, but still considered quite difficult to learn by some students. As many as 46.47% of students stated that the topic of the Human Reproductive System was quite difficult to learn, 33.33% of them were male students. Meanwhile, 53.33% of students considered that this topic is not difficult to learn; most of them were female students and only 13.33% of male students stated that the lesson is easy. Students assumed that almost all concepts in the Human Reproductive System are difficult to learn. As many as 73% of students stated the concept of hormones was the most difficult concept, followed by the concepts of fertilization, gestation and birth (46.67%), the concept of menstrual cycle and lactation (40%), gametogenesis and contraceptive methods (26.67%), breast milk and the structure of the reproductive organs and its functions (13.33%), and lastly, the concept that is considered quite difficult is the reproductive system disorder/disease (6.67%) (see Table 1).

**Table 1. Difficult Concepts of Human Reproductive System Based on Students' Perspective**

No.	Concept	Percentage
1	Hormones and its roles	73%
2	Fertilization, gestation, and birth	46,67%
3	Menstrual cycle	40%
4	Lactation	40%
5	Gametogenesis	26,67%
6	Contraception method	26,67%
7	Reproductive organs and their roles	13,33%
8	Breast milk	13,33%
9	Reproductive system disorder/disease	6,67%

The results of interviews with teacher respondents showed the same results as those stated by students. Both teacher respondents (male and female) reinforced student statements by saying that the material of the Human Reproductive System was interesting material. The male teacher stated that the material of the Human Reproductive System was interesting to study, without mentioning the reason for the statement, while the female teacher stated that the material of the Human Reproductive System was in-

teresting for students to learn because it was related to the reproduction of the students themselves, where for eastern culture it is a taboo knowledge.

The teacher’s statement about students’ difficulties was slightly different from the statement of some students. As an interesting material, the concepts that exist in the Human Reproductive System by the teacher are not difficult for students to learn. Both teacher respondents stated that the Human Reproductive System is not a difficult topic. Male teachers stated that only the menstrual cycle is difficult since it involves several concepts, while female teachers stated that the material of the Human Reproductive System is not difficult for students to understand because it has been anticipated by giving the concept of hormones first. Concepts in the Human Reproductive System which are considered the most difficult by male teacher and student are the menstrual cycle and fertilization, because both concepts require more thought from the teacher and students, while for female teachers the most difficult concept is the menstrual cycle, because students need to memorize more and it is a combination of several concepts.

### The Reason for Students’ Difficulties in Learning The Concept of Human Reproductive System

There are four reasons of students’ difficulties in learning the Human Reproductive System. The first student learning obstacles/difficulties are foreign terms that are difficult to understand and remember (53.33% of students). Secondly, several sub-concepts are abstract thus it is difficult to understand in the real context (40% of students). Thirdly, the way teachers deliver material is too monotonous and uninteresting (33.33% of students), and the fourth is inadequate sources of information, textbooks that are attractive and informative (20% of students) (Table 2).

**Table 2. Students’ Difficulties in Learning The Concept of the Human Reproductive System**

No	Difficulty	Percentage
1	The difficult foreign term in the learning topics	53,33%
2	Abstract and difficult sub-concept to be correlated by real-life context	40%
3	Less informative delivery bt teacher	0%
4	Monotonous and uninteresting delivery approach by the teacher	33,33%
5	Insufficient and unsuitable information source	20%
6	Less interest in learning Human Reproductive System topic	0%
7	Feeling embarrassed in learning since it is a taboo discussion	0%

### Source of Student Information in Learning The Human Reproductive System

Human Reproductive System is always identified with sexuality by most teenagers. Based on the results of the questionnaire, 60% of the students obtained information about sexuality when they were in junior high school, 33.33% of students obtained information about sexuality when they were in elementary school, and 6.67% of students obtained sexuality information while sitting in kindergarten. Sources of information and knowledge of sexuality obtained by students came from teachers as much as 86.67%, from friends at school as much as 46.67%, from families as much as 26.67%, and social intercourse outside the school as much as 13.33%. Students obtained information and knowledge through shows in the mass media (TV, newspapers, internet), listen to information from friends, read books, and see phenomena around the neighborhood (Table 3).

**Table 3. Information Obtained by Students**

No.		Persentase
1	Mass media (TV, Newspaper, Internet)	73,33%
2	Friend	53,33%
3	Reading a book about sexual	33,33%
4	Observing the surrounding environment	33,33%

### DISCUSSION

Biology is one of the sciences which until now is still considered difficult by teachers and students (Chavan, 2016; Çimer, 2012; Kempa, 1991). Several previous studies reported student learning difficulties in Biological concepts (Chavan, 2016; Çimer, 2012; Oztap, Ozay, & Oztap, 2003). The results of this study reinforce that high school students undergo difficulty in learning the concept of the Human Reproductive System.

In concepts related to the Human Reproductive System, hormones are categorized as the most difficult and complex material (Çimer, 2012; Raida, 2018; Tekkaya et al., 2001). As many as 73% of the student respondents in this study supported this. Students' difficulties in learning the concept of hormones are likely due to the memorizing approach of learning (Tekkaya et al., 2001). Even though student performance during learning is strongly influenced by working memory capacity. If there is an overload of working memory capacity, students will have difficulty understanding the concepts and difficulties in connecting the complexity of the material to the real concept (Bahar & Polat, 2007).

The results of interviews with teachers also indicate that the teacher is actually aware of student learning difficulties. Student learning difficulties can be anticipated by giving the concept of hormones first. New problems will arise if the teacher does not succeed in bringing the concept of hormones into the thinking realm of students. This makes the concept of hormone begin to be complex, abstract, and abundance in contents (Bahar & Polat, 2007; Raida, 2018). The nine findings (Table 1) indicate that teachers are too negligence in seeing the complexity of concept. Thus teachers assume that the difficult concepts are only the menstrual cycle and fertilization. Teachers need to be more careful in mapping students' cognitive learning difficulties.

Students' difficulties arose since the teacher monotonously teaches. The use of foreign terms without a sufficient explanation of definitions reduces the attention and interest of students. As a result, negative feelings and attitudes arise from students, and the learning is done begin to be unattractive, boring and less meaningful (Çimer, 2012). Based on these findings, to address student learning difficulties related to the existence of foreign unfamiliar terms that are difficult to understand and abstract sub-concepts, the teacher's teaching method must be effective and not monotonous.

The interests and attitudes of students in studying biology are related to gender factors (Hadjichambis et al., 2016). Female students tend to be more interested in learning biological concepts related to the health and well-being of human life compared to male students (Baram-Tsabari, Sethi, Bry, & Yarden, 2010; Uitto, Juuti, Lavonen, & Meisalo, 2006). The results of this study indicate that the number of students who experience learning difficulties of 46.67% it turns out that 33.33% of them are male students.

Female students consider this material easy. They want to know more about the menstrual cycle, the structure of their reproductive organs, the process of fertilization to childbirth, abnormalities or disorders of the reproductive system and sex hormones that play a role in reproduction.

The role of teachers is needed to foster student learning motivation. The teacher-centered approach can be understood as a result of limited learning time allocation, with abundant material and content teachers are required to be able to complete the learning process (Bahar & Polat, 2007; Chavan, 2016; Çimer, 2012). This seems to be the main problem in learning. Students are given lots of concepts, materials, and information in a short time. As a result, students learn only by relying on memories without correctly understanding the concepts learned (Çimer, 2012). Teachers need to be aware of the tendency to simplify teaching materials and the separation of conceptual knowledge during the short term teaching and learning activities since it leads to misconceptions (Şorgo & Šiling, 2017).

Boring and very long-winded textbooks can also be a barrier for students to learn. The non-use of the context of everyday life or problems that have personal or social relevance increases the complexity of the concepts and eliminate the motivation to learn among students (J Knippels, Jan Waarlo, & Th Boersma, 2005). Thus, teachers should pay attention to choosing the appropriate textbook that will be used by students and teachers in learning.

The role of the teacher is very important in providing correct and accurate information to students. The teacher's knowledge is also very decisive in understanding a concept. Lack of teacher knowledge can lead to conceptual errors in students (Kwen, 2005). In this study, the source of information or knowledge of students mostly came from teachers. Thus, the teacher must equip himself with sufficient knowledge in teaching and always improve mastery of concepts. Teachers' difficulties in teaching concepts lead to learning difficulties in students (Chavan, 2016).

Finally, the concern is the source of students in obtaining information about the Human Reproductive System. The rapid flow of information and the development of information technology has shifted the role of books as the main source of student learning. Most students obtain information about the Human Reproductive System related to sexuality from the mass media (TV, newspapers and the internet). This is important to be noted since not all information from mass media is accurate. Information received by students

can be incomplete and inaccurate. This can lead to factual misconceptions in students (Verkade, Mulhern, Lodge, Elliot, Cropper, Rubinstein, Horton, Elliot, Espinosa, Dooley, Frankland, Mulder, & Livett, 2017).

### CONCLUSION

Student learning difficulties in the concept of the Human Reproductive System are the trigger for misconceptions. Students' learning difficulties in Human Reproductive Systems are influenced by students themselves, teachers, and textbooks. The causes of student difficulties include unfamiliar terms that are difficult to understand and remember, abstract concepts and difficult to understand in real contexts, monotonous and uninteresting approach of a teacher in explaining and teaching and inadequate sources of information from textbooks.

The findings of this study are used as an educator's consideration in improving the quality of teaching thus students do not experience difficulties in learning and avoiding misconceptions, as well as being taken into consideration for conducting further research. The implications of this study are that teachers should be more mature in preparing effective learning strategies thus students can learn with an interesting learning atmosphere, and carefully determine the use of textbooks that are used as teaching materials.

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