



## The Students Worksheet Development on Fungi Based on The Plus KWL's Strategy to Train the Metacognitive Skills

*Pengembangan Lembar Kegiatan Peserta Didik Materi Fungi Berdasarkan Strategi KWL Plus Untuk Melatihkan Keterampilan Metakognitif*

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### Abstract

The objective of this research was to produce worksheet of fungi material based on Plus KWL's strategy to train the metacognitive skills seen at the effectiveness. The type of this research was a development with a 3D research design that was shortened into define, design and development. The subjects of this study were students of class X MIA 1. Instruments used in this study was test. Based on the effectiveness of worksheet based on Plus KWL's strategy was obtained from pre and posttest result which have been tested from the positive value sensitivity. This worksheet can be used to train the metacognitive skills by very good criteria that were determining the level of confidence and score. It can be concluded that the worksheet based Plus KWL 's is very effective to train metacognitive skills

### Abstrak

Tujuan penelitian ini adalah untuk menghasilkan lembar kerja mahasiswa materi Jamur dengan menggunakan strategi KWL Plus untuk melatih keterampilan metakognitif yang dilihat pada tingkat keefektifan. Jenis penelitian ini adalah pengembangan dengan desain penelitian 3D yang disingkat menjadi define, design, dan development. Subjek penelitian ini adalah siswa kelas X MIA 1. Instrumen yang digunakan dalam penelitian ini adalah tes. Berdasarkan efektivitas lembar kerja menggunakan strategi KWL Plus diperoleh hasil pre-test dan post-test yang telah diuji dari sensitivitas nilai positif. Lembar kerja ini dapat digunakan untuk melatih keterampilan metakognitif dengan kriteria yang sangat baik yang menentukan tingkat kepercayaan dan skor. Dapat disimpulkan bahwa lembar kerja berbasis KWL Plus sangat efektif untuk melatih keterampilan metakognitif

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## INTRODUCTION

Metacognitive is the 21st-century skills which is needed to foster the students' skills in Indonesian education because Indonesian education keeps improving its quality to achieve the goals of national education. The students' metacognitive skills are then chosen and included in the curriculum of 2013. Susantini *et al.* (2018a; 2018b) found that students are able to learn independently and honestly to develop themselves with the metacognitive skills by setting and achieving the goals to improve the learning outcomes.

The results of biology learning at SMAN 3 Surabaya shows that 50% of students find the difficulties to learn Biology because of the less interesting teaching style, i.e. the amount of memorization so that students understand less and are not so motivated in the subjects. The results were viewed from the results of the value obtained from the questionnaires given to students about biology learning on Fungi materials. Therefore, the lack of motivation relates to the lack of teacher strategy in teaching.

The KWL plus Learning strategy becomes one of the learning models that can explore all students' intelligence both psychomotor and cognitive. The strategy also improves the skills that involves all the components of learning because it is no longer centered on the teacher.

KWL Plus is the metacognitive learning strategies which consist of Know, Want, and Learned. Ruddel (2005) states that the KWL Plus is clearly designed to help students learning completely (pre-reading, whilst reading and post-reading). KWL Plus also asks the students to build their prior knowledge by remembering what is known; Determining what students want to learn, and identifying what is learned plus text mapping and summarizing information. Furthermore, it is supported by other components that interact in it, i.e. the learning resources. The learning resource that a teacher applies to support the learning process is the student worksheet.

Student worksheet are the sheets containing tasks that must be done by the students. The worksheet is usually in the form of instructions and steps to complete the task according to achieve of the basic competencies. To realize the importance of the students' learning, the students' metacognitive ability is then necessarily concerned with developing the student worksheet based on the KWL plus learning strategy.

The development of student worksheet based on KWL plus strategy expectedly train the students' metacognitive skills on problem solving in learning, especially the fungi material. Tok (2013) stated that students are able to diagnose their needs when students are aware of their own learning. The students also apply the metacognitive strategies to eliminate their shortcomings as well. Accordingly, the KWL Plus has several goals. The first is to help the students understand how to produce what is known and wanted to know. After, the students produce what they have learned to compare with their prior knowledge which the misconception may still occur.

As the argument stated above, the researcher was interested to examine this issue in a study which is entitled "the students' activity sheet development on fungi based on the plus KWL's strategy to train the metacognitive skills.

## MATERIALS AND METHODS

This study has applied the research and development by using a 3-D model which is adapted from Thiagarajan model. The development stages are Define, Design, and Development. The steps of developing students' worksheet based on the KWL Plus strategy were applied in several stages that follow. The first was the defining stage which was done by analyzing the four aspects, namely of curriculum analysis, concept analysis, student analysis, and task analysis.

The curriculum analysis was used in the fungi sub-subject based on the curriculum of 2013. The analysis proceeded in order to analyze the core competence, basic competence, indicators, and learning objectives. Then the concept was examined by identifying the main concepts to be taught completely, arranging and detailing relevant concepts systematically, e.g. the concept of the fungi material.

After that, student analysis was done at the beginning of the planning by paying attention to the characteristics, abilities, and experience of the students. Those analysis were done to know both individual and group characteristics of students. Accordingly, this study took the class X MIA 1 SMAN 3 Surabaya as the population of study.

Next, the Task analysis was done to determine the contents of the unit lesson. Task analysis was done by detailing the content of teaching materials in the form of an outline. Based on the indicators designed, the task analysis was then prepared to undertake students with the worksheet. The tasks

were presented in the form of student activities in order to draw the students' metacognitive abilities.

The second was the design stage in order to prepare the students' worksheet based on the KWL plus strategy. This preparation was adjusted from the material of class X. The third stage was the development stage which produced the revised students' worksheet of the KWL plus strategy based on input from the experts.

Furthermore, the product testing is a product feasibility test that was designed in the biology learning of the fungus material. The testing was limited to the One Group Pre-test-Pos-test Design. The testing was conducted to determine the effectiveness of worksheet based on KWL plus strategy. The test was performed on the students of class X MIA 1 SMAN 3 Surabaya in the even semester of the academic year 2017/2018, dated on 17<sup>th</sup> and 24<sup>th</sup> April 2017.

The research instrument was a description of the data needed to answer the questions or the problems in the study. The research instrument used in this research is the observation of students' worksheet implementation, student response questionnaire, knowledge and metacognitive skills' test.

Data collection method is a method used to collect data used. In this research data collection method used was observation, questionnaire and test.

Data analysis technique used in this research was the descriptive analysis. This analysis produced the result of worksheet's practicality and its effectiveness. The practicality of worksheet based on KWL plus strategy was measured by using the Guttman's scale.

The interpretation of the score based on the Likert scale, the implementation of a worksheet is stated to be practical if the average percentage is > 75%. When the students appraised "yes" in their responses reached > 71% then the worksheet was admittedly practical.

The effectiveness of students' worksheet was measured by using student learning analysis gained from pre and post-test with the type of three-tier test rule of scores (Pesman, 2010) due to:

1. Score 1. Score 1 for a correct answer and score 0 for the wrong answer at level one (one tier).
2. Score 2. Scores 1 for the correct answer at the level of one and two (two-tier). If the answer is wrong on one level then a score of 0 is given.
3. Score 3. Scores 1 for the correct answer at level one and two is answered confidently (three-tier), Yet a score of 0 is given.

4. A confidence score's level. Score 1 for certain answers on the level three. If the answer is not certain then score of 0 is given. At this stage, the measurements of the students' confidence level are performed by answering the questions.

Students are stated to have complete learning if the value of learning outcomes 75% or > 75. As to know the comprehensiveness of the learning outcomes on the pre-test and post-test. Additionally, the sensitivity value of the item is calculated to know the item's sensitivity to the effects of learning. The formula to calculate is:

$$S = (Ra - Rb) : T$$

Information:

- S : sensitivity of item
- Ra : Number of students who answered correctly in the final test
- Rb : Number of students who answered correctly on the initial test
- Q : Number of students taking the test

An effective grain index exists between 0.00 and 1.00 and a larger positive value indicates a larger item of the sensitivity to the learning effects (Gronlund, 1982).

#### Metacognitive Skills Analysis

1. The first is to determine the score on the answer. The skill sets the score on the answer if the difference between the teacher's score and the student's score is 0-10, if greater than that the student is considerably incomplete (Slavin, 2006).
2. The second is to draw the level of confidence in the correct answer. Students are considered to have high levels of metacognitive skills if students know and believe the answer is right or wrong. Otherwise, students are considered to have low levels of the metacognitive skills if the students do not know and are not sure that the answer is right or wrong. The students can be considered complete in the level of confidence on the correct answer if the fit between the answer and the belief level is  $\geq 65\%$  in all questions. The students are considered incomplete in the confidence in the correct answer if the fit between the answer and the confidence level is  $\leq 65\%$  in all questions.

**Tabel 1.** Metacognitive scale

Score	Category
1	Very poor
2	Poor
3	Good
4	Very good

## RESULTS AND DISSCUSION

The students' metacognition is a cognition included in the curriculum of 2013. The students then are expected to be independent, i.e. knowing what is being learned and what has been learned. Teaching metacognitive skills in the education system is important to help students develop the high order thinking processes and improve the academic achievement (Flavell, 2004; Larkin, 2009).

The practicality of the worksheet was obtained through observation of worksheet implementation. It was also based on the learning using students' worksheet based on the KWL Plus strategy. Moreover, the effectiveness was obtained based on the pre-test and post-test based on three-tier test.

The development of students' worksheet was adjusted to the 2013 curriculum by applying KWL

Plus learning strategy, in which the information required, was gathered from the activity. it obtained the information the knowledge that students know in column or stage know, the knowledge of what students want to know at the stage want. There were also activities described from the received information by answering questions from the stage want at the learning's stage. The tests (pre-test and post-test) were developed according to the indicators consisting of 10 questions with 3 stages of answering the problems, the reason and the level of confidence.

The practicality of students' worksheet was obtained from observing the students' worksheet implementation and the questionnaire from the students' response, the table of an observation result of implementation that follows:

**Table 2.** The Result of Observing the Worksheet

No	Activities	Observed					
		Yes			No		
		1	2	3	1	2	3
1	Students pay attention on worksheet's instruction	2	2	2	0	0	0
2	Students organize initial knowledge in the column <i>know</i>	2	2	2	0	0	0
3	Students write down a list of questions in the column <i>want</i>	2	2	2	0	0	0
4	Students review and discuss the fungi material text to answer some questions in the column <i>want</i>	2	2	2	0	0	0
5	Students write down the answers in the column <i>learned</i>	2	2	2	0	0	0
6	Students check their understanding in groups	2	2	2	0	0	0
7	Students make the score from the answers obtained by the assessment rubric	2	2	2	0	0	0
8	Students make a mapping of learning outcomes that have been obtained in the mapping column provided	2	2	2	0	0	0
Total		16	16	16	0	0	0
% Practicality		100	100	100	0	0	0
Category		Practical					

At the first meeting, students use worksheet on topics of mushroom characteristics, fungus body structure and fungal reproduction. The second meeting discusses the clustering of mushroom classification and the role of fungi in everyday life. The third meeting is doing practicum by making tapai cassava. Based on the results of observation analysis of worksheet implementation (Table 2) by two observers shows that all students carry out learning activities by applying KWL plus strategy, that is students looking at the use of the worksheet guidelines and students write their knowledge in the know, want, and learn and make mapping because according to Livingston (1997), metacognitive is the acquisition of new knowledge that builds knowledge of something.

Therefore, the implementation of KWL plus mapping helps to achieve these objectives so that students have implemented learning activities by using KWL strategy by following the procedures of KWL plus the students can develop metacognitive skills. In addition, a mapping is a cognitive or conceptual framework that involves prior knowledge to understand something. Mapping readers can develop well by involving metacognitive use.

The practicality of Student Activity Sheet or worksheet is also seen from the questionnaire of student response after receiving learning using worksheet based on KWL Plus strategy. The result of the student response questionnaire as follows (Table 3).

**Table 3.** The result of students' responses

No.	Aspect	Average Score		Nb
		Ya (%)	No (%)	
1	Learning activity based on KWL Plus strategy is new for me	100	0	P
2	Learning activities based on KWL Plus strategy are interesting and exciting	80	20	P
3	I am more motivated in the process of learning biology based on the KWL Plus strategy	90	10	P
4	I am more active in the learning process based on KWL Plus strategy	90	10	P
5	I am more able to express my opinions in group and class discussions in learning based on the KWL Plus strategy	85	15	P
6	Learning activities based on the KWL Plus strategies to practice metacognitive thinking skills are systematic and clear.	100	0	P
7	The material taught in problem-based learning is clear and easy to understand	80	20	P
8	The instructions given by a teacher during our working on the worksheet are very clear and useful	100	0	P
9	After participating the learning activities based on the KWL Plus strategy, I was able to work on the test easily	90	10	P
10	I am interested to follow the learning activities based on the next KWL Plus strategy	80	20	P
11	I'm happy if the Learning based on the KWL Plus Strategy is applied in high school	80	20	P
12	Knowing Phase on worksheet's activities can explore my initial knowledge about the material	100	0	P
13	Want Phase on worksheet's activities can grow my curiosity to learn more fungi material	100	0	P
14	Learned Phase on worksheet's activities can help me know what I have learned	100	0	P
Σ Students answer "yes"		255		
Maximum		280		
% Feasibility		91,07		P

Learning activity based on the KWL plus strategy is new for students. However, only 80% of students were happy and interested in the implementation of learning activities based on KWL plus strategy. Yet there were only 85% of students who can express their opinions in group and class discussion. Apparently, this strategy can be used in whole class activities, group activities or individual activities in order to help students remember what they read, what they revise in their concept and vocabulary. They were also able to activate the prior knowledge, assess what students have learned on the subject, and summarize the results learned in the form of mapping (Camp 2000; Dobbs 2003; Martorella *et al.*, 2005).

Accordingly, students believed that the material taught in the lesson was clear and easy to understand positively responded only by 80% students. On the other hand, 20% of students responded negatively.

This was due to a large number of Latin names and the fungi's life cycle in the various divisions that the students memorize.

The KWL plus strategy development was scored 255 from a maximum score of 280 with a feasibility percentage of 91.07 practical categories. It was identified After a recapitulation of positive responses from students.

The integration of worksheet based on KWL plus strategy was proved to give a positive result on the student knowledge test. Accordingly, the test method was used to know the effectiveness of students' worksheet based on the KWL plus strategy. The problems of knowledge test were made basically from the basic competence and indicators on the fungi material. Pre-test and post-test questions were adjusted on the cognitive levels of C3 and C4. The results of the completeness of indicators and sensitivity follow.

**Table 4.** The results of indicator satisfaction and sensitivity

No.	Indicators	<i>Pretest</i> Complete (%)	<i>Posttest</i> Complete (%)	Sensitivity
1	Categorize the characteristics of mushrooms in the images that have been provided	0 Very poor	100 very good	1
2	Determining the body structure of a fungus in one of the mushroom divisions	35 poor	75 good	0,4
3	Categorize the division of the mushroom division based on the image provided	10 very poor	40 poor	0,3
4	Selects grouping of mushroom divisions based on the main features of the division	5 Very poor	75 good	0,7
5	Determine the body structure of a fungus in one of the mushroom divisions by image	35 poor	75 good	0,4
6	Linking the structure of the fungus and its function	15 very poor	50 good	0,35
7	Sort the reproductive cycle of mushrooms based on random images	0 very poor	40 poor	0,4
8	Determine the kind of reproduction that occurs in one of the mushroom divisions	40 poor	75 good	0,35
9	Determining the role of fungi in everyday life	40 poor	75 good	0,35
10	Determining the role of fungi in everyday life based on images	5 very poor	100 very good	0,95

In accordance with the data in Table 5, it can be seen that, during the pre-test, the indicator was not completed to distinguish whether the category is poor or very poor. It showed the students had not mastered the whole material of fungi and an unusual problem where those can answer and reason to add the level of confidence (Al-Rubayea, 1996). Yet, In fact, the fungi material was a material that was previously taught. Additionally, the value of sensitivity is beneficially positive but there was also a negative, i.e. to determine the fungi body structure in its division based on the image.

There were some factors that cause this existence. Firstly, the learning process in the classroom tends to be more a teacher centered. Thus students were less actively involved in the learning process. On the other hand, students were more active in learning by using students' worksheet with KWL plus strategy. It created a good atmosphere that can help students understand the material.

Metacognitive learning occurs when some general strategies were obtained in order to facilitate the understanding of the knowledge. When students were aware of their own learning process, they can diagnose the needs and implement metacognitive strategies to eliminate their shortcomings (Tok, 2013). KWL Plus is a metacognitive strategy because it is a problem-solving process that focuses on thinking and developing language for thought processes on reading (Pennington, 2009).

The KWL method was designed to grow up the awareness of learning and develop the metacognitive (Mok *et al.*, 2006). The post-test knowledge test showed that the overall indicator was achieved although there were two unachieved indicators in categorizing the fungi division based on the provided image and determining the body structure fungi in its divisions.

This was due to the lack of understanding of students in the Latin name of fungi. Besides, that was caused by the influence of the assessment in the test. Although the answer in the first stage was correct, the students' reason in the third stage was wrong which also affect the assessment. Based on the results, it can be said that the students' worksheet based on the KWL plus strategy was effective to develop the metacognitive ability. Furthermore, it was also seen from the result of gan score score obtained equal to 0,6 with medium category. Table 4 showed that the sensitivity was coefficient (S) ranges from -0.05 to 1. From. This sensitivity value indicated that there were still some items that are less sensitive to the effects of learning.

Based on Table 5, the skill to determine the score on the answers was made by the students themselves on the first worksheet I, II and III. The skill component also determined the score best when it compared to the level of confidence in the correct answer. This was because students were told how to determine the score on each number according to the learning objectives.

**Table 5.** Metacognitive skills based on the KWL Plus student based worksheet on mushroom learning

Student	A Worksheet						B				Score
	I	T/TT	II	T/TT	III	T/TT	Pre	T/TT	Post	T/TT	
1	80	T	85	T	80	T	20	TT	70	T	4
2	80	T	80	T	75	T	40	TT	80	T	4
3	80	T	80	T	75	T	20	TT	80	T	4
4	90	T	80	T	80	T	40	TT	90	T	4
5	80	T	80	T	75	T	30	TT	90	T	4
6	80	T	80	T	75	T	30	TT	60	TT	3
7	80	T	80	T	75	T	30	TT	70	T	4
8	80	T	80	T	75	T	40	TT	80	T	4
9	80	T	80	T	80	T	40	TT	90	T	4
10	80	T	80	T	75	T	40	TT	90	T	4
11	75	T	75	T	75	T	10	TT	70	T	4
12	85	T	80	T	75	T	40	TT	80	T	4
13	80	T	80	T	75	T	30	TT	80	T	4
14	80	T	80	T	75	T	20	TT	80	T	4
15	85	T	80	T	75	T	40	TT	90	T	4
16	85	T	85	T	75	T	40	TT	90	T	4
17	90	T	80	T	80	T	30	TT	70	T	4
18	90	T	80	T	75	T	40	TT	90	T	4
19	85	T	80	T	80	T	20	TT	80	T	4
20	80	T	85	T	75	T	10	TT	70	T	4
Student(T)	0		19		20		20		20		
Student (TT)	20		1		0		0		0		<b>Average</b>
% T	0		95		100		100		100		<b>3,95</b>

**Description:**

A = Skill in determining score  
 B = Skills of determining beliefs

T = Completed  
 TT = Uncompleted

The level of confidence in the correct answer in pre-test and post-test was increased drastically. In the pre-test, the students were not finished because most of the students answer the questions wrongly but they were confident with that. The indicator in the level of confidence was convinced with “correct” in the correct answer and “wrong” in the wrong answer. Unfortunately, the student believed that the wrong answer was true. Additionally, during the pre-test, the students were not properly prepared. Yet the students studied the lesson at the second meeting.

The post-test in the level of confidence to the correct answer was found only one student who was not finished because the student was not sure of answering the question through the selected answer was correct or incorrect. However, the students mainly completed the level of confidence.

Based on the two components shown in Table 4.10, all students had “very good” metacognitive skills because students met all the components in the metacognitive skills. It was only one student who had "good" metacognitive skills. Accordingly, Metacognitive learning occurs when one obtains

some general strategies that facilitate learning or understanding knowledge. When students are aware of their own learning process, they can diagnose their needs and implement metacognitive strategies to eliminate their shortcomings (Tok, 2013).

KWL Plus is a metacognitive strategy because it is a problem-solving process that focuses on thinking and developing language for thought processes on reading (Pennington, 2009). The KWL method is designed to raise the awareness of learners and develop their metacognitive (Mok et al., 2006). KWL Plus was purposeful to help students understand the lesson taught (Szabo, 2006)

**CONCLUSION**

This research was developmental research that produced worksheet based on the KWL plus strategy. Based on the test of practicality by using questionnaire and observation of learning implementation, the worksheet was practically applied in biology learning on fungi’s subject. Based on effectiveness test, it was the results of a sensitivity test were positive. During the teaching of metacognitive skills, it showed that all students were “very good” at metacognitive skills. Therefore, it can

be concluded that students' worksheet based on the KWL strategy plus was very valid, practical, and effective in learning the biology of fungi's subject.

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