

Reconstruction of Vitamin C Test Worksheet for Junior High School Class VIII with ANCOR Stages

Novita Resti^{1*}, Bambang Supriatno², Amprasto³

^{1,2,3} Universitas Pendidikan Indonesia, Indonesia

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*Correspondence email:

novitaresti@upi.edu

ABSTRACT

Practicum is one of the learning methods that can help students construct various psychomotor skills, higher order thinking, and characterise learning outcomes. However, currently there are still many worksheets that do not meet the standards and do not show knowledge construction. In addition, there has been no research on the reconstruction of the vitamin c test worksheet. Therefore, it is necessary to analyse and reconstruct the vitamin c test worksheet. The method used is descriptive qualitative with the ANCOR (Analyze, Trial and Reconstruct) stage. The population in this study was vitamin c test worksheets for junior high school class VIII used by teachers. The sample in this study was one of the worksheets used in learning at school, circulating on the internet and having incomplete components. The sampling technique was purposive sampling. The results of the analysis obtained that the worksheet does not comply with the standards, so it is necessary to reconstruct the worksheet. The reconstruction of this worksheet can be an alternative worksheet to overcome the shortcomings of the current worksheet.

Rekonstruksi Lembar Kerja Tes Vitamin C JUNIOR HIGH SCHOOL Kelas VIII dengan Tahapan ANCOR

ABSTRAK: Praktikum merupakan salah satu metode pembelajaran yang dapat membantu mahasiswa membangun berbagai keterampilan psikomotorik, pemikiran tingkat tinggi, dan mengkarakterisasi hasil belajar. Namun, saat ini masih banyak lembar kerja yang tidak memenuhi standar dan tidak menunjukkan konstruksi pengetahuan. Selain itu, belum ada penelitian tentang rekonstruksi lembar kerja tes vitamin c. Oleh karena itu, perlu untuk menganalisis dan merekonstruksi lembar kerja tes vitamin c. Metode yang digunakan adalah kualitatif deskriptif dengan tahap ANCOR (Analyze, Trial and Reconstruct). Populasi dalam penelitian ini adalah lembar kerja tes vitamin c untuk SMP kelas VIII yang digunakan oleh guru. Sampel dalam penelitian ini merupakan salah satu lembar kerja yang digunakan dalam pembelajaran di sekolah, beredar di internet dan memiliki komponen yang tidak lengkap. Teknik pengambilan sampel adalah purposive sampling. Hasil analisis diperoleh bahwa lembar kerja tidak sesuai dengan standar, sehingga perlu dilakukan rekonstruksi lembar kerja. Rekonstruksi lembar kerja ini dapat menjadi alternatif lembar kerja untuk mengatasi kekurangan lembar kerja saat ini.

INTRODUCTION

In the independent curriculum, there are two main elements in science education, namely science understanding and process skills to apply science in everyday life (Idris et al., 2022);(Sideri & Skoumios, 2021). These process skills include observing, questioning, predicting, planning, investigating, processing, analysing data and information, evaluating, reflecting and communicating results (Mutlu, 2020);(Ekici, 2020). These skills can be trained through practical activities. Practicum is learning that involves students in the form of interaction with the learning environment (El-Sabagh, 2021);(Puspita, Rakhmawati, et al., 2023). According to Novitasari et al. (2023), practicum is one of the strategies in learning that covers the affective, cognitive, and psychomotor domains. Meanwhile, according to Mansfield (2022), practicum is an activity that connects "two domains", namely the domain of objects or phenomena that can be observed in the real world (hands on) with the domain of ideas or thoughts (minds on). (Tasmedir & Gumusok, 2023) and (Darwati et al., 2024), stated that practicum is an effective method to achieve learning objectives.

The purpose of practicum activities is to improve students' understanding and support science process skills (Doyan et al., 2020);(Sari et al., 2020). Practicum can help students in understand the concepts learned in class and provide new ways of learning for students (Susilawati et al., 2020). Practical activities can also construct various psychomotor skills, higher-order thinking, and characterise learning outcomes (Pratama et al., 2020). Haka et al. (2020) stated that through practical activities, students' knowledge and skills can be assessed simultaneously. Practicum can be used to see the development of students' scientific knowledge which should be assessed from the process rather than the end result of the investigation (Puspita, et al., 2023). The importance of practicum

according to Wola et al. (2023) and Bicak et al. (2021) is because practicum can foster motivation to learn science in students, can be the basis for developing competence in carrying out experiments, as a means to learn the scientific approach, and a means of supporting the lesson. The same thing is also stated by science education experts regarding the importance of practicum activities, namely generating motivation to learn science, developing basic skills in carrying out experiments, being a vehicle for learning a scientific approach and supporting understanding of subject matter (Rusydiyah et al., 2021);(Yildirim, 2020).

One of the factors determining the success of practicum activities is student worksheets or commonly abbreviated as student worksheet. Student worksheet contains instructions for carrying out practical activities which according to Suryatna (2022) consist of several aspects, namely; (1) activity objectives, (2) introduction (3) tools and materials, (4) work procedures, (5) how to assemble tools, (6) interpretation of observation data, (7) data analysis and (8) conclusions. Meanwhile, according to Pandia et al. (2023) the worksheet aspects include the title of the experiment, a brief theory of the material, tools and materials, experimental procedures, observation data and questions and conclusions for discussion. There are many benefits obtained through the use of worksheet such as facilitating educators in managing the learning process, helping educators direct their students to be able to find concepts through their own activities or in work groups, can be used to develop process skills and develop scientific attitudes and help educators monitor the success of students to achieve learning goals (Hidayati et al., 2023);(Widyaningrum & Prihastari, 2020).

The use of student worksheet can increase students' interest, motivation, willingness, creativity, imagination, and skills (Fajriah & Suryaningsih, 2020). A good worksheet will provide a conducive

practicum atmosphere, the achievement of learning objectives and the growth of student independence in constructing their own knowledge (Yildirim, 2020).

Based on the results of Rusydiyah et al. (2021), it was found that only 24% of all worksheets analysed could be used with results according to the procedure and complete in terms of data analysis and conclusion drawing, so there are still many worksheets that do not show knowledge construction, while Sayed & Afzal (2021) states that the effectiveness of a practicum can be achieved if there is a match between objectives, work tasks, classroom activities and student learning processes. According to Munandar & Junita (2022) and Rusdan & Mulya (2023) there are several problems that often arise in writing worksheet namely; (1) practicum objectives that are more inclined to cognitive aspects than psychomotor aspects, (2) discrepancies between practicum objectives and data obtained and difficulties in identifying observed objects, (3) practicum procedures are sometimes unstructured and confusing instructions and have the opportunity to cause different interpretations, and (4) selection of material without considering its substance, suitability, depth, and complexity.

To overcome these problems, analysis, trials and reconstruction were carried out on worksheet on "Vitamin C Test" circulating on the internet and used by teachers and students.

Currently, there is no research related to the reconstruction of worksheet on "Vitamin C Test" using the ANCOR stages. The stages of analysis, trial and reconstruction or abbreviated as ANCOR were developed by Resti & Supriatno (2024) with the initial stage in the form of analysis of worksheet using five indicators, then worksheet trials were carried out in the laboratory and finally reconstruction was carried out on the parts that needed improvement.

METHOD

This research used a qualitative descriptive method. The research was conducted at the Biology Laboratory of FPMIPA Universitas Pendidikan Indonesia from February to May 2024. The population in this study was the worksheet of junior high school class VIII on vitamin c test used by teachers in carrying out laboratory activities. The sample in this study was one of the worksheets of vitamin c test used in learning at school, circulating on the internet and having incomplete worksheet components. The sampling technique used was purposive sampling. This research used the ANCOR (Analyse, Trial and Reconstruct) stages developed by Resti & Supriatno (2024). In the first stage, the worksheet was analysed using an instrument containing five indicators based on the vee diagram developed by (Fitakurahmah et al., 2020). The five indicators are focus questions, objects, theories, principles and concepts, recording and knowledge claims.

After the analysis process is complete, then testing activities are carried out on the worksheet to find out whether this worksheet can bring up objects or phenomena that can help students construct their knowledge or not. The last step is to reconstruct the parts that need improvement.

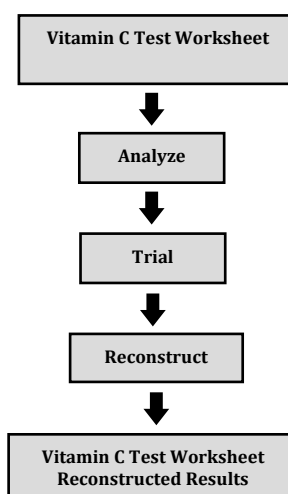


Figure 1. ANCOR Stages

RESULTS AND DISCUSSION

In the first stage of ANCOR, the worksheet on vitamin c test was analysed using five indicators as shown in Table 1. The lowest total score on each indicator is 0 and the highest score is 4.

Table 1. Indicators of Worksheet Analysis

Indicators	Score Range	Score Obtained
Focus question	0 - 3	3
Object/events	0 - 3	0
Recording/transformation	0 - 4	2
Theories, principles and concepts	0 - 4	2
Knowledge claims	0 - 4	3
Total		10

Based on the results of the analysis, the score obtained by this worksheet is 10 out of the total highest score of 18. In this worksheet there is a clear and identifiable focus question, covering the concept to be used and suggesting the main event and its accompanying objects. However, due to inappropriate use of tools and materials and procedures, no objects or events are identified. Data recording or transformation can be identified although the table presented on the worksheet is not perfect. The worksheet also identifies concepts and at least one type of relevant principle, and finally the knowledge claim includes the concept from the focus question and is derived from the recordings and transformations.

Worksheets are a means to help and facilitate learning activities so that interactions are formed (Elviana et al., 2024). Novelty in this worksheet there are focus questions that can direct students to focus on various aspects of the event or object to be observed. Mumtaza & Zulfiani (2023) argue, there are no practical objectives in this worksheet which are an essential part of a worksheet and will later become a guide in determining the steps to be taken during the practicum and are closely related to the focus question. The absence of practicum objectives causes unclear objectives to be achieved in

practicum activities and has the potential to widen the boundaries of the material so that the material becomes too complex (Vinnervik, 2023). According to Diora & Rosa (2020) material that is too complex can create noise in students so that students become unfocused. Good practicum objectives will be relevant to the curriculum (essential) and focus on activities that construct factual, conceptual and procedural knowledge (Mcphail, 2021).

The second indicator is objects/events that are strongly influenced by the use of tools and materials and work procedures. In this worksheet there is a mismatch between tools, materials and procedures, where there is no explanation regarding the size and units of the tools and materials used, there are differences in tools and materials in the list of tools and materials with those found in the work procedures, then many tools and materials are mentioned but their uses are not explained, there are even tools that are not used during practicum but are written in worksheet. Özkanal et al. (2020) argue, this will certainly cause confusion in students so that they cannot do the practicum independently and make practicum activities ineffective. In the work procedure, it can be seen that the steps written on the worksheet are not systematic and not detailed so that they can trigger the emergence of phenomena that can be observed (Warodiah et al., 2021); (Harwati & Rokhmat, 2021). According to Keen & Sevian (2021) lab procedures although detailed but unstructured and poorly understood instructions can lead to different understandings. Not observing objects or phenomena during practicum will cause failure in students when forming new knowledge. In addition, in this worksheet there is no safety procedure while the tools used are made of glass and the material can cause irritation if not used carefully. This is certainly dangerous considering that students are still in junior high school and do not have a high level of caution (Wahyuni et al., 2020).

The next indicator is data recording. Data recording will be based on observation results. According to Yilmaz et al. (2021), observation is an integrated activity between psychomotor skills and cognitive processes to find the character of an object/event with or without using tools. After making observations, data will then be recorded by recording. In this worksheet there is a command to record data in tabular form. The table provided in this worksheet is quite representative and can help students in organizing both quantitative and qualitative data so as to facilitate the data interpretation process (Ernawati & Sujatmika, 2021). According to Utama et al. (2021), the data that will be obtained from observation can be in the form of qualitative and quantitative data. A well-designed observation table will help students to see the relationship between facts. Recording data will be related to data transformation where in this process students convert the factual knowledge they get based on observations into conceptual knowledge (Fuadi et al., 2020). The observation table in the worksheet can help students to see the facts observed and build concepts based on these facts (Wahyuni et al., 2021). In addition, the questions given in the worksheet help students in interpreting data that will lead students to concept formation. The questions asked in this worksheet can only be answered if students do practical activities so that students are motivated to investigate. In science, according to Elviana et al. (2024) it means scientific methods or activities to describe natural phenomena to obtain science products in the form of facts, principles, laws, or theories. According to Fajriah & Suryaningsih (2020) if the components of notes and transformation are not owned, it is less able to increase students' self-awareness so that the metacognitive process to understand and interpret the results of observations is not facilitated. Based on the various explanations above, it can be said that there are still various deficiencies in the

worksheet so that it is necessary to reconstruct the worksheet, especially the absence of practicum objectives as the most important part of a worksheet which will determine the expected achievements of students. An important principle that should be present in the worksheet is the objective (Nasution & Hafizah, 2020); (Utami et al., 2020).



Figure 2. Trial Stage Process

The trial was conducted to determine whether or not the worksheet could bring students to the stage of constructing their own knowledge through practical activities. Overall, the activities in the worksheet have not been able to bring up the expected phenomena to construct knowledge in students (Utama et al., 2021). Based on the results of the trial, several discrepancies were found in the tools and materials with the work procedures. In the worksheet, many tools cannot be used for certain functions and should be replaced with other tools (Mahyuni et al., 2022). For example, the use of a drip plate as a container, while when the drip plate is dripped with twenty drops of betadine as an indicator, the drip plate is almost full, so it is feared that when dripping the ingredients to be tested, the drip plate cannot accommodate the solution and spills. Howley (2022) argue, this will certainly interfere with the implementation of practical activities and affect the phenomena that should be observed. Then, the worksheet does not write instructions and tools that can be used to smooth vitacimin in tablet form, while the vitacimin that is dripped on the indicator must be in the form of a solution. Likewise, with cornstarch in powder form, it is necessary to write the amount of water needed to dissolve it. In addition, cayenne pepper

extract is needed in practical activities but the amount of cayenne pepper used and the steps in making the extract are not written (Kusumiyati et al., 2022). Inappropriate steps in the preparation of cayenne pepper extract will cause the phenomenon to not

appear. Errors in the use of tools and materials as well as practical procedures can cause students to make mistakes when answering questions that should help build their knowledge.

Table 2. Results of The Worksheet Reconstruction Trial

Problems on The Worksheet	Solution
There is no practicum objective	Make clear practicum objectives that are in line with the title and curriculum outcomes
The tools and materials used are not appropriate, such as the use of a drip plate as a container for dripping fruit juice	The drip plate was replaced with a test tube so that the colour change and amount of solution could be more easily observed
Tools and materials are not specified	Added specifications on tools and materials
The use of tools is not explained in the procedure	The use of tools is explained in the procedure so that students can carry out practical activities independently
Discrepancy between the tools and materials in the list of tools and materials and those in the procedure	Consistent in writing tools and materials so as not to cause confusion to students
Work procedures are not detailed and systematic	Make detailed and systematic procedures so as to bring out the expected phenomena
There are no safety procedures	Make safety procedures so that students are careful in doing the lab work
Data recording and data interpretation were not based on the purpose of the practicum	Set up a data recording table that suits the purpose of the practicum

The following is a worksheet resulting from the reconstruction that has been carried out and is expected to be used by teachers to help the process of forming students' knowledge on the vitamin C test material. At the reconstruction stage, the worksheets were rearranged and some parts that were deemed necessary were improved.

It is hoped that with this reconstruction, the practicum activities carried out by students can be more meaningful because according to Anisah & Nasrudin (2023), Mahyuni et al. (2022) and Puspita et al. (2023) worksheets in schools have not been able to facilitate students to carry out meaningful practicum. The reconstructed worksheets also focus on process skills to support the successful implementation of the independent curriculum.

CONCLUSIONS AND SUGGESTIONS

Based on the results of analysis and testing of the worksheets used by teachers

and students, it was found that there were discrepancies between the worksheets and several aspects that should be on the worksheets. From the results of the analysis, it was found that the score for the worksheet was in the poor category so it needed to be revised. Then at the trial stage, there were many errors in both tools and materials and procedures so that the phenomena expected in the practicum did not appear, making students mistaken in concluding the concepts that students should get. Therefore, the reconstruction that has been carried out on the "Vitamin C Test" worksheet can be an alternative worksheet to complement the various shortcomings that exist in the current worksheet.

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073

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