
THE DEVELOPMENT OF STUDENTS' WORKSHEET USING SCIENTIFIC APPROACH ON CURRICULUM MATERIALS

M. Khairi Ikhsan¹⁾, Handayani. SB²⁾

¹⁾STKIP PGRI Sumbar

email: khairi_ikhsan@yahoo.com

²⁾STKIP PGRI Sumbar

email: handayani1976sofyan@gmail.com

Abstract

Scientific approach is a learning approach that is designed to make learners work actively in constructing concepts and principles through the stages observed (to identify or find the problem), to formulate the problem, propose or formulate hypotheses, collect data with a variety of techniques, analyzing the data, draw conclusions and communicate the concept. To support the implementation of the learning with scientific approach, scientific learning tools such as student's worksheet is required. Students' worksheet, as one of learning tools that is used to involve the students to work actively during teaching and learning process, should be developed based on the students' need. Students' worksheet with scientific approach in teaching curriculum has not developed well yet. A good student's worksheet must be satisfied criteria of valid, practical and effective. This research is a developmental research using 4-D, without the dissemination phase. It has been conducted on 32 students of STKIP PGRI Sumbar academic year 2012. In this study, data obtained from Curriculum syllabus analysis, students' need analysis and results of validation. Students' need analysis was done to analyze the students' perception about the previous learning materials and to know what kind of learning material they need. From the results and discussion on this research, it was found that the students' had bad perception about the previous Curriculum learning material in score 58.07. It was also found that the development of student's worksheet satisfies aspect of validity (average total validity is 75,4). Therefore developed student's worksheet in the category of was good.

Keywords: *Student's worksheet, scientific approach, Curriculum materials.*

1. INTRODUCTION

Curriculum course typically refers to the knowledge and skills students are expected to learn, which includes the learning standards or learning objectives they are expected to meet; the units and lessons that teachers teach; the assignments and projects given to students; the books, materials, videos, presentations, and readings used in a course; and the tests, assessments, and other methods used to evaluate student learning. One of the principles of curriculum is that students are directed not only to truly understand the concepts being taught but also to create the teaching devices. Mastering to prepare teaching devices is also one of the competencies that should be had by the students who will be a candidate of teacher. As stated in the document of the Republic Indonesia Minister of National Education Number 16 Year 2007 on Academic qualification standards and competencies of teachers, as for a variety of competencies that must be owned by teachers, among others, pedagogical, personal, professional and social obtained through professional education. Pedagogical competencies include understanding the teacher to the learner, the design and implementation of learning, evaluation of learning outcomes, and the development of learners to actualize various potentials.

Pedagogic competency of the students can be reached if the learning process is meaningful for them. Meaningful learning refers to the concept that the learned knowledge is fully understood by the individual and that the individual knows how that specific fact relates to other stored facts. To make the learning more meaningful and easily accepted by the students, it needs a learning approach that is related to the real life experience of students with curriculum concepts. One of learning approach that allows the connection between students' experiences with curriculum learning had been suggested by National educational curriculum 2013 is scientific approach. Scientific approach is a learning approach that is designed to make learners work actively in constructing concepts and

principles through the stages observed (to identify or find the problem), to formulate the problem, propose or formulate hypotheses, collect data with a variety of techniques, analyzing the data, draw conclusions and communicate the concept. It also focuses on the activities and the provision of learning experiences directly to the students. Scientific Approach based learning will impact learning for positive mental development of students, because through this learning, students have opportunity to explore and discover for themselves what they need.

2. REVIEW OF RELATED THEORIES

The concepts of scientific approach has been proposed by several experts. For instance, Sund (2010) states that in implementing scientific approach the discovery occurred when individuals, especially in the use of mental processes to find some of the concepts and principles. A student must use all his ability and act as a scientist (scientist) who performed experiments and able to perform the mental process.

Dealing with the opinion that scientific approach helps the students to develop their intellectual competency, Sanjaya (2011) adds that the use of scientific approach should pay attention to several principles, namely oriented intellectual development (development of the ability to think), the principle of interaction (the interaction between students and student interaction with teachers even among students in the environment), the principle of asking (teacher inquirers), the principle of learning to think (learning how to think), the principle of openness (providing space to provide opportunities for students to develop hypotheses and openly validate the hypothesis). There are some characteristics of the main learning model of Scientific Approach as follow:

1. Scientific Approach learning model emphasizes the students' activities optimally to seek and find, meaning that learners made the subject of study.
2. All activities undertaken students are directed to seek and find their own answers on a question. Scientific Approach learning model puts the lecturer as facilitator and motivator and not as a learning resource that explains it.
3. The purpose of a learning model Scientific Approach is to develop the ability to think in a systematic, logical and critical or develop intellectual abilities as part of the mental process.

To support the learning process by using scientific approach, learning tools are needed, one of them is the student worksheet. In this research, student worksheet selected as learning tools which would be developed because it can support teacher in performing learning process, assist students in learning and understand the learning material (Depdiknas, 2008: 13). Researchers also argue that student worksheet can be used directly by the students and students will get the chance to learn independently in accordance with the tasks of the worksheet. For implementing the learning approach well, it needs student worksheet using scientific approach.

Dealing with the students worksheet as the learning tools which can direct the students to work independently, Darusman, (2008: 17) states that students worksheet is a sheet contains guidelines for students to carry out the activities programmed. It includes instructions, guidance and understanding questions so that students could widen and deepen their understanding of the material being studied. Therefore, it can be considered that students worksheet is a source of learning which forms of sheets containing briefly material, learning objectives, the instructions do the questions and a number of questions that must be answered students.

In addition, Sutiasih (2009) explains that student worksheet is a series of tasks laid out in the form of questions. By answering these questions, students are able to master the materials they studied. The function of student worksheet for students is to make students easier to understand the subject matter studied. Meanwhile, according to Ladyawati (2009), student worksheet is a series of tasks with questions that make students in working on and get it done. Preparation of student worksheet intended to provide ease of students in understanding the material taught in the learning process.

3. METHOD

This research was a research development because researchers developed student worksheet by using Scientific approach on curriculum to prepare teaching devices. According to Richey in

Akker (2006: 222), developmental research is opposed to simple instructional development, has been defined as the systematic study of designing, developing and evaluating instructional programs, processes and products that must meet the criteria of internal consistency and effectiveness. Development of student worksheet on curriculum subject followed the stages of development as a result of modifications to the development model expressed by Richey in Sugiono (2007) called the development model of 4-D. This model consists of four phases, namely: a) define, b) design, c) develop, d) dissemination however in this research, the stages were applied without dissemination. Based on the description above, researchers then considered that it is important to develop student worksheet through research with title "The Development of Students Worksheet Using Scientific Approach on Curriculum for English Department of STKIP PGRI Sumbar". The purpose of this research is to describe the process of development of student worksheet by using Scientific approach on the subjects of Curriculum.

The Procedure of the research

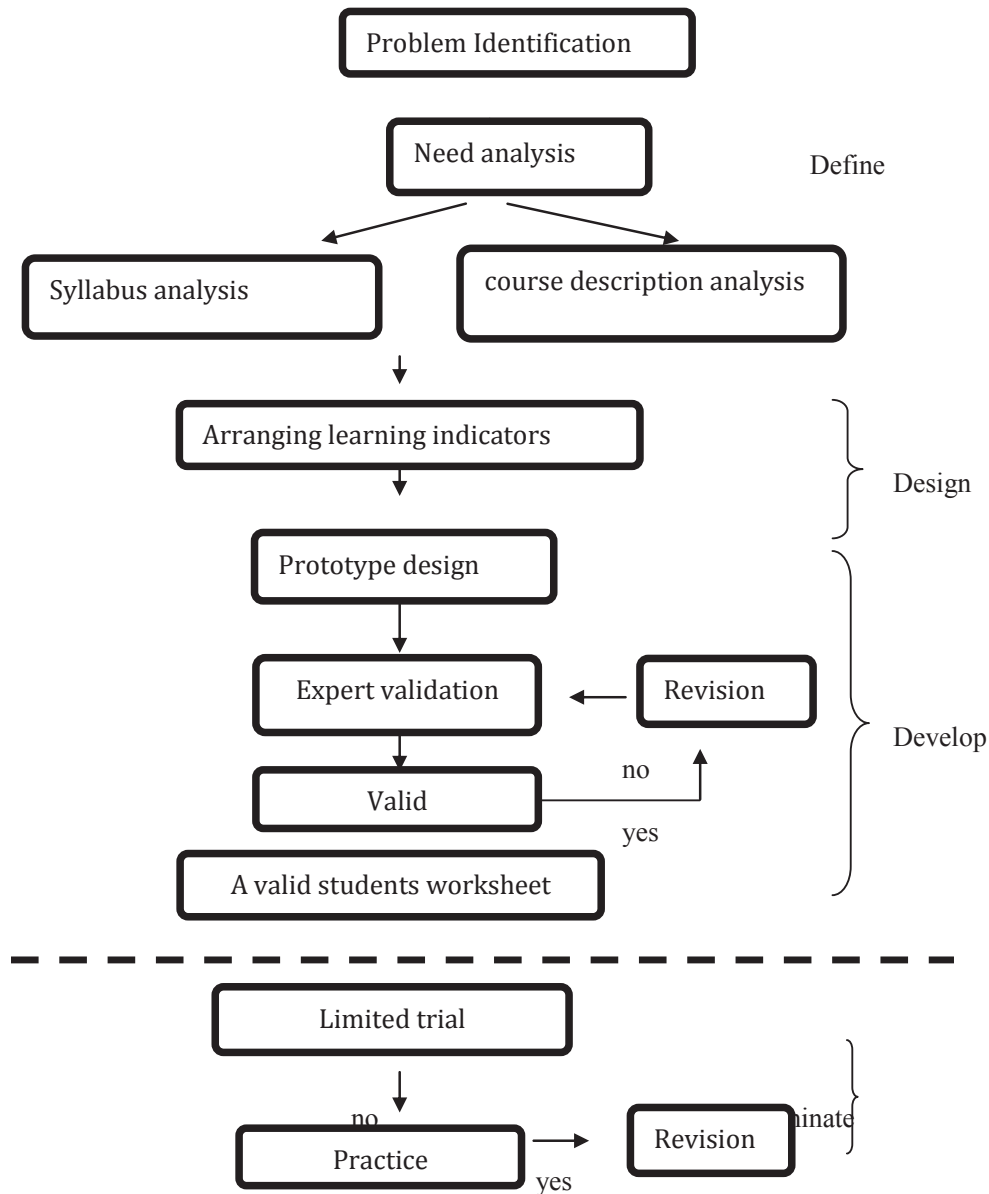
The procedures of the research were done in 4-D steps; Define, Design, Develop and Disseminate. Finding the problem would be done first by analyzing the objective of the curriculum syllabus. Need analysis was done as the next point of this research since this research categorized as developmental research. At this stage, the researchers did some analysis defining the analysis front end includes analyzing the curriculum and tools, and worksheets that are used by teachers

Analysis of the student to determine the level of student progress, which generated worksheets based scientific approaches would be developed for the 4th semester students of STKIP PGRI Sumbar. The task analysis was an analysis of the content of the material to obtain indicators of learning. Further analysis to determine the concept of important concepts that would be taught by standard competencies of curriculum course to be developed and the formulation of learning objectives based on the analysis performed generated learning objectives would be developed into a students worksheet.

After learning objectives obtained, performed the design against some students worksheet-based scientific approaches to be developed. There are several aspects that reconstructed on the syllabus. Furthermore, the design of the development of students worksheet structures adapted to the structure students' worksheet according to Ministry of Education (2006) is a good students worksheet structure includes the title, learning instructions, competencies achieved, supporting information, tasks and work steps. Students worksheet developed structure title, identity, discourse, tools and materials, ways of working, table observations, and questions about the critical thinking skills.

Students worksheets have some pictures, guide scientific attitude and critical thinking skills manual and reference answers. Students worksheets guide students developed requires students to find their own concepts when doing lab activities and after answering questions in the Students worksheets. Students worksheets developed will guide students in applying scientific attitude and practice critical thinking skills. At the development stage worksheets that have been developed further tested through a validation process.

Procedures of the research



The Participants and Data collection

This research involved 32 students of STKIP PGRI West Sumatera to see the need analysis of students' learning material. The data about the students' need about the learning tools were taken from two kinds of instruments; questionnaire and interview. The questionnaire was developed by indicators of students' perception of learning material and their experience in studying curriculum. Interview was also done to support the students' data about the learning material and experience in studying curriculum. To find the data about the lecturers' need analysis of teaching material, the researcher would give questionnaire and interview to some lecturers who ever taught curriculum course. The indicators of need analysis were developed into four indicators; perception of teaching curriculum, experience in teaching curriculum, preparation in teaching curriculum and perception on teaching curriculum material. Interview was also done to support the data about lecturers' need analysis.

4. DATA ANALYSIS AND DISCUSSION

As the data of this research were about the need analysis from students and lecturers, the validity of the product; some techniques are needed to be applied. Since the researcher started this research based on students' need on learning material, the researcher will analyze the data based on Likert scale. The criteria of the need analysis can be explained that the percentage of the number and proportional criteria are inversely. The smaller of the percentage, is the higher of the demand for the item in question, and vice versa, the greater of the percentage is the lower the demand for the item in question. Therefore it can be assumed that if the numbers of respondents are less, the higher need of the things are needed or vice versa. To examine the need criteria, semantic differential was used. If the result very low, it means that the need of the product would be high. The technique to analyze the reliability of the instrument of need analysis questionnaire was product moment correlation in type test-retest.

The next data that would be analyzed were the data about the validation of the prototype. Once the Scientific approach students' worksheet was made with a measured aspect based on a particular theory, the researcher then consulted with the valuator. The valuator gave an opinion whether the device needs to be repaired again; format or the words; or it may be revised. The valuator was an expert who had experience in curriculum field and he was also concerning in teaching English as foreign language.

After the students worksheet was completely designed; the next step was testing the validity of the experts with the following steps.

1. The researcher asked the expert's willingness to see at the feasibility of the students worksheet as well as the truth of the learning concept that has been made
2. The researcher asked the expert's willingness to provide an assessment of the students' worksheet that is made based on the existing items in the questionnaire and expert's criticism or suggestions to the deficiencies of it.
3. After the assessment done, the researcher revised the form and the content of the students' worksheet according to advice provided. This following table shows the name of the lecturer valuator

Findings

On the front – end analysis, researchers conducted observations in the classroom before the product was produced to find out what was required of faculty and students as learning tools in the form of worksheet to the course curriculum. Researchers gave questionnaires to faculty and students what they think about curriculum course as one of the compulsory subjects in English language courses, learning media which has been used and the media to learn what is needed.

a. Define

At this stage, the analysis performed curriculum analysis, students analysis, teaching material analysis, and the demands of the curriculum analysis. The curriculum was curriculum 2013 refers to KKN. The first analysis results indicated that the student learning materials used in the course curriculum was only to make students aware of the concepts and theories of curriculum based learning process in which the source of the theory developed. While clearly said that the selection of instructional materials to meet the demands of the curriculum should be adapted to the conditions of students and usefulness of the instructional materials throughout the life of the student. Teaching materials available today already meet the needs of students of the theory curriculum but can not lead students to develop a critical mindset to be able to apply theory as the basis for development of curriculum was teaching device they need while teaching practice later.

Subsequent analysis is devoted to the development of teaching materials that are used during the process of learning the curriculum. Teaching materials used in the course curriculum so far only given in order to provide the theory and concepts to waive implementation of the curriculum in the form of performance. The theory was given directly to the students not accustomed challenged to perform an initial analysis of the theory in question until the knowledge gained just stayed as a theory in their brains. While as a prospective teacher, they should be able to perform an initial analysis on educational problems, collect data, analyze the data to be able to find a way out. Therefore, what was the problem of education were found during the implementation of a curriculum could be completed.

The next analysis was the lecturers' need of teaching tool. The analysis was done by distributing questionnaire to some lecturers who have ever taught curriculum for long times. The components which were asked to lecturers were about experience in teaching curriculum, experience in preparing teaching material, the result of need assessment of teaching material of curriculum test shown that the lecturers and the students were really need a teaching curriculum material which lead the students not only to understand the theory of curriculum but also create and prepare their own learning material. The table below would show the result of lecturers need analysis of the teaching material

Table 1. Lecturers need analysis of teaching curriculum material

No	Indicators	Score
1	Lecturers' experience in teaching curriculum	71.66
2	Lecturers' experience in preparing teaching material	72.22
3	Lecturers' experience in teaching curriculum	48.15
4	Lecturers' perception on available teaching curriculum	40

From the table it could be assumed that the lecturers thought that the available teaching curriculum material could not filled their need in guiding the students to precede discovering activity. The result of interview also indicated that the lecturers need appropriate curriculum teaching tools.

Next, the result of students' need analysis of the teaching curriculum material also showed that the students really need a learning tool which leads them not only to understand the theory but also produce some teaching devices. It can be seen from this following table:

Table 2. Students' need analysis of learning curriculum material

No	Indicators	Score
1	Students' perception of curricullum course	71.68
2	Students' learning experience of learning curricullum	64.77
3	Students' perception of learning material used	58.07

From the table above, it can be concluded that the students had dire perception of the available learning material used in curriculum and the result of the interview also indicated same opinion. It means that they need learning tools which helped them in developing their discovery skill.

Therefore, a learning tools in form students' worksheet would be developed aiming not only to help the students understand about the concept of curriculum but also common in doing scientific activities to dig their knowledge. The worksheet would be developed based on the principles and the characteristics of Scientific Approach as an approach that guides the students to dig their discovery skill and their skill in solving problem. It was also in line with the results of the analysis of the Curriculum theory for the development of student worksheet was about the development of student worksheet based on the principles and characteristics of Curriculum. Analysis of the students was the student characteristics examination in accordance with the development design of the student worksheet. The intended characteristics included knowledge background of students, academic ability of students and potential students' ability to construct knowledge.

b. Design and Develop

Based on the need analysis which has been done, the students' worksheet was developed which appropriate with the teachers' and students need. The prototype of the students' worksheet consisted of:

- 1) The cover of the worksheet (before revision)

STUDENTS' WORKSHEET CURRICULUM

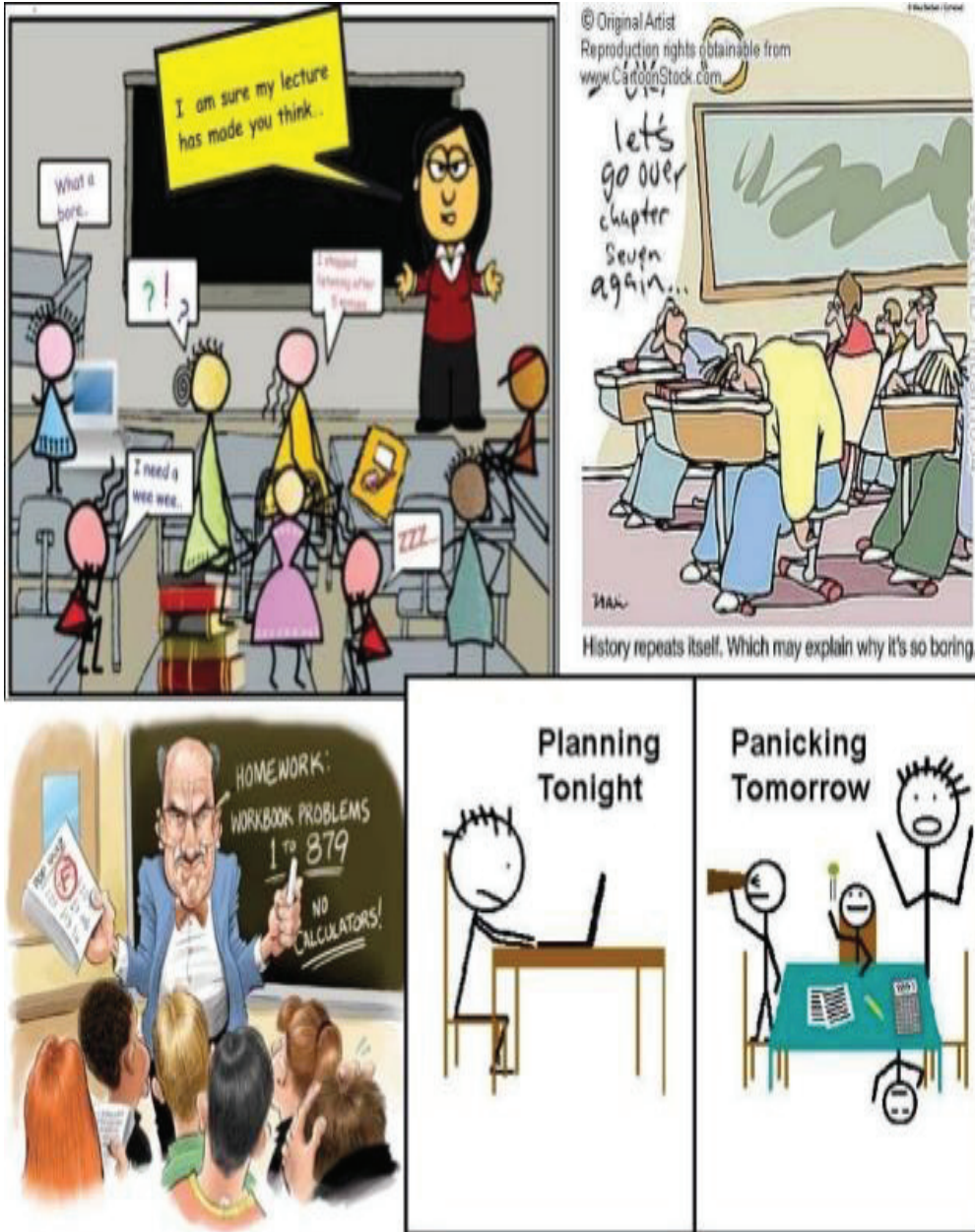


**PRODI BAHASA INGGRIS
STKIP PGRI SUMBAR**

The prototype was started by the cover of the worksheet, based on the suggestion of the expert, the words on the cover should be used in English. Some revision have had been done.

After revision

**STUDENTS' WORKSHEET OF
CURRICULUM MATERIAL**



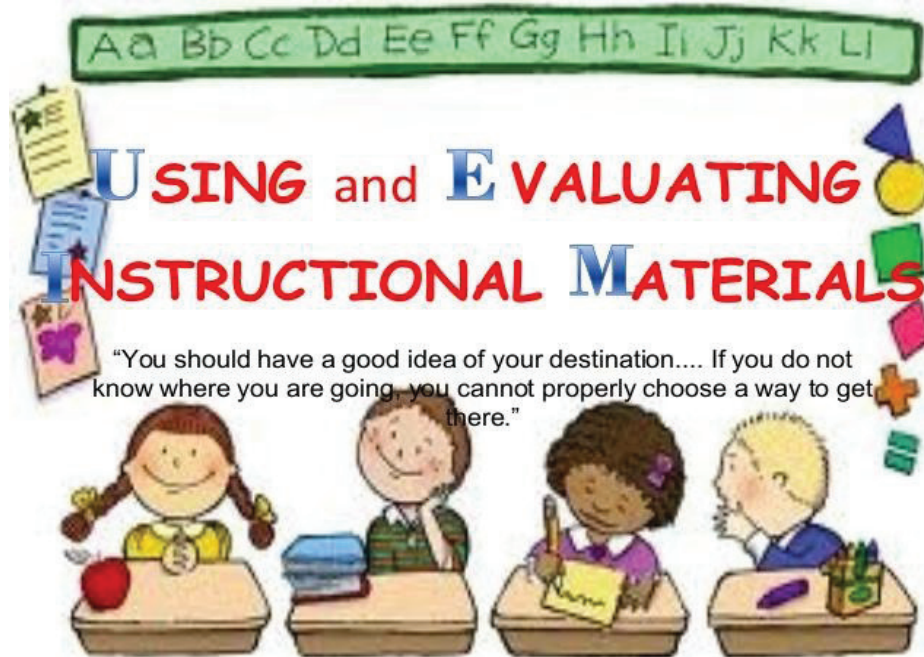
**ENGLISH DEPARTMENT
STKIP PGRI SUMBAR**

2. Sample of worksheet (before revision)

The next validation came into the sheet of the worksheet. Here is the sample of the worksheet before revision.

**STUDENTS' WORKSHEET
(LEMBARAN KERJA MAHASISWA)**

Program Studi : Pendidikan Bahasa Inggris
Mata Kuliah : Kurikulum
Pokok Bahasan : Instructional Materials
Alokasi Waktu : 2 SKS



Objectives

After studying this part you are expected to be able to:

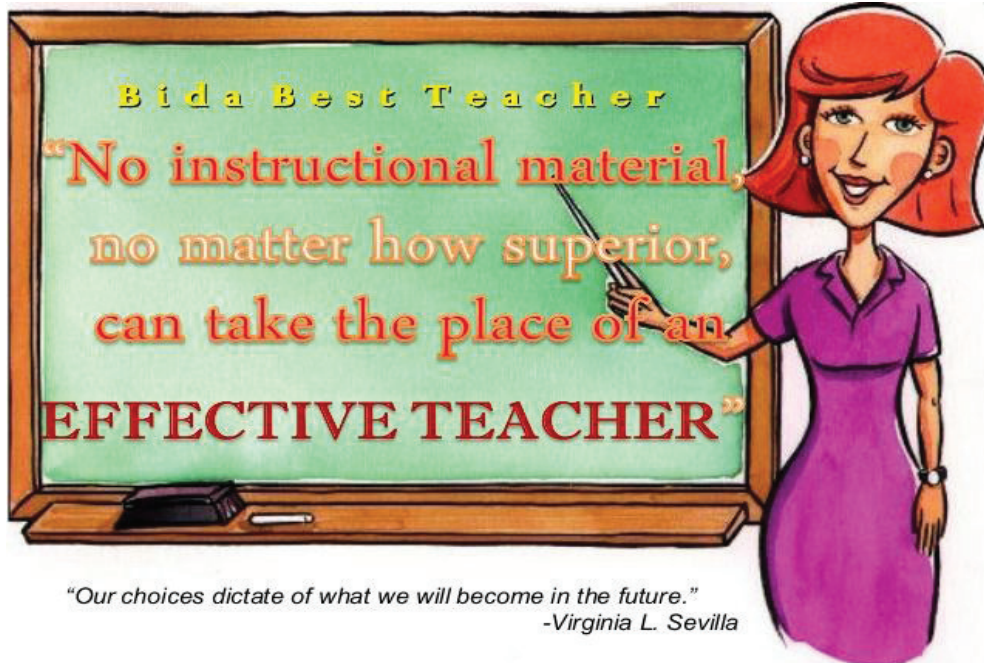
1. Explain about the types and the functions of Instructional Materials
2. Mention the criteria in choosing instructional materials
3. Design the instructional materials

Scientific Approach Suggested Activities:

1. The students observe a teacher instructional materials of Junior High School and Senior High School English
2. The students quest some information on instructional materials
3. The students work in syllabus by exploring information on instructional materials
4. The students design instructional materials
5. The students share the information on the instructional materials by building networking with friends

Materials

TASKS:



1. Draw the types of materials for English Language Teaching

2. Explain the functions of materials for English Language Teaching

3. Mention the criteria in choosing materials of English Language Teaching

4. Choose a topic from the syllabus for teaching Listening, speaking, Reading, and Writing then design the appropriate material by considering the criteria of developing materials.



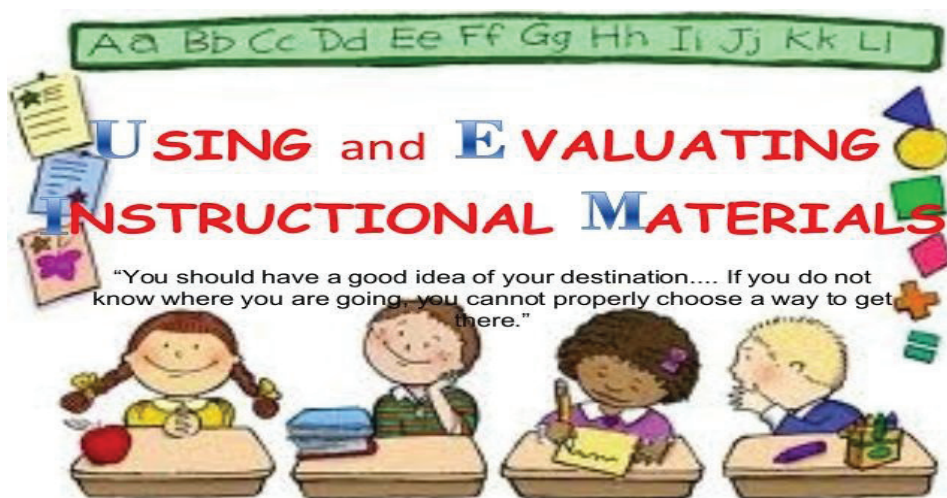
The result of the valuator evaluation about the worksheet was the worksheet did not represent the activity of scientific approach yet. The implementation of the activity should be based on the guidance of scientific approach such as constructing concepts and principles through the stages observed (to identify or find the problem), to formulate the problem, propose or formulate hypotheses, collect data with a variety of techniques, analyzing the data, draw conclusions and communicate the concept. The identity of the worksheet was still in Bahasa, therefore it should be chosen into English.

Based on the suggestion of the valuator, the researcher tried to revise the worksheet mostly in the part of students' activity in implementing the concept and theory of curriculum. Here is the worksheet after revision,

STUDENTS WORK SHEET

(LEMBARAN KERJA MAHASISWA)

Department : English Education
Course : Curriculum
Topic : Instructional Materials
Time Allocation : 100 minutes



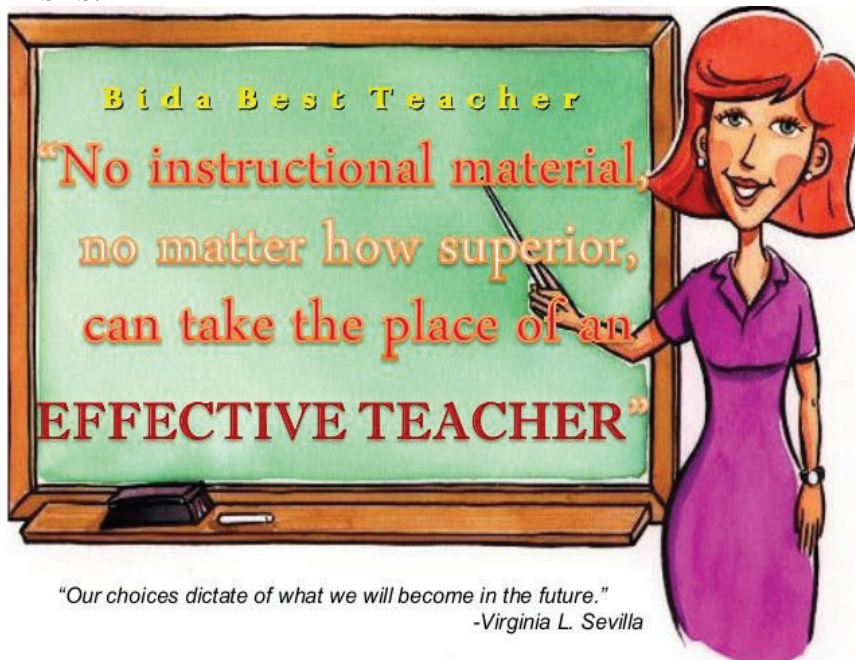
Objectives

After studying this part' you are expected to be able to:

1. Explain about the types and the functions of InstructionalMaterials
2. Mention the criteria in choosing instructional materials
3. Design the instructional materials

Scientific Approach Suggested Activities:

1. The students observe a teacher instructional materials of Junior High School and Senior High School English
2. The students quest some information on instructional materials
3. The students work in syllabus by exploring information on instructional materials
4. The students design instructional materials
5. The students share the information on the instructional materials by building networking with friends

Materials (the concept and theory about instructional media)**TASKS:**

1. Draw the types of instructional media that teachers used based on your analysis result

2. Explain the problem of the instructional media of English that you found

3. Discover the problem based on your interview result with the teachers

4. Explain the functions of materials for English Language Teaching based on what you found

5. Mention the criteria in choosing materials of English Language Teaching based on what you learned

6. Choose a topic from the syllabus for teaching Listening, speaking, Reading, and Writing then design the appropriate material by considering the criteria of developing materials.

Validity of the product

The validation stage was done by asking expert's willingness to determine the validation of the product four aspects would be considered; the content, the language, the presentation and the appearance. Result of the validation was 79.4 categorized into can be used with little revision. Therefore the product could be used with little revision. The table will show it:

Table 3. Valuator's validation on the students worksheet

No	Aspect	Valuator score	Total score
1	Content	37	72.15
2	Language	13	81.25
3	Presentation	11	72.75
4	Appearance	18	71
Average			77.4

Validation of Student Work Sheet was done by performing validation of the content by a valuator who was an expert in the development and application of teaching materials based on learning curriculum Scientific Approach. Expert used a checklist to validate the students' worksheet. The tests validated based on four aspects, the first content, language aspects, presentation and display validator also provided some notes for improvement students' worksheet indicator represents the indicator has not been the activities of designing instructional materials because there was no indicator that directs students to produce teaching materials. In modeling and strengthens the assessors who think that teaching materials on modeling and reinforcement parts should be changed due to the activities of these parts were not in accordance with the activity to produce teaching materials.

Based on the evaluation and recommendation of the expert, several revisions were made to the students' worksheet. Researchers analyzed the material used had to be varied to avoid monotony of teaching materials. Instructions were given also need a slightly revised to further refers to measures Scientific Approach. The use of language was also slightly revised by taking into account the grammatical structure of English. Some revisions were also conducted in aspects such as the appearance of the font used, the empty space available as the characteristics of the students' worksheet, some interesting pictures and some colored tables. After the researchers analyzed the results of the first validation, the researcher revised some aspect of the worksheet based on the suggestion of the expert.

5. CONCLUSION

The development of learning tools in this research was conducted in three phases: namely define, the design, develop without dissemination. After doing this research, it obtained that the result about the development of student worksheet with the scientific approach in the subject of curriculum is the average value of the validation score provided by experts (75.4). Therefore, the student worksheet with the scientific approach on the subject of curriculum was valid. In addition, student worksheet with scientific approach on the subject of curriculum can be said to be theoretically practical because based on a common assessment of the experts, it can be said that the student worksheet can be used with little revision. From the above statement, student worksheet with scientific approach on the subject of curriculum is in the valid. Then, student worksheet developed can be said either. As a suggestion, in order to achieve a better learning process with scientific approach, it should be developed not only student worksheet, but also the other learning tools, such as lesson plan, student books and assessment sheet. In addition, to get the validation result of student worksheet with the Scientific approach surely valid, all the principles and the characteristics of Scientific approach must be contained in composing validation sheets in order to explain that the validity criteria shows the student worksheet in accordance with the principles and characteristics of Scientific approach. The practicality and the effectivity will be estimated for the next research activity after the disseminate stage is done completely.

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