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Development of Approach-Based Acid and Base Module Scientific Probing Prompting Techniques to Improve Critical Thinking Skills of Class XI Senior High School Students

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Abstract:- This study aims to produce an acid-base modulebased on a scientific approach with prompting and probing techniquesdetermine the level of validity, practicality and effectiveness of the module.This research includes development research withusing the Plomp development model which has threestages, namely the preliminary research phase,prototyping phase and stageassessment (assessment phase). At the prototype stageconducted self evaluation (self evaluation), expert judgment (expertreview), individual evaluation (one-to-one evaluation), evaluationsmall group (small group evaluation), while the assessment stageconducted through a field test (field test) in schools, namely SMAN1Painan. The research instrument used was a deep questionnairevalidity and practicality sheet form, objective form questions anda matter of critical thinking. The results of the module validitytest conducted bysix validators with a mean of 0.89, practicality by the teacheran average of 0.94 and practicality by students in small groupswith an average of 0.90 with a very high level of validity. ResultHypothesis test showed a significant difference between the resultslearning experimental and control classes at school does not existsignificant differences in school with student abilitiesThe low one. Hypothesis test results show the differencesignificant between the critical thinking skills of the experimental class andcontrol.

Keywords:- *Module, Acid-Base, Scientific Approach, Engineering, Probing Prompting, Critical Thinking, Modeling, Plomp Development.*

I. INTRODUCTION

Chemistry is a science that is built by thinking andexperimenting in which consists of the stages of observing,measure, analyze, and conclude. Chemistry learning is not justgood academic abilities are required, but also abilitypractices that can be implemented in everyday life. Chemistry asscience includes facts, concepts, and principles.Chemistry as a process includes skills and attitudesowned to acquire and develop knowledge orchemistry.

Learning applied in learning chemistry currently refers toin the 2013 curriculum. The 2013 curriculum was developed through either oneperfecting the mindset, namely becoming passive learning patternsActive-seeking learning and passive learning patterns of beingcritical learning (Permendikbud No.68 of 2013). Curriculum 2013has three aspects, namely aspects of knowledge, aspects of skills,and aspects of attitude / behavior. Permendikbud number 54 of 2013 statementthat "in the aspect of knowledge, students are required to havebehavior that reflects the attitude of a believer, has a noble character, knowledge,self-confident, and take responsibility for effective actionsocial and natural environment in the environment of the home, school, and placeis playing. In the aspect of skills, students are required to havefactual and conceptual knowledge based on his curiosity aboutscience, technology, arts, and culture in insight,nationality, statehood, and civilization related phenomena and events inhome environment, school, and playground. Meanwhile, in aspectsAttitudes / behavior of students are required to have the ability to thinkproductive and creative in the realm of abstract and concrete according to whichassigned to him.

The role of teachers in the 2013 curriculum is not just teachingknowledge only, but also must be able to be an educator at the same timesupervisor by providing direction so that students canmore active in learning that can foster creativity.

Acid and base material is one of the compulsory subjectsstudied in class XI SMA / MA semester II appliedusing a learning model that refers to the 2013 curriculum.On the topic of acid-base, students are asked to describe the acid-base theory by determining the properties of a solution anddetermine the pH of a solution by calculation.

The learning process can be matched with a scientific process,therefore the 2013 curriculum mandates the essence of a deep scientific approachlearning. The scientific approach is believed to be a gold bridgedevelopment and development of attitudes, knowledge and skillslearners. The

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scientific approach is the organizing of experienceslearn in a logical order through the 5M learning process namelyobserve, ask questions, gather information, associate, andcommunicate (Hosnan, 2014: 37). In doing all five thingsIt is hoped that students can be active and think critically in the processlearning. Therefore, to support the implementation of the curriculum2013, we need a learning technique that can createstudents are motivated to think, so that students are more active inlearning process. The curiosity of students can be developedthrough questions given to students (Ellizar,2009: 14).

This is in accordance with the opinion of Nasution (2010: 161) that the questionis a stimulus that encourages students to think andlearn. In learning there are two helpful questioning techniquesincrease the activeness of students, namely the technique of asking questions that areprobing and prompting questions(Ellizar, 2012: 50)

The probing-prompting learning technique is a learning techniquecan develop and improve the critical thinking skills of participantsstudents, because students are directly involved in the processlearning. Students are also required to have skillscritical thinking. To improve the thinking skills of students,then students must be trained to think through questions.These questions can be either digging questions orguiding questions. So that students are able to actively think deeplyfind answers to the questions asked. Think critically toois one of the five reinforcement of the character value to beencourage learners to have 21st century abilitiesneeded in living his life.

Learning critical thinking is important because through critical thinking, students will be trained to observe the situation, bring up questions, formulate hypotheses, make observations, and collect data, then provide conclusions. Learning process in school expected to also train students to think critically. Some research that has been done states that thinking skills learners can be improved through designed learning activities specifically to develop critical thinking skills.

From the results of the author's interviews with several chemistry teachers andthe results of a questionnaire given to students at SMA 1 Painan were obtainedinformation that most students still have difficulty indistinguish compounds belonging to acids and bases. Other than that,Teaching materials used in acids and bases are textbooks andLKS. The number of text books in schools is limitedits use can only be used at school and should not be taken home, so that the teaching materials in schools cannot make studentslearn independently. Teaching materials in the form of modules are not yet available in schoolsand probing prompting techniques in learning are still rarely used.

In the 2013 curriculum, it is expected that students can learn scientificallyand independent. Moreover, the use of textbooks makes learners onlylearning depends on the presence of the teacher and is unable to learnindependent, soit is necessary to use teaching materials that can makeactive students and able to learn independently.

One of the teaching materialsusable is a module. The use of modules can increasemotivation of students to learn because the module is equipped withconcept maps, charts and color images. Concept maps in modulesmake it easier for students to remember information, concentrateattention and improve understanding. Color charts and picturesmake the brain more active and increase the pleasure of students (Elizar.Et al, 2013).

Module is a complete unit consisting of a series of activitieslearning provides effective learning outcomes to achieve that goalformulated clearly and specifically (Nasution, 2008: 205). According toDepdiknas (2008) learning through modules can help studentslearn independently without depending on others. Use of modulescan increase students' understanding with the percentage of completenessof students reached 84% (Fitri, 2012). Teaching materials developedin the form of a module adapted to the demands of the scientific approach.

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The research to be carried out is relevant to the research that has been doneconducted by Charles (2017) on "Nomenclature Module DevelopmentCompound Based Scientific Approach with Probing Prompting Techniqueto Improve Critical Thinking Skills of Class X StudentsHigh school ". The results showed that there was an increase in the class average scoreexperiment, where previously the average value of the experimental class wasof 37 with the highest score being 53 and the lowest score of 20, increasingto 77 for the average score with the highest score of 86 and the lowest to be 69. This shows that the probing-prompting learning model is effectiveused.

Based on problems and facts in the fieldmake writers interested in innovating the development of teaching materialsin the form of modules, for that the author submits a research proposalentitled "*Development of Approach-Based Acid and Base Module Scientific Probing Prompting Techniques to Improve Critical Thinking Skills of Class XI Senior High School Students"*

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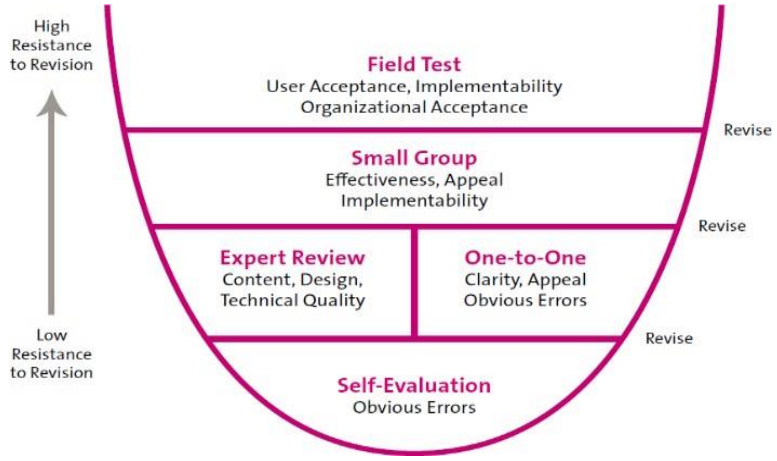
II. RESEARCH METHOD

This type of research used in this study is researchdevelopment (Research and Development). Development researchis research used to produce certain products andtesting the effectiveness of these products (Sugiyono, 2012: 407) . This researchconducted to develop the Acid-Base module based approachscientific probing prompting techniques to improve skillscritical thinking of class XI high school students.

The development model used in this study usesPlomp model designs such as those developed by Tjeerd Plomp.This model consists of 3 stages, namely the preliminary investigation stageresearch), the development stage or making a prototype (development orprototyping phase) and the assessment phase (Plomp, 2013: 30)



Picture 1. *Fomative Evaluation Layer (Plomp, 2013: 36)*

Based on Picture1 the formative evaluation layers used in this study are as follows:

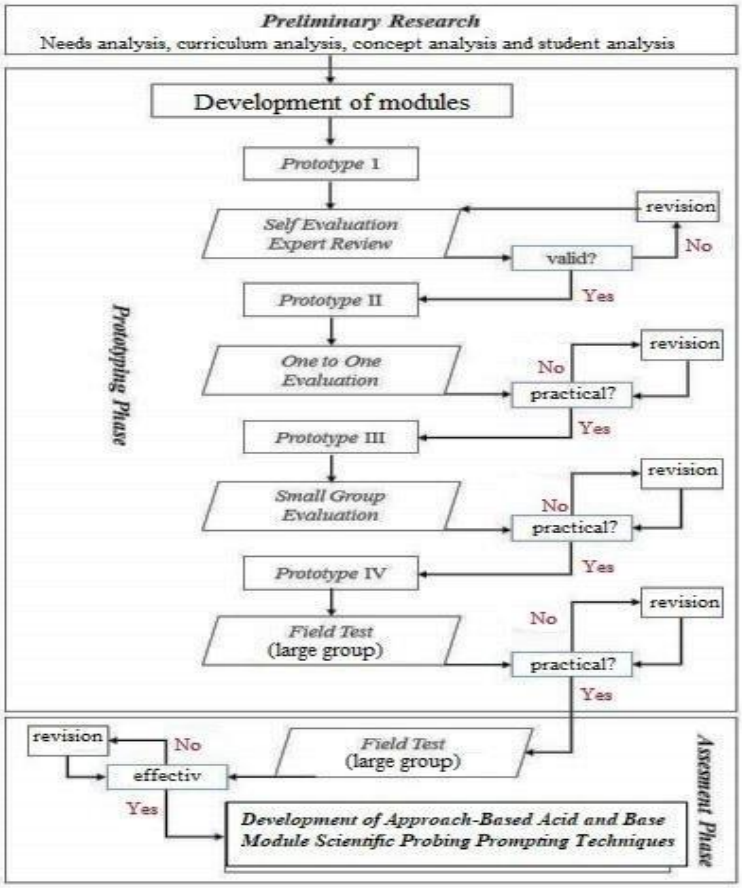
1. Self-evaluation, using a checklist of important characteristics or design specifications.
2. Expert reviews, expert groups (subject matter experts, learning design experts) provide assessments and suggestions for the products being developed.
3. Individual evaluation (one-to-one evaluation), three users use the product in normal situations. Evaluators observe and interview respondents.
4. Small or mic to evaluation, a small group of users using the product in normal situations. Evaluators observe and interview respondents.
5. Field trials (group tests), a group of users use the product in actual conditions to find out the practicality and effectiveness of the product.

➢ *Preliminary Research Phase*

Table 1. *Activities carried out at the preliminary research stage*

Activities Research	*Rated aspect*	**Destination**
Analysis Preliminary	*Analyze Needs*	To find out which problem contained in the study of Acid Bases and existing teaching materials.
	Analyze Curriculum	To formulate indicators and learning objectives according to competencies expected by the curriculum 2013 revision
	Analyze Concept	To identify, detail and arrange systematically the concepts required and used as a reference in module development
	Analyze Learners	To find out the caracteristics of students, Difficulties aced by students, the needs of students for teaching materials and critical thinking skills of students.

The detailed development procedure includes the following steps:



Picture 2. *Design and Research Procedures for Acid-Base ModuleDevelopmentBased on a Scientific Approach with Probing Prompting Techniques*

➢ *Product Trial*

Product trials were carried out to obtain practical data andeffectiveness with which to revise the product. Product trials consist ofthree stages, namely individual evaluation, small group evaluation, and testingfield. Individual evaluation was carried out to produce prototypes III andsmall group evaluation to produce prototype IV. Field trialsdone with the following step :

1. Determine the design of the field trial implementation.

The research design used was "Non Equivalent" research Control Group Postest Only Design ". This design can be described as following (*Lufri, 2005: 69*).

Table 2. *Design of Field Trial Execution*

	Treatment	Final Test
Experiment Class	**X**	**T**
Control Class	**Y**	**T**

Information:
X: Learning with modules
Y: Learning without modules
T: Final Test

2. Conduct population and sample selection

Population is a certain group of something (people, things,events and so on) selected and the results of their studies or researchcan be generalized to the group. A populationhas at least one characteristic that distinguishes it fromother groups (Lufri, 2005: 78). The population in this study were participantsClass XI students of SMAN 1 Painan consist of XI MIA 1-2 who are registered at2019/2020 school year. The sample is part of the population studied(Lufri, 2005: 78). In each school, two classes were selected, namely oneexperimental class and one control class. Sampling was carried outwith purposive sampling technique.

1. Carry out the learning process using the appropriate moduleswith a predefined schedule.
2. Give a final test (posttest) to determine learning outcomes (aspectscognitive) and critical thinking skills.
3. Requesting the availability of teachers and experimental class students forfill out the module practicality questionnaire.

Analysis of critical thinking skills is done by giving a score on the answers given. Scoring is based on the assessment rubric which is modified from the following Finken and Ennis (Zubaidah, 2015: 211).

Table 3. *Modified Critical Thinking Rubric of Finken and Ennis*

Scores / Points	Descriptors
5	• All concepts are true, clear and specific • All answers are correct, clear and specific, supported by strong, true, clear arguments • Flow of good thinking, all concepts are interrelated andintegrated • Grammar is good and right • All aspects appear, evidence is good and balanced
4	• Most concepts are true, clear but lack specificity • Most of the answers are correct, clear, but lack specificity • Good thinking flow, most concepts are interrelated and integrated • Grammar is good and right, there are small mistakes • All aspects appear, but not yet balanced
3	• A few concepts are true and clear • A small part of the answer description is true and clear but the reasons and arguments are unclear • The flow of thinking is quite good, a few are interrelated • Grammar is quite good, there are spelling mistakes • Most aspects that seem right
2	• Concepts are lacking focus or excessive or dubious • The description of the answer does not support • The flow of thinking is not good, the concepts are not interrelated • Good grammar, incomplete sentences • A few aspects that seem right
1	• All concepts are incorrect or insufficient • The reason is incorrect • The flow of thinking is not good • Grammar is not good • Overall aspects are insufficient
0	• There are no answers or wrong answers

III. RESULTS

The results of the analysis of the content component research data by the validat or shows that aspect number 2 has a level of validity which is high, while the aspect numbers 1,3,4 and 5 have very high validity.

Average kappa moments for components of the acid-base module with a scientific approach based on Probing Prompting which is 0.86 with very category high. The results of the analysis of the content component research data can be seen in the Table.

Table 4.*Content Component Analysis Results*

No	Instrument Criteria	K	Level Validity
A.	***Content Components***		
1.	The suitability of the material presented with modules with demands Basic Competence (KD), GPA, and goals learning you want Achieved.	**1.00**	Very High
2.	The contents of the module created in accordance with the high school student abilities	**0.74**	High
3.	Conformity issues were provided with the material taught	**0.86**	Very High
4.	Conformity question to find concept	**0.86**	Very High
5	Truth of facts, concepts, scientific principles	**0.86**	Very High
A v e r a g e		**0.86**	***Very High***

The results of the analysis of the construct component module assessment data shows that aspect number 8 has high validity while for aspects number 6, 7, 9, 10, 11, 12 and 13 which are has a very high validity. Average kappa moments for the construct component of the acid-base module with the approximation scientific based on Probing Prompting, namely 0.89 in the category very high. The results of the construct component assessment analysis can be seen in Table 5.

Table 5. *Results of the Construction Component Assessment Analysis*

No	Instrument Criteria	K	Level Validity
B.	***Construct components***		
6.	The relationship between the concept and problem given in the module	**0.96**	Very High
7.	The observing stage can guide students to analyze problems	**0.91**	High
8.	The asking stage that contains prompting probing questions can be guide students as well explore the knowledge of students to be able to formulate problems in the form of questions and make a hypothesis	**0.80**	High
9.	Information gathering stage can be guide and explore students to collect a variety information, observe objects and record observations	**0.86**	Very High
10	The data processing stage can guide and explore the knowledge of students to give a simple explanation, write down examples, make definitions and provide arguments (ability give reasons)	**0.91**	Very High
11.	The verification stage can guide participants students to prove the hypothesis and provide further explanation	**0.96**	Very High
12	The stage of making conclusions, you can guide students to make conclusions based on objectives learning	**0.86**	Very High
13.	The questions on the evaluation sheet are appropriate with the learning objectives in the module	**0.86**	Very High
A v e r a g e		**0.89**	***Very High***

The results of the analysis of the linguistic component assessment data shows that all aspects of its very high validity. The average kappa moment for the linguistic component is 0.95 with very high category. The results of the component assessment data analysis languages can be seen in Table 6.

Table 6. *Results of Data Analysis for Language Component Assessment*

No	Instrument Criteria	K	Level Validity
	C. Language Component		
14.	Font size and shape can be read	**1.00**	Very High
15.	Instructions and information delivered in clear modules	**1.00**	High
16.	Modules use rules Correct Indonesian	**1.00**	Very High
17.	The language used can understood	**0.91**	Very High
18	The language used is clear(does not raise confusion)	**0.86**	Very High
A v e r a g e		**0.95**	***Very High***

The results of the analysis of the validator assessment data on the components graphic shows that all aspects are very high. Average kappa moment for the acid-base module graphic component with a scientific approach based on Probing Prompting, namely 0.87with a very high category. The results of the assessment data analysis graphic components can be seen in Table 7.

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Table 7. *Result of Analysis of Graphical Compound Assessment Data*

No	Instrument Criteria	K	Level Validity
	D. Graphic Components		
19.	Use font size varies	**0.91**	Very High
20.	Interesting module layout	**0.86**	High
21.	Illustrations, pictures and graphics interesting	**0.86**	Very High
22.	Module design overall interesting	**0.86**	
A v e r a g e		**0.87**	***Very High***

a. The practical results of the student response questionnaire

The practicality questionnaire of student responses was filled in by 20 people students after learning using modules. There is Several aspects were assessed from the practicality questionnaire, namely ease of use, efficiency of learning time, benefits as well as the attractiveness of teaching materials. Result The practicality questionnaire analysis of the module at the field test stage can be seen in Table 8. Acquisition of the average kappa moment for the practicality of the student response questionnaire was 0.90 with a level very high practicality.

Table8. *Results of Student Practicality Questionnaire Analysis*

No	Aspects assessed in the Module	K	Level Validity
	A. Ease of Use		
1.	The questions are clear	**0.92**	High
2.	The language used is easy to understand	**0.90**	Very High
3.	The letters used are clear	**0.96**	Very High
4.	The letters used are easy to read	**0.97**	Very High
5.	Modules have a practical size	**0.93**	Very High
6.	Modules have an easy size Brought	**0.86**	Very High
A v e r a g e		**0.92**	Very High
	B. Efficiency of Learning Time		
7.	Using this module, time learning becomes more efficient	**0.87**	Very High
8.	Modules allow me to study accordingly at my learning pace	**0.81**	Very High
A v e r a g e		**0.84**	Very High
	C. Benefits and Attractiveness of Teaching Materials to Students' Interests		
9.	The image in the module motivates me to find concepts	**0.89**	Very High
10.	The table in the module motivates me to find concepts	**0.84**	Very High
11.	Readings in the module motivates me to find concepts	**0.89**	Very High
12	Modules help me understand the concept through the questions	**0.89**	Very High
13	Modules help me understand the concept through the questions	**0.87**	Very High
14	Student worksheets (LKS) in the module can measure my understanding of acid matter alkaline	**0.87**	Very High
15	Modules help me study independently	**0.90**	Very High
16	The existence of an answer key in the evaluation can help me in measuring my abilities	**0.97**	Very High

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17	Modules increase my interest in learning	**0.93**	Very High
18	I love learning with this module	**0.95**	Very High
A v e r a g e		**0.98**	***Very High***
Overall Average		**0,90**	***Sangat Tinggi***

b. Practical Results from the Teacher Response Questionnaire

The aspects assessed by the teacher include convenience usage, efficiency of learning time, attractiveness of teaching materials, and benefits. Obtained average kappa moments for practicality amounting to 0.94 with a very high level of practicality. Analysis results This practical data shows that the module is acid-base a scientific approach based on the probing prompting developed practically used in the learning process. Following are the results of the analysis and practicality test of the teacher response questionnaire Table 9.

Table 9. *Results of Teacher Response Questionnaire Analysis*

No	**Instrument criteria**	K	**Level Validity**
A. Ease of Use			
1.	Instructions for using the module can be understood clearly	**1.00**	High
2.	The whole module content is easy to understand	**0.80**	High
3.	The modules developed are in accordance with the 2013 revised curriculum	**0.80**	High
4.	The modules developed are in accordance with basic competencies	**1.00**	Very High
5.	The modules developed are in accordance with the indicators of competency achievement to be achieved	**1.00**	Very High
6.	The material presented is clear and easy to understand	**1.00**	Very High
7.	Experimental / experimental activities according to the competency achievement indicators	**0.91**	Very High
8.	The image used is in accordance with the competency achievement indicators to be achieved	**0.91**	Very High
9.	The module has a practical size and is easy to carry	**0.91**	Very High
A v e r a g e		**0.93**	Very High
B. Efficiency of Learning Time			
10.	The module allows students to learn according to their learning speed	**0.80**	High
11.	By using this module, learning time will be more efficient	**1.00**	Very High
A v e r a g e		**0.90**	Very High
C. The attractiveness of teaching materials			
12.	Modules can increase students' interest in learning	**1.00**	Very High
13.	The combination of colors and designs in the module is interesting	**0.91**	
14	Modules can support students to be active in learning	**1.00**	Very High
15	Modules help students in independent learning	**1.00**	Very High
A v e r a g e		**0.98**	Very High
D. Benefits			
16	Modules can support the role of the teacher as a facilitator	**1.00**	Very

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			High
17	Modules can reduce the workload of the teacher to explain material repeatedly	**1.00**	Very High
18	The steps of the Scientific Approach in the module can lead students to think criticall	**0.91**	Very High
19.	The use of modules can help students find concepts	**0.91**	Very High
20.	The use of modules makes it easier for teachers to improve student learning activities	**1.00**	Very High
21.	The worksheets in the module can measure students' understanding of acid-base material	**0.91**	Very High
22.	The evaluation sheet in the module can measure the achievement of learning objectives	**0.91**	Very High
A v e r a g e		**0.95**	***Very High***
Overall Average		**0,94**	***Very High***

c. Effectiveness Test (learning outcomes and activities)

1) Learning Outcomes

The learning process in the experimental class, teacher using modules as teaching materials. While in class teacher control carries out the learning process as usual without using the developed module. Experiment class and the control class of both schools carried out pretest and protest. The summary of the results is in Table 10

Table 10.*Results of pretest and posttest for experimental and control classes*

Class	**Pretest average**	**Average posttests**	**Average Gain Score**
Experiment	**57.5**	**82**	**0.64**
Control	**46**	**72**	**0.84**

To see if the use of the module can influencing student learning outcomes then hypothesis testing is carried out. Hypothesis testing was carried out in the experimental class and the control class. However, before the hypothesis testing is done, it is done first normality test and homogeneity test against the sample class from the results of the gain score for the experimental and control classes. Results of data analysis shows that the experimental and control classes are distributed normal and homogeneous, where the significant value> 0.05. Furthermore, hypothesis testing is carried out (test-t), summarized in Table 11.

Table 11. *Hypothesis Test for Student Learning Outcomes*

Class	N	gain s core	Asymp. Sig	Decision
Experiment	20	0.64	0.015	***Reject H_0***
Control	**30**	**0.48**		

Significance value> 0.05 then H_0 is accepted and vice versa.

In Table 11, H_0 is rejected, meaning that the learning outcomes of students with low student abilities are learning with using modules and without modules differ significantly. Average student learning outcomes using the module on low school results have higher average results learning students who do not use modules.

2) Critical Thinking Ability

The critical thinking skills tested were seen from five aspects, namely providing a simple, constructive explanation basic skills, make conclusions, provide explanations go ahead, and set strategy and tactics. Critical thinking skills students seen from the ability of students to answer questions made based on indicators of critical thinking. Summary of analysis results critical thinking skills can be seen in Table12.

Table 12. *Results of Students' Critical Thinking Ability Analysis*

Aspects of Critical Thinking Skills	**% Critical Thinking Skills and their Categories**			
	Experiment Class		***Control Class***	
Basic Clarification	91.00 %	Very good	79.00 %	Good
The bases for adecision	75.00 %	Good	50.00 %	Very good
Inference	83.00 %	Very good	76.00 %	Enough
Advanced Clarification	73.00 %	Good	56.00 %	Good
Strategy andtactics	59.00 %	Enough	39.00 %	Good
Average	**76.20 %**	**Good**	**60.00 %**	**Good**

The use of modules affects thinking skills critically, he hypothesis is tested. Homogeneity and normality test on the results of critical thinking of students shows that the critical thinking results of the experimental class and the second control schools are normally distributed where the significance value is> 0.05 and has a homogeneous variant where the significance value> 0.05so the t test is carried out. Summary of hypothesis test results as follows.

Table 13. *Results of the Critical Thinking Hypothesis Test for the Experimental and Control Class*

Class	N	gain s core	Asymp. Sig	Decision
Experiment	20	76	0.001	***Reject H₀***
Control	**20**	**60**		

The decision to reject H_0 means the participant's critical thinking ability students who learn using modules and without using a significantly different module. Average critical thinking skills of students who use modules higher than students who do not use modules. Students.

IV. DISCUSSION

The module teaching material products developed are said to be of high quality if it has valid, practical, and effective criteria (Nieveen, 1999: 127).The results showed that the acid-base module with a scientific approach based on probing prompting has valid, practical, and effective criteria. The following is an explanation of each of the criteria.

1. Module Validity

Module validation is done by experts or experts using instrument that has been validated. This module is validated by 4 (four)a chemistry lecturer and 2 (two)high school chemistry teachers. According to Sugiyono(2007: 414) states that product validation is carried out by several experts or experienced experts to assess weaknesses and strengths of the resulting product. Components are rated for module validation, including content components, construction components, linguistic components and graphic components (Depniknas, 2008:28).

The components of the module content have very high validity. This matter shows that the acid-base module with a scientific-based approach The probing prompting developed is in accordance with the curriculum2013 revision, core competencies, basic competencies, indicators and objectives learning to be achieved. This result is in accordance with the statement Purwanto (2006: 138)

The construct component has very high validity. This matter indicates that the systematic arrangement of the modules has been adjusted with the constituent components of the module, and syntax suitability of mo dulacid-base with a scientific approach based on probing prompting. Validity construction shows the relationship with each other and connected internal consistency between the components of the module(Rochmad, 2012:69)

Graphic components have very high validity. This matter indicates that the readability of the writing, the use of type and size letters, layout, images, and designs and colors used are attractive. According to Hamdani (2010: 222), the layout and colors are good can create an attraction to the interest of students.

The results of module validation in terms of various aspects are very high indicates the module is valid.

2. Practicality Module

The practicality that is assessed consists of a component, namely convenience usage, efficiency of learning time, attractiveness, and benefits of the module (Sukardi, 2013: 52). Practicality of acid-base modules with a scientific approach based on probing prompting assessed by chemistry teachers and class XI students MIA and practicality data were analyzed using kappa moments.

a) Practicality by students

The practicality test by students was carried out at the small stage group, and filed test. In the small group evaluation stage, module was tested on nine students with abilities different learners on actual conditions. At the end student meetings are asked to provide practicality assessment of module and at the field trial stage, the module is tested on20 students at the school, namely SMAN 1 Painan.

The results of the practicality assessment of small groups and field tests(field test) has very high validity .. This shows that the acid-base module with a probing-based scientific approach Prompting has instructions for use that can be understood, questions are presented in clear, language use easy to understand, the letters used are clear and easy readable and has a size that is practical and easy to carry, such as said Sukardi (2011: 52) that practicality considerations can be seen in the ease of use.

In terms of efficiency, learning time has practicality very high and high. This shows that with using the learning time module more efficiently and accordingly at the speed of student learning. This is in accordance with the statement Daryanto (2014: 192) that learning by using modules can make learning time more efficient and students can learn at their own pace.

In terms of the benefits of the module, it is also the level of practicality very high. This shows that the picture, and reading contained in the module can motivate students in find the concept, the questions contained in modules can help students understand concepts, sheets work on modules can measure students' understanding on acid bas material, steps scientific approach with prompting probing techniques can help students to find concepts, modules help students learn independently, and increase students' interest in learning.

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b) Pratikalias by the teacher

The results of the practicality assessment by the teacher in terms of ease of use, time efficiency, attractiveness and benefits has a very high validity. On aspects ease of use indicates that the instructions for use and the module content is easy to understand, the material presented is clear and easy to understand, conformity of modules to the curriculum, and size the module is practical and easy to carry. In the aspect of efficiency learning time indicates that learning time by using more efficient modules and making modules students learn according to their learning speed. On attractiveness and benefit aspects, showing that the module can increase student interest in learning, modules can support the role of the teacher as a facilitator, and modules can help participants students in independent learning.

The results of the practical assessment by students (Table 23) (field test) and the teacher shows very high practicality. Analysis results this practicality shows that the module is designed already practical.

3. Module Effectiveness

The effectiveness test aims to see the usefulness of the product developed. According to Nieveen (1999: 128) if the module is operations provide results according to the module, so the module said to be effective. The effectiveness of using modules in this study was seen from the learning outcomes of students and critical thinking skills. Learning outcomes obtained from the difference in the value of students' pretest and posttest tested at school. The school has two sample classes, namely class experiment and control class.

In Table 12 on page 7 it can be seen that the gain score is the result learning experimental class is higher than learning outcomes the control class, and the post-test results of the experimental class were higher than the control class. The use of acid-base modules with a scientific approach based on probing prompting on learning outcomes tested with using hypothesis testing aims to determine whether the difference learning outcomes are influenced by the use of acid-base modules with probing-based scientific approach, prompting or not. Test results hypothesis (Table 12) Page 7 shows that there is an influence the use of acid-base modules with a probing-based scientific approach prompting on learning outcomes.

The effect of using acid-base modules with a scientific approach based on probing prompting on learning outcomes due to modules can guide students to find their own concepts through stages with a scientific approach based on probing prompting. Influence the use of modules on learning outcomes can be seen from the answer analysis students in the module, where the students had an average score of 82. This is in accordance with the research Balim (2009: 2) states that the scientific approach is based on probing prompting can help students find their own concepts and information and can increase the success of students in the process learning.

The use of modules in schools has an effect on ability students, and improving learning outcomes. Student learning outcomes based on the postest value of the experimental class as much as 75% has a value above KKM. Improved learning outcomes of students who are currently able because students are less familiar with the process learning that emphasizes students finding their own concepts, because students find it easier to understand learning if it is a concept directly given by the teacher.

The activity sheet contained in the module is accompanied by activities to practice thinking skills of students. Learning process Students' critical thinking skills are tested using five description questions. Critical thinking aspects that are assessed can provide basic clarification, making the basis of a decision (the bases for a decision), making inference, giving further explanation (advanced clarification) and set strategies and tactics (strategy and tactics) (Ennis, 2011: 2).

The results of hypothesis testing (Table 13) indicate that ability critical thinking of students who learn to use the acid-base module with a scientific approach based on probing prompting differently significant compared to students who did not use the module. The high critical thinking ability of students in the experimental class compared to the control class due to the experimental class critical thinking skills of students are trained through activities contained in the module. According to Kadir (2007: 183) the ability to think critical is an ability that can be trained, learned and taught through mental activities such as problem solving, taking decisions, analyze assumptions, and conduct scientific research.

The activities contained in the module are adjusted accordingly the steps of the probing prompting-based scientific approach, namely observe, ask questions, collect data, process data and communicate. The model steps are based on a scientific approach This probing prompting can train participants' critical thinking skills students, so that students' critical thinking skills increase.

The results of the simple correlation analysis between critical thinking skills with the learning outcomes at school with the students' abilities obtained equal to 0.021 for the control class and 0.041 where sig <0.05. These results show that there is a correlation between the two variables and unidirectional(positive), where the higher the critical thinking ability the higher the student learning outcomes. This is in line with research Husnah (2017) stated that the higher the level of critical thinking of students the greater the functional relationship that is significant to the results learn. Critical thinking skills direct students to think precisely and assist more accurately in solving problems. According to Jhonson (2010: 125) the ability to think critically is as a directional and clear process used in activities mental like problem solving, making decisions, analyzing assumptions and conduct scientific research.

In this research, there are obstacles in using acid-base modules with a scientific approach based on probing prompting. Learning using the acid-base module with a probing-based scientific approach prompting is something new for students, so it's on at the beginning of the meeting there were still students who had difficulties use it.

➢ *Research Limitations*

The research conducted has several research limitations of the modules that have been developed, namely:

1. The development of the chemistry learning module was only trialled in schools namely SMAN 1 Painan, this is due to the Covid 19 pandemic cause can only do research in one school.
2. The truth of the questionnaire given by students is not supervised fully by the researcher, especially the aspect of honesty in filling out the questionnaire. When filling in the questionnaire, it is possible that there is a subjective element or not according to actual circumstances. Therefore, researchers need to outline under the assumption that the responses given by students are appropriate with the real.

V. CONCLUSION, IMPLICATIONS & SUGGESTIONS

a. Conclusion

This research is a development research that produces acid-base module with a scientific approach based on probing prompting for improve critical thinking skills of Class XI SMA / MA students. Based on the research results, the following conclusions were obtained: 1.) The research produces products that are acid-base modules with an approach scientific based probing prompting to improve skills critical thinking class XI SMA / MA students.2.) The results showed that: (a). Acid-base module with a scientific approach based on probing prompting the results have a very high level of validity with0.89 kappa moment. (b). The practicality of the module produced has a level of practicality very high (k = 0.81) in the small group evaluation evaluation) and field tests and (field tests) have a level very high practicality (k = 0.90) and the results of the teacher response questionnaire has a very high level of practicality (k = 0.94). (c) The effectiveness of the module is seen from the comparison of class student learning outcomes experiment and control class Hypothesis test shows that there is a significant difference between student learning outcomes in class experiment and control class.

Hypothesis test results show that the resulting module can improve critical thinking skills of students and the experimental class have higher critical thinking skills than the class control.

b. Implications

Acid-base module with a scientific approach based on probing prompting to improve the critical thinking skills of class XI students SMA / MA that have been developed meet the criteria of validity, practicality, and effective so that this module can be used as teaching material for teachers and students in the learning process. This research can provide an overview of the organizers education to improve the quality of learning. Module development this can be done by other teachers without neglecting the validity, practicality and effectiveness, so that it can add to the teacher's experience in the learning process.

Development of acid-base modules with a probing-based scientific approach This prompting can help teachers in the appropriate learning process with the revised 2013 curriculum. With this module I can study independently and find my own concepts. In addition, the use of modules can be train students' critical thinking skills.

c. Suggestions

Based on the development limitations obtained while doing field trials, the following can be suggested:

1. For teachers it is recommended that the acid-base module with a scientific-based approach This probing prompting can be an alternative teaching material.
2. For teachers or researchers who want to use module teaching materials acid-base with a scientific approach based on the probing prompting developed this, can be re-analyzed in its application especially in terms of time allocation and characteristics of students.

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