CHAPTER IV
RESULT & DISCUSSION

This research is a Research and Development (R & D) which includes analysis of curriculum textbook 2013 used in schools, development of teaching materials and standardization of teaching materials that have been developed. The research that has been done is aimed to produce science-based chemistry-based literacy materials conducted in class XI SMA / MA. This developed teaching material must meet the quality standards as required by BSNP and the composition of the materials prepared in accordance with the contents of the curriculum syllabus 2013.

The first stage of this research is to analyze the chemistry materials class XI used in high school N 1 Tebing Tinggi. Based on the results of the analysis, in the next stage carried out the development of books used in schools of teaching material based on science literation. Then to the teaching materials that have been developed validation by expert validators consisting of lecturers using the form of BSNP covers the content feasibility, language feasibility, presentation feasibility, graffity feasibility and presentation feasibility based on science literation. In the final stage of the implementation of teaching materials that have been developed.

4.1 Analysis Teaching Materials for Grade XI Used in School

Result of analysis teaching material in SMA N 1 Tebing Tinggi based on BNSP can be seen in Figure 4.1.

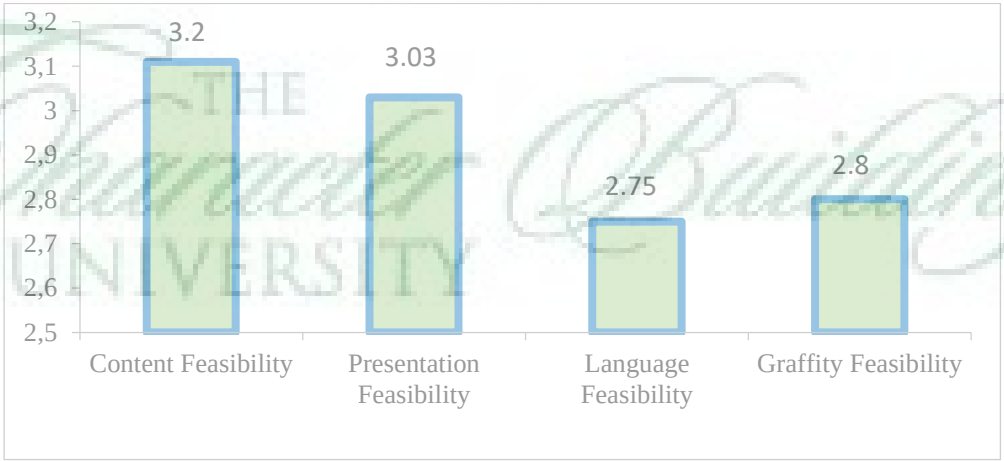


Figure 4.1 Result of analysis teaching material by BNSP

Figure 4.1 can be seen the results of the analysis of teaching materials based on BSNP include content feasibility, language feasibility, presentation feasibility and graffity feasibility show that the average value of 1) Content feasibility of 3.03 indicates the teaching material is valid and does not need to be revised, 2) Presentation feasibility of 3.2 indicates the material is valid and does not need to be revised, 3) Language feasibility of 2.75 means the material is valid and does not need to be revised, 4) Graffity feasibility of 2.8 means the material is valid and does not need to be revised. The average result of the feasibility level of 2.92 indicates the teaching material is valid and does not need to be revised so it can be concluded that the teaching materials worth to use.

Based on the above explanation, it can be concluded that the chemistry of teaching material for grade XI is quite valid and does not need to be revised but needs to be developed to some aspects according to BSNP requirements. Then from the results of the analysis, not found in teaching materail based on science literation. So that researchers can make the results of this analysis as a material to develop teaching materials based on science literation.

4.2 The Development of Teaching Material Based on Science Literation

This teaching material was developed by searching for information from various sources ie 5 books and 10 international journals relevant for the manufacture of chemistry materials. Preparation of teaching materials that are developed based on the syllabus, competency standards and basic competencies. In addition, the main aspects developed in teaching materials are science-based literacy. There are 4 aspects of science literacy are (1) *science as body of knowledge;* (2) *science as a way of investigating;* (3) *science as way of thinking;* (4) *interaction of science, technology, and society.*

The first aspect is to orient learners to the problem by presenting the problem in the form of illustrations in the form of facts or events in everyday life. The illustrations presented also use a dialogical and interactive language. It is useful to stimulate students to think critically and to attract students' attention to learn ingredients that are developed thoroughly.

The second aspect of organizing learners is by displaying commands so that students form learning groups and help students define the learning tasks associated with the problem by writing down problems in the form of questions based on illustrations on the first aspect to be solved with the established group. The formation of learning groups aims to develop life skills students.

The third aspect of guiding individual and group investigations. In this syntax, the researcher presents a command in the form of an invitation to each group to solve the problem by seeking as much information from the description of the material that has been provided on the teaching materials. Teaching material material is presented by using language that is dialogical and interactive and also comes with examples of problems to facilitate students understand the material being studied. After getting the information, the students in the group work together to solve the problems that have been presented.

The fourth aspect is to describe the difficulties of science and technology for everyday life, as well as to explain examples of utilization that can be used in community life.

4.3 Validation of Teaching Material Based on Science Literation

The results of the assessment of the chemistry lecturer on teaching materials that have been developed can be seen in the Figure 4.2.

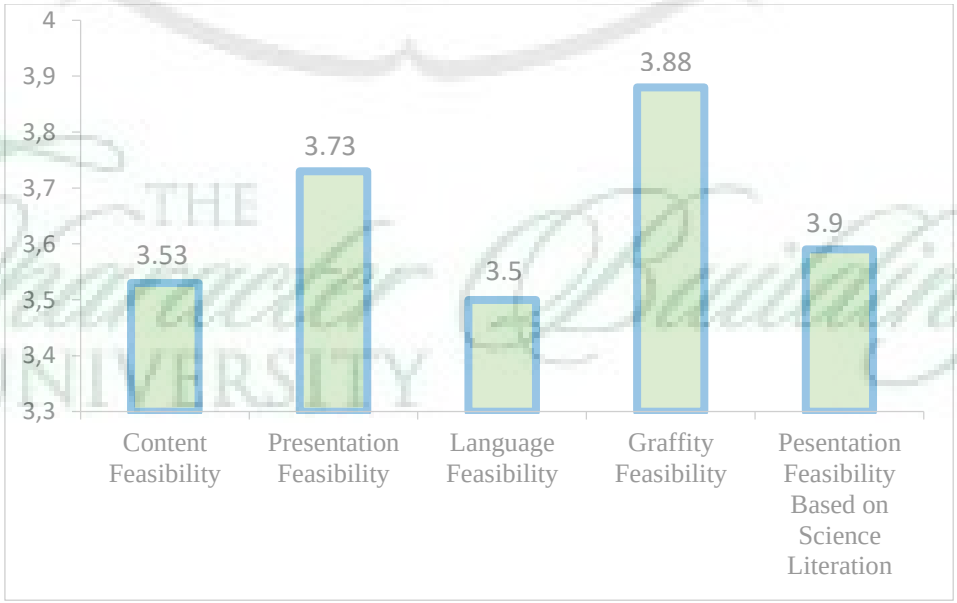


Figure 4.2 Level of Feasibility of Teaching Material according to BSNP by Lecturer as Expert Validator.

The results of the analysis of teaching materials based on science literation based on BSNP include content feasibility, language feasibility, presentation feasibility and graffity feasibility show that the average value of 1) Content feasibility of 3.53 indicates the teaching material is valid and does not need to be revised, 2) Feasibility of presentation of 3.73 indicates the material is valid and does not need to be revised, 3) Language Feasibility of 3.5 means the material is valid and does not need to be revised, 4) Graffity feasibility of 3.88 means the material is valid and does not need to be revised, 5) Presentation feasibility based on science literaction of 3.59 indicates that the teaching material is valid and does not need to be revised. The average result of the feasibility level of the teaching material based on science literation is 3.64 indicates the teaching material is valid and does not need to be revised so it can be concluded that the teaching materials worth to use.

4.3.1 Content Feasibility

The results of the teaching material Based on Science Literation based on feasibility aspect of content by chemistry lecture can be seen in the Figure 4.3.

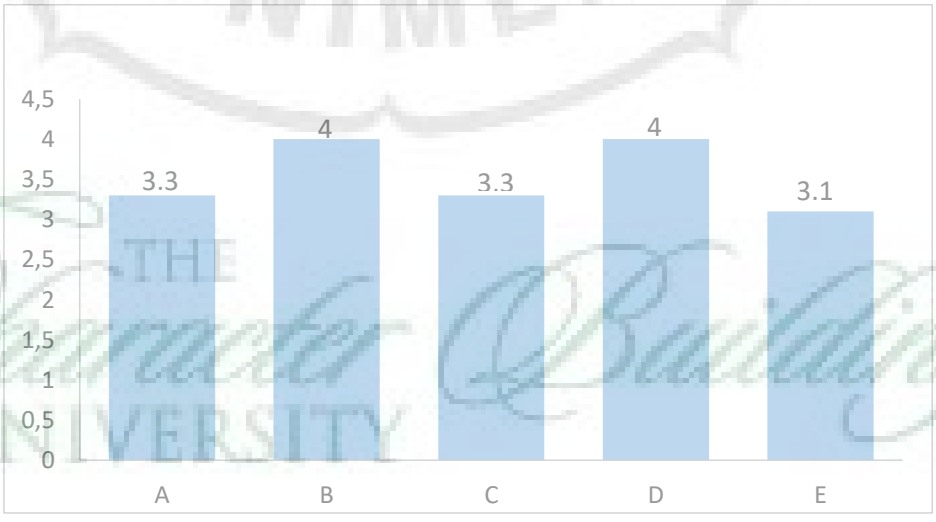


Figure 4.3 The result of teaching material Based on Science Literation on feasibility aspects on content.

From figure 4.3 above can be seen that in the aspect of eligibility of the contents there are 5 indicators related to the feasibility of the contents of each assessed by lecturers and teachers as experts validator. For lecturer's assessment include: (A) material coverage of 3.33 means that the teaching material is valid and does not need to be revised; (B) The accuracy of the material of 4 means that the teaching material is valid enough and does not need to be revised; (C) an update of 3.33 indicates that the teaching materials are valid and does not need to be revised; (D) Obedience to the law of 4 indicates that the teaching material is valid and does not need to be revised; (E) A skill of 3.12 means that the teaching material is valid and does not need to be revised.

Based on the result of lecturer's evaluation on teaching materials based on science literacy on feasibility aspects of content based on BSNP as a whole having a mean value of 3.53 means that it is valid enough and does not need to be revised so it is feasible to use.

4.3.2 Presentation Feasibility

The results of the teaching material Based on Science Literation based on presentation feasibility aspect by chemistry lecture can be seen in the Figure 4.4.

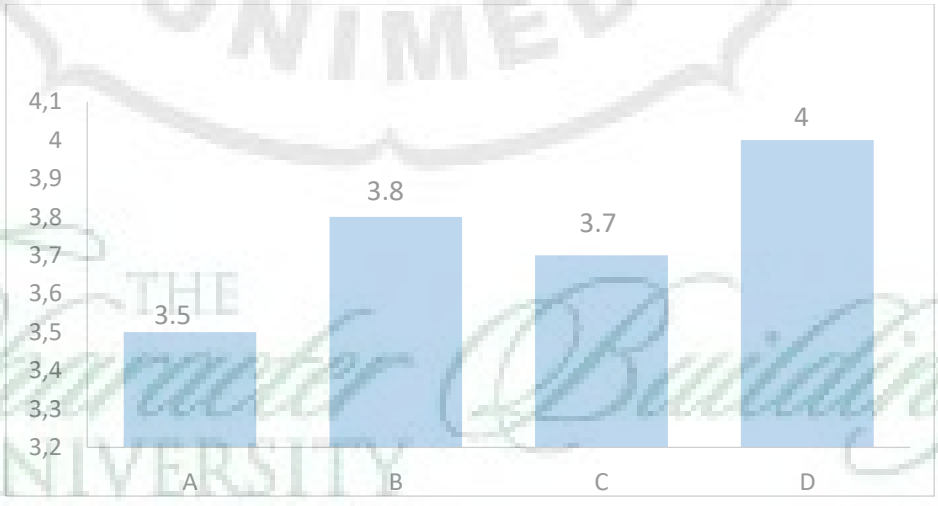


Figure 4.4 The result of teaching material Based on Science Literation on feasibility aspects on presentation.

From figure 4.4 above can be seen that in the feasibility aspect of presentation there are 4 indicators related to the feasibility of the contents of each assessed by lecturers and teachers as experts validator. For the assessment of lecturers include: (A) the scope of presentation technique of 3.5 means that the teaching materials are valid and does not needto be revised; (B) The presentation of the material of 3.8 means that the teaching material is valid and does not need to be revised; (C) The presentation of learning of 3.7 indicates that the teaching materials are valid and does not need to be revised; (D) Completed Presentation of 4 indicates that the teaching material is valid and does not need to be revised.

Based on the results of lecturers' assessment of teaching materials based on science literacy on feasibility aspects of presentation based on BSNP as a whole has a mean value of 3.73 means quite valid and does not need to be revised so it is feasible to use.

4.3.3 Language Feasibility

The results of the teaching material Based on Science Literation based on feasibility aspect of language by chemistry lecture can be seen in the Figure 4.5.

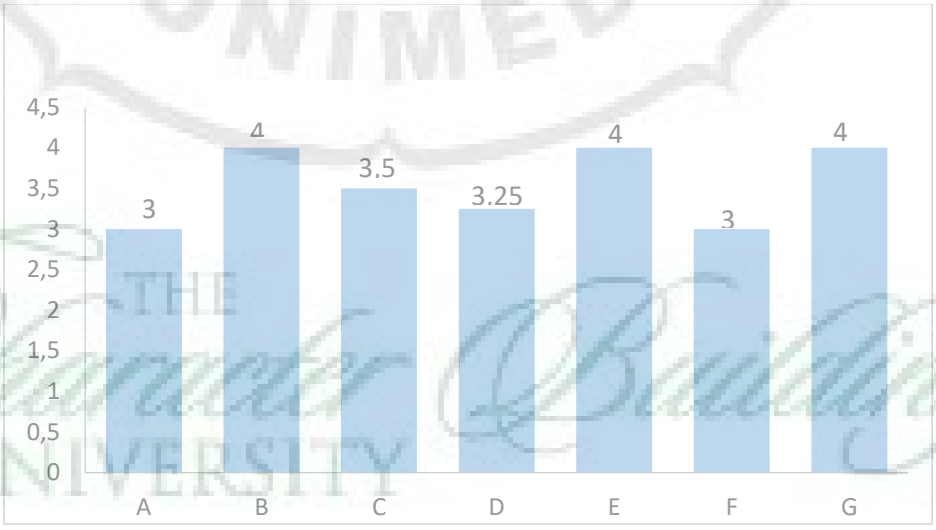


Figure 4.5 The result of teaching material Based on Science Literation on feasibility aspects on language.

From Figure 4.5 above can be seen that in the aspect of language feasibility there are 7 indicators related to the feasibility of the content respectively assessed by lecturers and teachers as experts validator. For the assessment of lecturers include: (A) In accordance with the development of learners of 3 means that the teaching materials are valid and does not need to be revised; (B) Communicative of 4 means that the teaching material is valid and does not need to be revised; (C) Dialogic and Interactive of 3.5 indicates that the teaching materials are valid and does not need not be revised; (D) A straightforward of 3.25 indicates that the teaching material is valid and does not need to be revised; (E) The coherence and flow demands of 4 indicate that the teaching material is valid and does not need to be revised; (F) Compliance with the rules with the Indonesian language of 3 indicates that the teaching materials are valid and does not need to be revised; and (G) The use of terms and symbols of 4 indicates that the teaching material is valid and does not need to be revised.

Based on the results of lecturers assessment of teaching materials based on science literation on the language feasibility aspect based on BSNP as a whole having a mean value of 3.5 means quite valid and does not need to be revised so it is feasible to use.

4.3.4 Graffity Feasibility

The results of the teaching material Based on Science Literation based on feasibility aspect of graffity by chemistry lecture can be seen in the Figure 4.6.

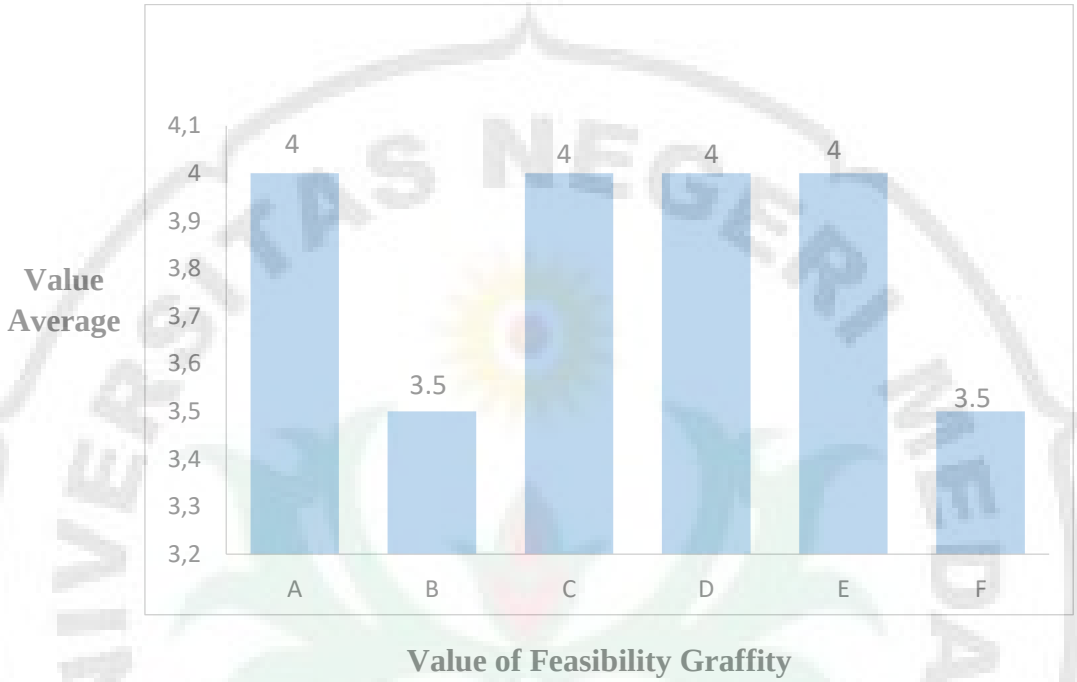


Figure 4.6 The result of teaching material Based on Science Literation on feasibility aspects on graffity.

From Figure 4.6 above can be seen that in the aspect of feasibility kegrafisan there are 6 indicators related to the feasibility of the content respectively assessed by lecturers and teachers as experts validator. For the assessment of lecturers include: (A) size of 4 means that the material is quite valid and does not need to be revised; (B) Typography of the book cover of 3.5 means that the teaching material is valid and does not need to be revised; (C) Book illustration of 4 indicates that the teaching materials are valid and doe not need to be revised; (D) The book content layout of 4 indicates that the teaching material is valid and does not need to be revised; (E) Typography of book content of 4 indicates that the teaching material is valid and does not need to be revised; (F) The book content illustration of 3.5 indicates that the teaching material is valid and does not needs to be revised.

Based on the results of lecturers assessment of teaching materials based on science literacy on the aspect of feasibility of graduation based on BSNP as a

whole has a mean value of 3.88 means that it is valid enough and does not need to be revised so it is feasible to use.

4.3.5 Feasibility Aspects Based on Science Literation

The results of the teaching material Based on Science Literation based on feasibility aspect based on science literation by chemistry lecture can be seen in the figure 4.7.

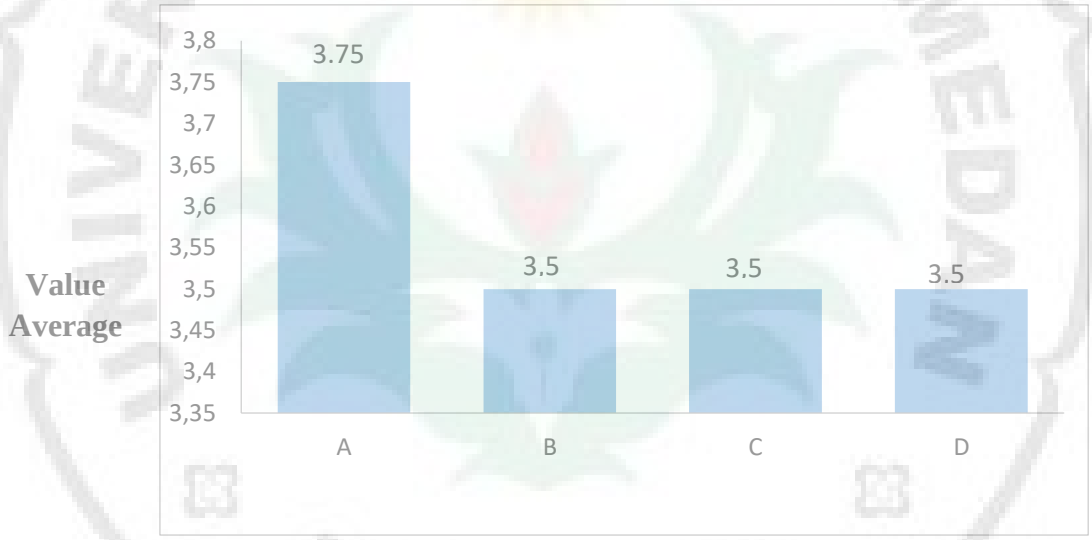


Figure 4.7 The result of teaching material Based on Science Literation on feasibility aspects based on science literation.

From figure 4.7 above can be seen that in the feasibility aspects of the presentation of science literacy there are 4 indicators related to the feasibility of the content respectively assessed by lecturers and teachers as experts validator. For the assessment of lecturers include: (A) a body of knowledge of 3.75 means that the teaching materials are valid and does not need to be revised; (B) way of investigating 3.5 means that the teaching material is valid and does not need to be revised; (C) way of thinking of 3.5 indicates that the teaching materials are valid and does not need to be revised; (D) The interaction of science, technology, and

society 3.5 indicates that the teaching material is valid and does not need to be revised.

Based on the results of lecturers' assessment of teaching materials based on science literacy on feasibility aspects of science literacy presentation based on science literacy aspect as a whole having a mean value of 3.59 means that it is valid enough and does not need to be revised so it is feasible to use.

4.4 Results of Research

4.4.1 Analysis of Instrument data

After doing a test that used as an instrument of research, is to find out:

4.4.4.1 Validation

Validity is the accuracy or precision of an instrument to measure what you want to measure. The validity of the test instrument is calculated using SPSS 22 for windows correlation with the provision that if $r_{calculate} > r_{table}$ at $\alpha = 0.05$ with $n = 34$ so, the question can be said to be valid, and otherwise if $r_{calculate} < r_{table}$ the question is invalid, the provisions of the r_{table} is = 0.339 (Appendix 10).

Based on the validity table ,shows that of the 30 questions that tested only contained 20 questions are valid. The question that valid categorized having the opportunity to be used as an instrument in the study, however the question that invalid can not be used as an instrument in research.

Validation of instrumnet test also performed by expert. Here are the results of the validation performed by experts.

4.4.4.2 Reliability

The reliability test is used to know the consistency of measurement. The reliability of evaluation test was calculated by using SPSS 22 for Windows with using the Cronbach's Alpha value. The criterion of reliability, if Cronbach's Alpha value < 0.6, it is poor reliability, if Cronbach's Alpha value 0.6 – 0.79, it is acceptable reliability, and if Cronbach's Alpha value > 0.8 it is good reliability. Based on the data that processed in SPSS 22 for Windows, the value of

Cronbach's Alpha that gotten was 0.837, it means the evaluation test has acceptable reliability. The data of reliability test is shown in (Appendix 11).

4.4.4.3 Difficulty level of Instrument

Good questions are questions that are not difficult and not easy. Based on the calculation of the difficulty level of instrument, the question that have some categorized such as : difficult categorized (P = 0.0 to 0.3), moderate (P = 0.31 to 0.70), and the easy category (P = 0.71 to 1.0). From 30 question that after tested we get 20 question that Middle categorize , 5 Easy , and 5 difficult categorize (Appendix 13).

4.4.4.4 Different Index of Instrument

The ability of a question to be able distinguish between low-ability of students can be measured from distinguishing test instrument. Based on the different calculations contained in distinguishing questions that are have some categorize , such as : very well (D = 0.7-1), goog (D = 0.4-0.7), adequate (D = 0.2-0.4), bad (D <0.2). from 30 question have 8 Good Categorize, 12 Adequate Categorize, and than 10 Bad Categorize for Distinguish Index (Appendix 15).

4.5 Result Data of Research

Experimental & control class, before being given a different treatment, firstly given preliminary tests with aim to testing the ability of each student's initial. Then, every classes should be taught by a different treatment, the experimental class should be taught using Module Based on Science Literation, the control class is given teaching using Module in the School.

Then, at the end of the lesson is given a final test that aims to identify improving student learning outcomes. Based on the data obtained in the research we get average, standard deviation, variance, minimum and maximum values of the pretest data, posttest and gain in experimental class and the control class as follows:

4.5.1 Data of Student's Pretest

Complete the data can be seen in Appendix 18

	Experiment Class	Control Class
Average	35,97	38,47
Maximum	50	50
Minimum	20	20
Deviation Standart (S)	6,95079075	6,416435
Varians (S^2)	48,3134920	41,17063

4.5.2 Data of Student's Posttest

Complete the data can be seen in Appendix 18

	Experiment Class	Control Class
Average	81,67	69,72
Maximum	95	95
Minimum	60	50
Deviation Standart (S)	9,56182887	8,275993
Varians (S^2)	91,4285714	68,49206

4.6 Analysis test of data

Before testing the hypothesis, firstly tested for normality and homogeneity tests. To normality test, analysis of data using the initial test, post-test and gain of learning outcomes. whereas to homogeneity test , analysis of data using the initial test in learning outcomes.

4.6.1 Normality Test

Normality test was conducted to determine whether the data is normally distributed (Appendix 19). Analysis of data by manual test, can using statistic parametric . Normality of data can calculated with using Chi Square formula. Where, the normal criteria is $X^2_{count} < X^2_{table}$ in $\alpha = 0.05$

Table 4.3 Normality test using Chi Square.

Class	Data	X^2 calculate	X^2 table	Note
Experimntal Class	Pretest	8.88	11.07	Normal Distributed
	Post test	10.38	11.07	Normal Distributed
Control Class	Pretest	6.25	11.07	Normal Distributed
	Post test	9.23	11.07	Normal Distributed

4.6.2 Homogeneity Test

Testing the homogeneity of the data was conducted to determine the ability of the two groups had the same initial or not. The data used to test the homogeneity of the data value is the initial test.. Data can called homogeneity if $F_{calculate} < F_{table}$ in $\alpha = 0.05$ and dk $V_1 = n_1 - 1$, $V_2 = n_2 - 1$.

Table 4.4 Result of Homogeneity test

Class	Variants	$F_{calculate}$	F_{table}	Note
Experiment class	48.31	**1.17**	**1.77**	Pre test data in experimental & control class is homogeny.

Testing is said homogeneous if it has $F_{count} < F_{table}$. $F_{calculate}$ obtained by comparing the value of the largest variance with the smallest variance. Based on the data in the table above shows that the $F_{calculate} < F_{table}$ (1.17 < 1,77). This indicates that the data are homogeneous. The data obtained on the output in (appendix 20).

4.6.3 Hypothesis Test

After testing and data analysis requirements have been known to normally distributed data and homogeneous, then doing the hypothesis test by statistic using Right side T-test in significant $\alpha = 0.05$, with criteria : If $t_{calculate} > t_{table}$, Ha is accepted. Calculation of test data on the hypothesis attached in (Appendix 21). The calculated of hypothesis can we see below :

Table 4.5 Hypothesis test by using Right Side T-test

Class	Average of Gain	$t_{calculate}$	t_{table}	Note
Experiment class	0.76	**6.1**	**1.686**	**Ha is Accepted**
Control class	0.54			

From the table Ha is accepted because , $t_{count} > t_{table}$ (6.1 > 1.686). So, Student Achievement in using Module Based On Science Literation better than Student Achievement in using Module in the School on Salt Hydrolysis Topic.

4.6.4 Increasing of Learning Outcomes

Improving of student learning outcomes calculated by using an average of gain in experimental class and the Control class. Based on the calculations that obtained:

a. Increasing of Learning Outcomes by using Module Based On Science Literation (experimental class) is 71%
b. Increasing of Learning Outcomes by Using Module in the School (Control Class) is 50%

So, the difference of improving student learning outcomes in experiments class with control class is 71% - 50% = 21% (Appendix 22).

4.7 Discussion

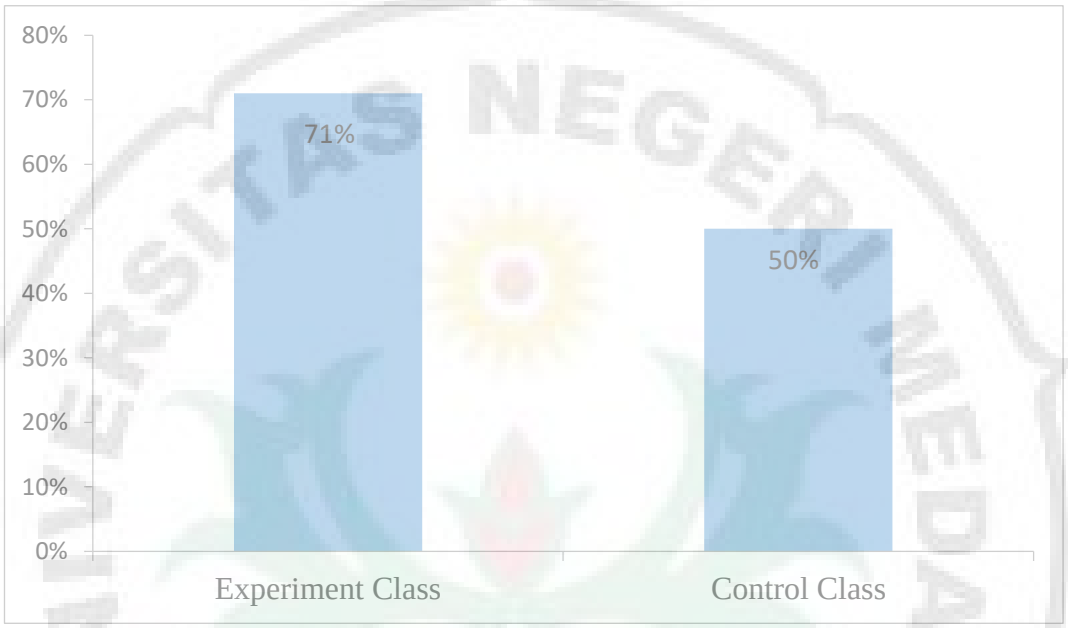
This research was conducted in SMA N 1 Tebing Tinggi February - March in class XI IPA school year 2017/2018. The population in this study were all class XI IPA SMA N 1 Tebing Tinggi, amounting to 2-class field. Sampling was done randomly in order to obtain a given class teaching with Using Module Based On Science Literation (experimental class) and the other classes were teaching with Using Module in the School (Control Class). Before doing research firstly, the sample class are given preliminary tests using 20 items (Appendix 5) that after valid and reliable.

The study was conducted during 3x meeting then do the final test. The results were analyzed using SPSS 22 for windows and statistic analyzed . Based on the analysis using SPSS 22 for windows and statistic analyzed obtained calculating student learning outcomes data from the procurement of pretest and post tests. Average of initial tests on experimental class is 35.97 and the average value of the initial test on the control class is 38.71. Through the initial test shows that the ability of the two classes is almost the same initial. At the end of the test, in experimental class gained an average of final test values. In experimental class was 81.53 Thus, in the control class at 69.72.

From the test in experimental class and control class, every class doing normality test, homogeneity test, hypothesis test and percentage of learning outcomes /gain (g). From normality and homogeneity test can shown from the data is normal distributed and homogeneous. Result of hypothesis data by using manual test. Hypothesis test that doing in this research is Right Side T-Test. Ha testing criteria is acceptable if the price of $t_{calculate} > t_{table}$ which means also reject Ho. From the data obtained $t_{calculate}$ (6.1) > t_{table} (1.686). If we connected with the module based on science literation, learning outcomes in experimental class have a high value of student. Where, percentage of learning outcomes in experimental class is 71% and percentage of learning outcomes in control class is 50%.

Improved learning outcomes in experimental & control class can be determined by calculating the normalized gain. Gain obtained in experimental class is 0.71 so that the increase was 71% and in the control class at 0.50 and increase by 50%. Based on research that conducted in SMA N 1 Tebing tinggi can be said that that using module can increasing student learning outcomes higher than using module in the school on during teaching learning process.

Figure 4.8 Percentage of learning outcomes



From the hypothesis, can be concluded that there are significant differences in learning outcomes of students taught by Using Module Based On Science Literartion compare with student learning outcomes by Using Module in the School on subject salt hydrolysis.