SMK NU Ungaran. Observations and interviews with teachers and students shows that students tend not to pay attention when the teacher explains the material. Interaction is also still impressed one direction, only the teacher to the student. It shows that the students' interest towards learning chemistry is still relatively low. The data confirmed the results of the field study questionnaire distributed to student's researchers, 32 of the 40 students stated that chemistry is a difficult subject to understand. This is consistent with the results of the study Sirhan (2007) and Talanquer (2011) Students have difficulty understanding the material chemistry, because chemistry related macroscopic concepts, submikroskopis, and symbolic. This was confirmed by the results of the questionnaire field study which showed that 31 of the 40 students stated that there was no relationship with the chemical social issues that exist in the environment around the student. This means that students cannot connect the macroscopic level, microscopic, and submikroskopis as revealed by Johnstone (2000).

Preliminary research began the last week of November 2013 to January 2014. Preliminary research activities include observation, interviews and document research to identify problems and learning needs in the School of Chemistry. Observations and informal interviews indicate that the need for teaching materials and reference chemical Fun-Chem important curriculum provided to students in 2013, this is due to the curriculum in 2013, teachers were not allowed to sell traded Student Worksheet (SW). The results of the analysis of questionnaire data indicates that students need a fun teaching materials that can be read in advance, so that students come to school already has sufficient knowledge of the house. Results of analysis of questionnaire data indicates that students are not familiar with the type of chemistry integrates social issues such as those used in the PISA tests.

3.2 The Result of the Fun-Chem Learning Materials Integrated Socio-Science

The definition of scientific literacy in PISA 2015 is the capacity to use scientific knowledge, procedural knowledge, and epistemic knowledge to identify questions, describe an evidence based conclusions in order to understand and help make decisions about the nature and changes to it through human activity. Three competencies required of a person under the framework of science literacy PISA 2015 can be seen in Table 1.

Tablel 1: Science Literacy Competency

No.	*Competence*	*indicator*
1.	Explaining of phenomena scientifically	Acknowledging, offer and evaluate explanations for natural phenomena and technology.
2.	Evaluating and Designing a Scientific Investigation	Explaining and assessing scientific inquiry and propose ways of addressing scientific questions.
3.	Interpreting data and scientific evidence	Interpreting data and scientific evidence Analyzing and evaluating scientific data, claims and provide arguments in a variety of presentation and draw appropriate conclusions

(Reference : OECD, 2013)

The Characteristics of Fun-Chem teaching materials are fun and integrated of social-scientific issues. Fun instructional materials were designed based on the findings of the current study filed that showed the involvement of students in learning chemistry is still relatively low (low student interest). According to the findings of Spiegel, McQuilan, Halpin, Matuk, Diamond (2013) young people will be engaged in learning science by using comics and illustrated stories. Based on these findings, researchers used a comic strip in Fun-Chem teaching materials in order to be able to increase the involvement of students, especially in science learning adolescence. The interview result also showed that students were interested in the redox material, because in the opening of learning activity it was presented by using comic strip.

The device used in the study of learning, geared to reach the third scientific literacy competencies as listed in Table 1. Wei, B & Thomas, G.P. (2006) found that the use of social science issues in learning can improve the scientific literacy of students, therefore, this study instructional materials Fun-Chem besides designed with fun features, contains comic chemistry, redox song joss, also uses social-scientific issues. MacFarlane (2001) said that learning log can be used as a tool to help students construct their knowledge, so FunChem learning material is also completed with learning log. Devices tested before learning to students, validated by experts materials and media experts to determine the feasibility of product development in this study. Validation by expert panel material done by experts. From the results of this expert assessment, then calculate the validity of teaching materials Fun-Chem as summarized in Table 2.

Table 2: Results Scores Matter Expert Assessment of Teaching Material Fun-Chem

Aspect	*Validator Score*	*Criteria*
Feasibility of Contents	0,97	Valid
Presentation components	0,96	Valid
Linguistic components	0,94	Valid
Characteristics of Social-sciences Insight Module	0,95	Valid
Results Overall aspects	0,96	Valid

The average score of Validator obtained from the whole aspect was 0.96 that is categorized as valid, based on the formula of Aiken, so it can be said that Fun-Chem teaching materials developed by researchers can be used in learning activity, though it still needed some revisions. Assessment rubric for Fun-Chem instructional materials was designed by referring to the assessment of curriculum text books issued in 2013 by the National Education Standards and Puskurbuk. Material experts will assess the feasibility aspect of the content, the presentation component, linguistic components, and characteristics component of socio-minded science teaching materials, while media experts assessed the graphical aspects.

3.3 The Increasing of Literacy Science of Students

Test the effectiveness of the product development of scientific literacy competencies students conducted research on the subject is class X SMK NU Ungaran total 40 students with research design one group pre-test post-test design. The

Licensed Under Creative Commons Attribution CC BY

instrument used to measure the competence of scientific literacy is shaped test item description that integrates scientific literacy competencies (refer to the PISA 2015 assessment framework) with a basis for subject matter competence redox.

Before treated, the students were given a pre-test about the competence of scientific literacy (which is integrated with the concept of redox mastery tests) and asked to complete a questionnaire of attitude toward science. After the pre-test, students were given a treatment of guided inquiry learning with Fun-Chem instructional materials integrated Socio-sciences. In the last meeting, students were given a post-test about the competence of scientific literacy (which is integrated with the concept of redox mastery tests) and asked to complete the questionnaire attitude toward science to see the increasing of scientific literacy competence, and attitude toward science improvement.

Data analysis that was used to see the difference of scientific literacy competency test results (which is integrated with a redox concept mastery test), was performed by using paired samples t-test. Paired samples t-test required a few prerequisites that the data pre-test and post-test should be normally distributed. Therefore, prior to testing the hypothesis, then testing the normality of the data pre-test and post-test using the program SPSSTM 17.0 Kolmogorov Smirnov and test showed that the data sig> 0.05, it meant that the data of pretest and post-test was normally distributed. Average data of pre-test and post-test are presented in Table 3.

Table 3: Results of Pre-Test and Post-Test Science Literacy Competency

Data	*Significance*	*Normality of Data*
Pre-test	0,084	Normal
Post-test	0,097	Normal

Pre-test results of all 40 students did not reach the minimum criteria KKM (70), while based on the results of the post-test, it was found that out of 40 students 35 of them reach the KKM (> 70). Other results can be seen from the average value in the classical style, where an increase in the average value of scientific literacy competency test (which is integrated with a redox concept mastery test) after a given treatment, that is, from the previous 31 to 78. Speaking about the thoroughness of the student, then the condition post-treatment showed increased than before treatment. When pre-treatment, the number of students who did not complete is 40 students, while the post-treatment condition only 5 students who did not complete.

The data in Table 3 showed that the significance of the data pre-test and post-test> 0.05 so that it can be concluded that the data were normally distributed. Because the data of pre-test and post-test is normal, the paired samples t-test could be performed. Data on improving the competence of scientific literacy was calculated by using the value of N-Gain. The results of the analysis of N-Gain Class X result in the average achievement level of 0.68 and into the category of being. Of the 40 students, students who achieve high N-Gain of 15 and 25 other students were in the middle category. Post-test results showed that 35 students achieved score > 70, with an average in the classical 78 which means that the implementation of teaching materials through guided inquiry Fun-Chem was effective in improving scientific literacy competence. The use of social issues in the teaching materials Fun-Chem turns equally effective in improving the competence aspect of scientific literacy. Similar findings were obtained from the research Barab, Sadler, Heiselt, Hickey & Zuiker (2010) that the use of socio-scientific issues can provoke inquiry skills, so as to increase the scientific literacy of students.

Table 4: The mean scores pre-test, post-test and N-Gain Literacy Aspects of Competence in Student Ability Group High, Medium and Low

Group	$\bar{X}$ *Pre-Test*	$\bar{X}$ *Post-Test*	$\bar{X}$ *N-Gain*	*Criteria*
High-ranking	43	82	0,69	moderate
Moderate-ranking	30	79	0,70	higher
Low-ranking	20	72	0,65	moderate

The resulting increase in competence aspects and aspects of students' attitudes toward science had shown the same pattern when viewed by a group of high ability, medium and low. This is associated with students' attitudes toward research science. It can be seen from Table 4:14 that shows the highest increase in the profile scientific literacy aspects of students' attitudes toward science achieved by a group of students capable of being, which is then followed by a group of high-ability students and the last is on the low-ability students. Similar findings resulted from research of Prokop, Tuncer, and Chuda (2007) who conducted a study of 655 students Slovakia to see the impact of students 'attitudes toward science (attitude toward science) to the achievement of science students' learning outcomes.

Results of classroom observations indicate that the low group students tend to be difficult to set up, it is suspected to be the reason why the increase in N-Gain Low also small groups. In the group was experiencing an increase of N-Gain is greatest, this is presumably because the group was happy and tend to show a high interest for learning, actively asking. This study was also intended to see how the students' response to learning using teaching materials Socio-minded Fun-Chem applied sciences through guided inquiry. To determine the students' response to learning using teaching materials Socio-minded Fun-Chem applied sciences through guided inquiry, researchers used a questionnaire which is reinforced by the interview after filling the questionnaire. Questionnaire to determine students' responses to a text resource questionnaire consisted of three indicators described in 20 of the questions. The questionnaire is based on a modification of the questionnaire developed by Tasdelen & Koseaglu (2008) on the text in the learning teaching materials.

3.4 Students' Response

The results of the analysis of the student's response obtained a score of 2593 which is in the category of accepting the instructional materials of Socio-minded Fun-Chem applied sciences through guided inquiry. If the indicators are grouped based questionnaire, students' response to the profile of teaching materials Fun-Chem can be seen in Figure 1.

Licensed Under Creative Commons Attribution CC BY

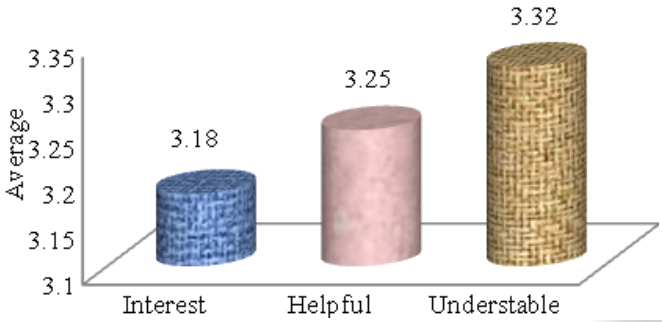

Figure 1: Student response profile of subjects fun-chem

Fun-Chem Instructional materials integrated social-sciences were considered as attractive, easy to understand, and assist students in learning the redox with the 2593 acquisition of scores in the category agreed. This is commensurate with the opinion of Tasdelen & Koseaglu (2008) which says a text teaching materials said to be good, if it gets a positive response of the students related aspects of the attractiveness of the (interesting), the extent to which can help students (helpful), and how the ease to understand by students (understandable).

4. Conclusion

Based on the results of the study can be summarized as follows: a) the results of the validation of integrated teaching material Fun-Chem socio-material sciences redox chemistry that was developed to obtain a valid criterion to validate the value of 0.96 for use in learning chemistry; b) the application of instructional materials sciences Fun-Chem integrated socio-effectively meet the criteria. It is shown the average results of tests of competence in the classical scientific literacy is 78 (score > 70) and the classical mastery learning which students completed 35 of 40 students (KKM above 70); c) students 'response to the implementation of teaching materials Fun-Chem integrated socio-sciences received a positive response, d) integrated Fun-Chem teaching materials developed socio-sciences can improve aspects of scientific literacy in the achievement of competencies with a mean N-gain is 0.68 and the aspect of students' attitudes toward science and the achievement of the N-gain 0.16.

References

[1] Barab, SA, Sadler, TD, Heiselt, C., Hickey, D., and Zuiker, S. 2010. Erratum to: Relating Narrative, Inquiry, and Inscriptions: Supporting Consequential Play. Journal of Science Education Technology. 19: 387-407.

[2] Blonder, R., Kipnis, M., Naaman, R.M., Hofstein, A.,. 2008. Increasing Science Teachers' Ownership through the Adaptation of the PARSEL Modules: A "Bottom-up" Approach. *Science Education International*. 19(3):285-301.

[3] Brist, A.H. 2012. The Effect Of A Contextual Approach To Chemistry Instruction On Students' Attitudes, Confidence, And Achievement In Science. *Proposal for Science Master*. Master Programme di Montana University.

[4] Bybee, R., McCrae, B., Laurie, R. 2009. PISA 2006: An Assessment of Scientific Literacy. *Journal of Research In Science Teaching*. 46(8):865–883.

[5] Conolly, M. 2012. *Using Modules to Teach General Chemistry*. University of St.Thomas. Tersedia: http://www.wcer.wisc.edu/nise/cl1/il [downloadable 13 November 2013].

[6] Dawson, C. (2002). The Scientific and the everyday: Two Different Ways of Knowing, Some Implication for Science Teaching. *The Australia Science Teachers Journal*. 38 (1).

[7] Fibonacci, A., Sudarmin, Haryani, S. (2014). Pengembangan Bahan Ajar Fun-Chem *Berwawasan Social-Science Berpendekatan Inkuiri untuk Meningkatkan* Literasi Sains, Tesis, Unnes.

[8] Holbrook, J & Rannikmae, M. 2007a. The Nature of Science Education for Enhancing Scientific Literacy. International Journal of Education. 29 (11): 1347-1362.

[9] Johnstone, A.H. 2000. Teaching of Chemistry-Logical or Psylogical?. *Chemistry Education: Research and Practice In Europe*. 1(1):9-15. [downloadable 13 August 2013].

[10] Liliasari. 2011. Building communities Character Nation Science Literacy Through Learning. Papers of the National Seminar on Science Education 2011 Unnes. Available: http://liliasari.staf.upi.edu/files/2011/05/Makalah-Semnas-UNNES-2011.Liliasari.pdf [downloadable June 4, 2013].

[11] MacFarlane, B. 2001. Developing Reflective Students: Evaluating the Benefits of Learning Logs within a business ethics program. Teaching Business Ethnic Springer. 5 (4): 375-387.

[12] Marks, R and Eilks, I. 2009. Promoting Scientific Literacy Using a Socio-criticaland Problem-Oriented Approach to Chemistry Teaching: Concept, Examples, and Experiences. *International Journal of Environmental & Science Education*. 4 (3): 231-245.

[13] OECD. 2013. PISA 2015 Science Framework Draft March 2013. Available: www.oecd.org [downloaded 28 November 2013].

[14] Prokop, P., Tuncer, G., Chudá, J. 2007. Slovakian Students' Attitudes toward Biology. *Eurasia Journal of Mathematics, Science, & Technology Education*. 3(4): 287-295.

[15] Sirhan, Gassan. 2007. Learning Difficulties in Chemistry: An Overview. *Journal of Turkish Science Education*. 4(2): 1-20.

[16] Sudarmin. (2014). Model Pembelajaran Kimia Berbasis Etnoasins (MPKBE) untuk Mengembangkan Keterampilan Generic, Literasi Sains, dan Sikap Ilmiah. Pidato Orasi Ilmiah Pengukuhan Profesor Bidang Ilmu pendidikan Kimia FMIPA Unnes. 23 Oktober 2014.

[17] Suharyadi, Permanasari,A., dan Hernani. 2013. Pengembangan Buku Ajar Berbasis Kontekstual Pada Pokok Bahasan Asam dan Basa. *Jurnal Riset dan Praktik Pendidikan Kimia*.1(1): 60-68.

[18] Souza, A.F.D and Porto, P.A. 2012. Chemistry and Chemical Education Through Textand Image: Analysis of Twentieth Century Textbooks Used in Brazilian Context. *Journal of Science and Education*. 21 (5): 705–727.

[19] Spiegel, AN, McQuilan, J., Halpin, P., Matuk, C., Diamond, J. 2013. Engaging Teenagers with Science Through Comics. *Springer Science and Education*

Licensed Under Creative Commons Attribution CC BY

Research. 43 (6): 2309-2326. [downloadable 13 August 2013].
[20] Talanquer, V. 2011. "Macro, Submicro, and Symbolic: The Many Faces of The Chemistry "Triplet". *International Journal of Science Education. Taylor & Francis.*33(2):179-195.Tersedia: http://cbc.arizona.edu/tpp/IJSE10_Triplet.pdf. [downloadable 9 Mei 2014].
[21] Tasdelen, U & Koseaglu, F. 2008. Learner-Friendly Textbooks: Chemistry Texts Based on a Constructivist View of Learning. Education Research Institute. 9 (2): 136-147.
[22] Trianto. 2009. *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta: Kencana.
[23] UNEP. 2012. 21 Issues for the 21st Century: Result of the UNEP Foresight Process on Emerging Environmental Issues. United Nations Environment Programme (UNEP). Nairobi, Kenya. Available: www.unep.org [downloaded 28 November 2013]
[24] Wei, B & Thomas, G.P. 2006. An Examination Of The Change Of Junior Secondary School Chemistry Curriculum in the PR China: In The View of Scientific Literacy. *Researh in Sciences Education (electronic journal of Springe*r). 36 (4): 403-418.
[25] Word, H. (2007). Analysis of Science Literacy Based on the results of the National PISA 2006. Jakarta: Center for Educational Assessment Research and Education Ministry.
[26] Yarden, A. 2009. Reading Scientific Texts: Adapting Primary Literature for Promoting Scientific Literacy. *Science Education Research*. 39: 307-311 [downloadable October 4, 2013].

Author Profile

Anita Fibonacci is a candidate Magister on Chemistry Education of graduate school-Indonesia University of Education. Her Expertise is in teaching-learning on chemistry.

Sudarmin, Professor of Chemical Education, He is now a lecturer in State University of Semarang (UNNES)-Indonesia. Her Expertise is in teaching-learning on chemistry. Her recent research is in developing models of teaching chemistry, especially with The learning model ethnoscince, generic skills, scientific literacy, and scientific attitude

Licensed Under Creative Commons Attribution CC BY