Development of e-modules based on science technology society integrated life based learning in history learning

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Abstract. Science and technology development as well as globalization stream bring shifting towards education field. The 21st learning paradigm put students as agents of change. Therefore, students involvement in solving social issues is indeed required. However, recent study indicated that technology has drawn students became rather individualistic and less socialize. Science Technology Society (STS) Life Based Learning integrated has become alternative solution in improving students’ capacity and problem solving towards education gap issues upon society needs. STS integrates science and technology to be utilized by society. Learning activities involving students actively in learning process of society environment. This research and development study attempts to generate education product in form of electronic module based Science Tecnology Society integrated Life Based Learning which was being validated by experts and improves history learning. This study engaged ADDIE model. Data collection performed observation, questionnaire, and interview. Study sample were three SMAN for observation and one school for trial, three history teachers, and 95 students. Research result of e-module development indicate content expert validation obtains 82% categorized as eligible, language expert validation expert obtains 94% categorized as very eligible, design validation expert obtains 91.6% categorized as very eligible and users test score is 83.2 categorized very high. Based on this result, electronic module based Science Technology Society integrated Life Based Learning is appropriate and effective as learning source in history subject.

1. Introduction

The development of science and technology and globalization steam have an effect in terms of education [1] A new paradigm of 21st century learning has emerged, which focuses on developing an innovative framework of students thinking [2] [3]. Students within 21st century have mastered information, media and technology upon their daily lives. Thus, it is necessary to develop social skills, which integrated with students emotional competence in order to solve the problems in their surroundings [4] [5] [6]. When students learn engaging technology, in a meaningful learning environment setting, they do not learn from technology, but learn using technology [7]. This is the paradigm of 21st century learning.

According to Nichols (2017), four main principles in 21st century learning are instruction should be student-centered, education should be collaborative, learning with context, and schools should be integrated with society [8]. In addition, education must be able to adapt to the dynamics developing within society, especially the demands and needs of the community [9]. 21st century learning is oriented towards lifestyle, thinking tools, learning research and digital knowledge work. The way it works requires the ability to collaborate, strengthen thinking tools, the ability to use technology, digital tools, and services, and a digital lifestyle [10] [11]. Covid 19 pandemic has forced all many people to immediately adapt and customize into a digital lifestyle. Thus, educators as the main actors
towards education are expected to immediately optimize their potential as that they need to be adaptive to digitalization.

Research results attempted by Wulandari, Umamah, and Sumardi 2017 reveals several issues in history learning, namely that students are not actively participate in obtaining various information to solve problems in learning history, as students considered history as less attractive to students [12] [13] [14]. Other research from Naim and Sumardi 2017 Historical learning, could not be adaptive towards the demands of current times, thus it makes students bored. The ideal history learning facilitates students to achieve the goals of learning history optimally [15]. Optimal history learning deals with aspects that can encourage and motivate students.

The research result conducted by Umamah 2017 regarding technology utilization in the classroom, students download material through 64% websites, 50% DVDs, smartboards, 46% digital textbooks, 45% online videos, 42% learning websites, 81% of them self-study, 81% of digital textbooks, materials studied through websites 81%, 80% of online videos, 79% of learning game-based systems, 77% of textbooks, 74% of social media, Skype 73%, Postcard 72 %, DVD / Movie 61% [16]. Based on the results of this study, it shows that effective learning demanded by Generation Z is learning that could utilize technological advances and allows students to learn effectively, adaptively, and innovatively. The results of the teacher performance analysis questionnaire could identify the needs analysis and gaps related to history learning at SMAN 2 Probolinggo, SMAN 3 Probolinggo, and SMAN 4 Probolinggo, which concludes that innovative learning facilities are needed, one of which is the need to develop e-modules.

According on description mentioned above and the results of the performance analysis of educators, it indicates a gap between the students need who were categorized Zgenerazion and the ability of educators regarding the development of teaching materials that are in accordance with the learning objectives. Hence, it is necessary to develop an e-module to facilitate students. E-module is a set of planned learning and is employed to assist students learn independently, and be able achieve learning goals. [16] The development of this E-module engages Science Technology Society model. Science Technology Society is being applied in educational programs around the world, since it allows to prepare students in participating effectively upon activities in a technology-oriented environment [17]. Keith Courville (2009) explains that Science Technology Society shows greater interest in implementing learning with more positive attitudes [18]. Another study from Nasser Mansour (2009) states that the Science Technology Society model is the preferred model for educators as it influences social behavior in the classroom [19]. This learning model is expected to be able to answer the demands of the 4.0 industrial revolution.

The industrial revolution 4.0 demands revitalization [20]. 2013 curriculum education obtains objectives in building character. E-module was developed is integrated with Life Based Learning. Life Based Learning that accommodates all forms of learning resources that allow to increase abilities [21].

Based on the description above, E-Module based on Science Technology Society integrated with Life Based Learning is very necessary to be developed as a medium for learning history and it is expected that this media could increase the effectiveness of history learning. Research and development of E-Module based on Science Technology Society integrated Life Based Learning has the following objectives: (1) Generate validated products; (2) Generate products to improve the history learning effectiveness.

2. Methods
This research is a research & development using the ADDIE model developed by Branch, 2009. The ADDIE model consists of (1) Analyze; (2) Design; (3) Develop; (4) Implement; (5) Evaluate. The procedure to be carried out by the researcher is presented in the following figure.
This research and development apart from producing products, also examines the effectiveness of the products generated [22]. Data collection in this study was using documentation, observation, questionnaires, interviews, and tests. Research subjects were students and high school history educators of Probolinggo city.

Data analysis employed qualitative data analysis techniques and quantitative analysis techniques. Qualitative data analysis aims to analyze data based on observations, questionnaires, expert advice and documentation. Meanwhile, quantitative data analysis aims to define the quality of the developed modules based on experts validation and users and examine its effectiveness.

Expert validation data analysis was performed engaging percentage data analysis with following formula.

\[ p = \frac{\sum x}{\sum xi} \times 100\% \]

Details:
\( P \) : percentage
\( \sum x \) : total number of respondents answers
\( \sum xi \) : total ideal score of 1 item

The calculating result of questionnaire percentage then being analyzed through the product eligibility criteria. The following table is the product eligibility.

| Achievement Level | Qualification | Information       |
|-------------------|---------------|-------------------|
| 85% - 100%        | Very Good     | No need to revise |
| 75% - 84%         | Good          | No need to revise |
| 65% - 74%         | Enough        | Revised           |
| 55% - 64%         | Less          | Revised           |
| 0 - 54%           | Very Less     | Revised           |

Source: Arikunto, 2008:216

Effectiveness data using E-Module E-Module Development Based on Science Technology Society Integrated Life Based Learning in History Subject for Class XI Senior High School was obtained through the results of students’ pre-test and post-test. Then the calculation of its effectiveness was conducted using the relative effectiveness (ER) formula as follows.

\[ ER \left(\frac{Mx2 - Mx1}{\frac{Mx1 + Mx2}{2}}\right) \times 100\% \]

Details:
\( ER \) = relative effectiveness level
\( Mx1 \) = mean atau the mean class value after the action
\( Mx1 \) = mean atau the mean class value before the action

The analysis result of relative effectiveness then being interpreted based on the following criteria:

| relative effectiveness test results | Effectiveness category |
|-----------------------------------|------------------------|
| 91% - 100%                        | Very high effectiveness|
| 61% - 90%                         | High effectiveness     |
31% - 60%  Medium effectiveness  
11% - 30%  Low effectiveness  
0% - 10%  Very low effectiveness  
Source: Sugiyono, 2014:94-95

3. Results and Discussion
The result of this research and development is a draft of E-Module Based on Science Technology Society Integrated Life Based Learning in History Subject for Class XI SMA, which is completed for expert validation and being examined for its effectiveness. The following is an explanation of the activities performed within the research, namely: (1) the development process, (2) expert validation, (3) testing and effectiveness testing.

3.1 E-Module Draft Development Process
The process of developing a draft is an adjustment to the development model used, namely the ADDIE model. Based on this model, the steps were taken include: (1) Analyze, (2) Design, (3) Develop, (4) Implement, and (5) Evaluate [25]. The following steps are carried out in development research described in table 1:

| Tabel 3. Development Steps | Steps | Work Log |
|----------------------------|-------|----------|
| Analyze                    |       | The researcher conducts an analysis; Validates performance gaps, defines instructional goals, analyzes students, resources required, recommends potential delivery systems, writes project management plans at Problinggo High School |
| Design                     |       | Researcher Conducts a task inventory, writes performance goals, generates test strategies, calculates investment. |
| Development                |       | Researcher generates the content, selects and develops media, formulates guidelines for students, develops guidelines for educators, conducts formative revisions, conducts trials. |
| Implementation             |       | Researcher prepares educators and students. |
| Evaluation                 |       | Researcher determines evaluation criteria, selects evaluation tools, conducts evaluations |

3.2 Expert Validation
Expert validation is a feasibility test related to the material, language, and learning design within E-Module Based on the Integrated Science Technology Society Life Based Learning in History Subjects in Class XI SMA.

The following description explains the analysis content expert validation data, linguist validation, and learning design expert validation of electronic module development products based on Integrated Science Technology Society Life Based Learning.
3.2.1 Content expert validator
The content expert validator was Mr. Suharto, S.S., M.A. The results of the data analysis obtained a percentage value of 82%, which was categorized as "good" and "does not need revision". Then the validator provides product comments, namely: The E-Module is good, it can be continued as a learning material about the history of revolution in various countries, it is good and appropriate.

3.2.2 Linguist validation
The linguist validation was carried out by Mrs. Anita Widjianti, S.S., M.Hum. The results of the analysis obtained a percentage value of 94%, which was categorized as "very good" and "No Need for Revision". The comments and suggestions given are that the product is suitable for use as a high school learning resource.

3.2.3 Design expert validation
The learning design expert validation was carried out by Mr. Yanuar Nurdiansyah., S.T., M.CS. The results of the design expert validation obtained a percentage value of 91.6%, which is categorized as "Very Good" and "No Need for Revision" qualifications. The comments and suggestions given are that the product is good and continue to be tested.

3.3 Product Trials
The trial of E-Module products based on the Integrated Science Technology Society Life Based Learning in the History Subject of Class XI SMA was performed on research subjects, namely educators as users and students in small group trials.

3.3.1 The User Test
The user test was attempted in a high school with history educator, namely Arief Muhammad Ramadhani, S.Pd. The results of the user test data analysis obtained a percentage value of 83.2% which is categorized as "Very Good" and "No Need for Revision". The following is the user trial assessment table:

| No. | Assessment Aspects                                               | Rating Score |
|-----|-----------------------------------------------------------------|--------------|
| 1.  | The accuracy of the title with the material being discussed     | ✔            |
| 2.  | The accuracy of the material with the learning objectives       | ✔            |
| 3.  | Chronology of stories                                          | ✔            |
| 4.  | The suitability of the image illustration with the material     | ✔            |
| 5.  | The accuracy of the grammar used                               | ✔            |
| 6.  | E-module design                                                | ✔            |
| 7.  | Selection of writing fonts                                     | ✔            |
| 8.  | Selection of font size                                         | ✔            |
| 9.  | The ability to provide important and new information            | ✔            |

**Total Score = 42**
3.3.2 Small Group Trial

The small group test involved 9 class X students in each school who were the research subjects, namely students at SMAN 3 Probolinggo. At this stage, researchers performed learning with E-Module Based on Science Technology Society Integrated Life Based Learning as a learning resource and are focused on determining the level of effectiveness of E-module products. The results of the small group test obtained a recapitulation of the evaluation values pre test and post test.

The value of the Pre Test and Post Test that students have from small groups can be seen from the learning results obtained. The trial values are presented in the following diagram:

![Bar Chart: Average score of Pre Test and Post Test for the Small Group](image)

3.3.2.1 Effectiveness Test

Data analysis was conducted to determine effectiveness increase through small group trials. Based on the bar chart above, it can be observed the increase of students learning outcomes after applying using e-modules based on the Science Technology Society integrated Life Based Learning in history subjects in class XI. The following shows the paired statistical data, paired correlation, paired sample t-test and normality test based on the values of the pre-test and post-test in small group subjects.

| Value    | Mean | Std. Deviation |
|----------|------|----------------|
| Pre Test | 40.15| 6.37           |
| Post Test| 81.44| 3.76           |

Based on table 3, it is recognized that the average value of the Pre Test is 40.15 (Std. Deviation = 6.37) and the Post Test is 81.44 (Std. Deviation = 3.76). The mean value of the Post Test is greater than the value of the Pre Test in small group subjects. Thus, it can be concluded that there has been an increase in the knowledge value of students (in small groups) after using e-modules based on the Science Technology Society integrated Life Based Learning in history subjects in class XI.
Table 6. Test results Paired Correlation

| Total N | Correlation | Value Sig |
|---------|-------------|-----------|
| 9       | 0.564       | 0.114     |

Table 4 shows a significance level of 0.114 (greater than the threshold value = 0.05). Thus, there is no significant correlation between the pre-test and post-test scores in the small group at the 5% confidence level (0.39> 0.05).

Table 7. Results of Paired Sample T-Test

| Value t  | Df  | Value Sig, |
|---------|-----|------------|
| 41.28   | 8   | 0.00       |

Based on table 5, it reveals that the t test value is 41.28 (df = 8) and a significance value of 0.00. The significance number is smaller than the confidence level threshold value of 5% (0.00 <0.05). Thus, it can be concluded that there is a significant difference between the Pre Test and Post Test scores in small group subjects.

Based on table 5, the results of the pre-test and post-test score average, then the effectiveness is calculated using the Relative Effectiveness (ER) formula which analysis is as follows.

$$ER = \frac{81.44 - 40.15}{\frac{40.15+81.44}{2}} \times 100\% = 67.91\%$$

Based on the results of the above analysis, the value was 67.91%. Thus, by being consulted on the relative effectiveness test criteria, a product qualification was obtained in the "high effectiveness" category.

3.3.2.2 Normality test
In this study, the normality test used the Shapiro-Wilk test. Shapiro-Wilk Test being used since the samples in the small group trial were 9. Hence, the Shapiro-Wilk test is more suitable for small sample sizes (<50 samples) (Balogun, 2015; Laerd Statistics, 2018; Shapiro & Wilk, 1965). The results of the small group normality test can be seen in the table below.

Table 8. The Results of Test of Normality

| Shapiro-Wilk Statistic | df | Sig. |
|------------------------|----|-----|
| Pre Test               | .911 | 9 | .322 |
| Post Test              | .900 | 9 | .254 |

Based on table 6, it is found that the normality value of the Pre Tests is significant, 322 (df = 9), and the normality value of the Post Test is significance of 0.254 (df = 9). Explain the significance number greater than the threshold value of the normal level of 0.05 (with details = the significance number> 0.05). Thus, it can be concluded that the Pre Test and Post Test data are normally distributed.
3.3.3 Large Group Trials
The large group effectiveness test in this study was conducted on 34 SMA class XI IPS students at SMAN 3 Probolinggo. At this stage, researchers carry out learning using E-Module Based on Science Technology Society Integrated Life Based Learning as a learning resource, which is focused on knowing the level of product effectiveness in learning that is reviewed through the value data of student learning outcomes. The trial results obtained a recapitulation of the pre-test and post-test evaluation values which are presented in the bar chart as follows.

**Bar Chart2. Results of the Pre-Test and Post-Test Mean scores for the Large Group**

![Bar Chart](image)

3.3.3.1 Effectiveness test
Data analysis was carried out to determine the effectiveness level of students' history learning through large group trials. Based on the bar chart above, it can be seen the increase of students learning after engaging e-modules based on the Science Technology Society integrated Life Based Learning in History subjects in class XI. The following shows the paired statistical data, paired correlation and paired sample t-test based on the pre-test and post-test values for small group subjects.

**Table 9. The Results of Paired Statistic**

| Value   | Mean | Std. Deviation |
|---------|------|----------------|
| Pre Test| 41.63| 5.98           |
| Post Test| 85.16| 4.73           |

Based on table 7, it is known that the average value of the Pre Test is 41.63 (Std. Deviation = 5.98) and the Post Test is 85.16 (Std. Deviation = 4.73). The average Post Test score is greater than the Pre Test value in large group subjects. Thus, it can be concluded that there has been an increase in the knowledge value of students (in large groups) after using e-modules based on the Science Technology Society integrated Life Based Learning in History subjects in class XI.

**Table 10. The Results of Paired Correlation**

| Value N | Correlation | Value Sig |
|---------|-------------|-----------|
| 34      | 0.969       | 0.00      |
Table 12 shows a significance value of 0.00 (less than the threshold value = 0.05). Thus, there is a significant correlation between the pre and post test scores of the small group at the 5% confidence level (0.00 <0.05).

### Table 11. Paired Sample T-Test Results

| Value t | Df | Value Sig. |
|---------|----|------------|
| 43.52   | 33 | 0.00       |

Based on table 8, it is found that the t test value is 43.52 (df = 33) and a significance value of 0.00. The significance number is smaller than the confidence level threshold value of 5% (0.00 <0.05). Thus, it can be concluded that there is a significant difference between the Pre Test and Post Test scores in large group subjects.

Based on table 6, the average results of the pre test and post test, then the effectiveness is calculated using the Relative Effectiveness (ER) formula which analysis is as follows.

$$ER = \frac{85.16 - 41.63}{\frac{41.63+85.16}{2}} \times 100\% = 68.67\%$$

Based on the results of the above analysis, the value was 68.67%. Thus, by being consulted on the relative effectiveness test criteria, a product qualification was obtained in the "high effectiveness" category.

#### 3.3.3.2 Normality test

In this study, the normality test used the Shapiro-Wilk test. The use of the Shapiro-Wilk test is because the samples in the small group trial were 34. The Shapiro-Wilk test is more suitable for small sample sizes (<50 samples) (Balogun, 2015; Laerd Statistics, 2018; Shapiro & Wilk, 1965). The results of the small group normality test can be seen in the table below.

### Table 12. The Result Test of Normality

|             | Shapiro-Wilk |
|-------------|--------------|
|             | Statistic    | df | Sig.  |
| Pre Test    | .958         | 34 | .215  |
| Post Test   | .942         | 34 | .070  |

Based on table 9, it is found that the normality value of the Pre Test is significant, 215 (df = 34), and the normality value of the Post Test has a significance of 0.070 (df = 34). Explain the significance value greater than the threshold value of the normal level of 0.05 (with details = significance value > 0.05). Thus, it can be concluded that the Pre Test and Post Test data are normally distributed.

Based on the results of this study, the development of an E-Module based on the Science Technology Society integrated Life Based Learning in history subjects in class XI SMA can increase the effectiveness of learning history with the support of relevant previous research. The journal from Kok & Schoor explained the views of social science teachers stating that the Science Technology Society learning applied in learning was able to provide better learning outcomes than penebajaran I activities compared to learning activities II [23]. The journal from Bettencourt, Velho & Almeida concludes that the results of interviews with teachers in the Science Technology Society model of high school show positive things for students while participating in classroom learning [24]. The journal of
Nasser Mansour states that the Science Technology Society model is the preferred model for educators because it can influence social behavior in the classroom [25].

The journal from Mai, etc, explained the results of a survey on the application of Science Technology Society learning, arguing that an increase in the assessment of learning outcomes in social sciences in societal learning provided an increase in student learning outcomes with the results of the comparison of the first meeting of 48.05% then at the second meeting; to 73.30% [26]. The journal from Akcay & Yager, describes the results of learning activities using the Science Technology Society model which can improve learning compared to a model that focuses on educators in grade nine [27]. The journal from Keith Courville explains that the Science Technology Society shows greater interest in implementing learning, more positive attitudes towards the scientific profession, and increased conceptual mastery than students who are taught traditionally, textbooks, or inactive behavior [31].

The research from Minasari explained that there were differences in the understanding of the material of students using the Science Technology Society model with a configurational learning model with the size of the learning outcomes of students [28]. Angelia's research stated that the module using the SETS model was able to improve student learning outcomes by 92.6% with a very practical category [29]. Research conducted by Ratnaningtyas said that learning using the Science Technology Society model was able to improve students' cooperative attitudes reflected in the result score. observation obtained 76.67% in the very good category [30].

Journal of Maclean. 2007 stated that Life Based Learning is able to provide added experience for high school students to solve social problems in their community [31]. Journal from Staron. 2011 in (Sudira n.d) Life Based Learning learning is able to invite students to find solutions to problems in the community by analyzing the root of the problem in terms of social science learning outcomes in schools [32].

4 Conclusion

The results of the development of electronic E-Module E-Module Based on Science Technology Society Integrated Life Based Learning in the History Subject of Class XI SMA have been expertly validated, namely: (1) validation of material experts got a percentage value of 82% which was included in the category "good" and "No Need for Revision" in product eligibility criteria, (2) linguist validation gets a percentage value of 94% which is included in the" very good "and" No Need Revision" category in the product eligibility criteria, and (3) design expert validation gets a percentage value of 91.6% are included in the category "very good" and "no need for revision" in the product eligibility criteria. Besides being validated by experts, the E-Module Based on the Science Technology Society Integrated Life Based Learning in the History Subject of Class XI SMA is also validated by users, who get a percentage value of 83.2% which is included in the "good" category in the product eligibility criteria.

E-Module Based on Science Technology Society Integrated Life Based Learning in History Subject for Class XI SMA is effective in increasing students' knowledge. The effectiveness level of the module was obtained from two trials carried out, namely: (1) small group trials got a percentage value of 67.91% which was included in the "high effectiveness" category in the relative effectiveness criteria, (2) large group trials got a percentage value of 68.67% which included in the category of "high effectiveness" in the criteria for relative effectiveness.

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References

[1]. Umamah, N, et al 2016 Penerapan Berbasis Proyek Dengan Penilaian Produk Untuk Meningkatkan Kreativitas Dan Hasil Belajar Sejarah Peserta Didik Kelas X MIA 4 SMA Negeri 1 Gambiran Jurnal Pendidikan Dan Humaniora 511

[2]. Hartnett, M, St George, A, and Dron, J 2014 Exploring motivation in an online context: A case study Contemporary Issues in Technology and Teacher Education., 141, 31-53

[3]. Liffler, M, and Tschesner, A 2013 The Internet Of Things and the Future of Manufacturing McKinsey & Company

[4]. Hall, C D 2018 Evaluating The Depth Of The Integration Of 21st Century Skills In A Technology-Rich Learning Environment by Presented to the Educational leadership program of the College of Saint Elizabeth in partial fulfilment of the requirements for the degree of Doctor of Education March 2018, March

[5]. Radu, F, Radu, V, and Croitoru, G 2018 The Advantage Of The New Technologies In Learning Recent Researches in Artificial Intelligence, Knowledge Engineering and Data Base 97 : 150-155

[6]. Ghavifekr, S, and Rosdy, W A W 2015 Teaching and Learning with Technology: Effectiveness of ICT Integration in Schools International Journal of Research in Education and Science 12175–191

[7]. Lee, C beng 2017 Initial development of the Meaningful Learning with Technology Scale MeLTS for high-school students Scale MeLTS for high-school students Interactive Learning Environments, 4820 March, 1–12 https://doi.org/10.1080/17551315/2017/1283336

[8]. Costley, Nichol K C 2017 The Positive Effects of Technology on Teaching and Student Learning

[9]. Naim, M, et al 2017 Upaya Meningkatkan Ektivitas Dan Hasil Belajar Penerapan Melalui Model Pembelajaran Jurnal Pendidikan Dan Humaniora 551:75

[10]. Trilling, B and Fadel, C 2009 21st-century skills: learning for life in our times US: Jossey-Bass A Wiley Imprint

[11]. Kurniawati, A V, Naim, M, and Soepeno, B 2017 Implementasi Pembelajaran Kooperatif NHT Menggunakan Media Hypertext Untuk Meningkatkan Kreativitas dan Pencapaian Akademik Peserta Didik Mata Pelajaran Sejarah XI IPS di SMAN 1 Jenggawah Improve Students ’ Creativity And Achievement History of XI IPS 1 Jurnal Edukasi 43:1-14

[12]. Wulandari, R S, Umamah, N, and Suranto 2014 Penerapan Model PembelajaranSiklusBelajar Artikel Ilmiah Mahasiswa, 20144, 1–7

[13]. Safitri, D ,Umamah, N, and Sumardi 2019 Accelerated Learning Integrated by Discovery Learning in History Course: How Z Generation Learn IOP Conf Series: Earth and Environmental Science 243 https://doi.org/101088/1755-1315/243/1/012151

[14]. Na’im, M, and Sumardi 2017 The Development Of Digital Module through Exe Application-Based to Improve Learners Attraction and Learning Outcomes of Indonesia History Mohammad Na ‘i m and Sumardi History Education , Faculty of Educator Training and Education University of Jember The International Journal of Social Sciences and Humanities Invention 47.; 47, 3582–3587 https://doi.org/1018535/ijsshi/v4i703

[15]. Umamah, N 2017 Pembelajaran Sejarah Kesiapannya Menghadapi Tantangan Zaman Yogyakarta: Penerbit Ombak

[16]. Permendikbud 2013 Kerangka Dasar dan Struktur Kurikulum Sekolah Atas/Aliyah Jakarta: Peraturan Menteri Pendidikan dan Kebudayaan

[17]. Akcay, B, & Akcay, H 2015 Effectiveness of Science-Technology-Society STS Instruction on Student Understanding of the Nature of Science and Attitudes toward Science, 31, 37–45

[18]. Courville, K 2009 Constructivism: Creating a Dynamic, Active, and Engaging Scientific Classroom, 1–19

[19]. Mansour, N 2009 Bulletin of Science Technology & Society https://doi.org/101177/0270467609336307
[20] Hussin, A Yahya 2018 Education 4 0 Made Simple : Ideas For Teaching International Journal of Education & Literacy Studies 63:92–98
[21] Mcewan, M, Jasinski, M, and Jasinski, M 2006 Life Based Learning In attendance
[22] Sugiyono 2014 Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R & D Bandung: Alfabeta
[23] Branch, RM 2009 Intructionaldesaign: the ADDIE Approach New york: Springer
[24] Kok, L, & Schoor, R Van 2014 A science-technology-society approach to teacher education for the foundation phase : Students ’ empiricist views, 41, 95–110
[25] Câitia Bettencourt, etc 2011 Biology teachers’ perceptions about Science-Technology-Society STS education Procedia Social and Behavioral Sciences 15 2011 3148–3152
[26] Mansour, N 2009 Bulletin of Science, Technology & Society https://doi.org/10.1177/0270467609336307
[27] Mai, M Y, Halim, I., Yaseen, R M, & Meerah, T S M 2014 Science, Technology, and Society STS Issues, 203–212 https://doi.org/104018/978-1-4666-6102-8ch011
[28] Yager, R E, &Akçay, H 2007 What Results Indicate Concerning the Successes with Science Technology Society Instruction Science Educator, 161, 13–21
[29] Courville, K 2009 Constructivism: Creating a Dynamic, Active, and Engaging Scientific Classroom, 1–19
[30] Uci Minasari 2017 Pengaruh Penerapan model pembelajaran STM Terhadap kemampuan pemahaman konsep siswa pada pokok bahasan ekosistem kelas VII MTs paradigm Palembang
[31] Anggi Angelia 2017 Pengembangan Modul Fisika Dengan Pendekatan Science Environment, Technology, And Society SETS Untuk Kelas Viii Smp Materi Gerak Dan Gaya UIN Imam Bonjol Padang
[32] Latifah ratna ningtyas 2017 Pengembangan Perangkat Pembelajaran Fisika Berbasis Model Pembelajaran Science Technology Society STS Dalam Peningkatan Penguasaan Materi Dan Pencapaian Kerjasama Pada Peserta Didik SMA Universitas Negeri yogyakarta
[33] Maclean, R 2007 Vocational and Higher Education : Issues , Concerns and Prospects, 1–14
[34] Sudira, P nd Life-Based Learning Dalam Pendidikan Teknologi Dan Vokasional, 1–10