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Development of an e-practical guidebook based on chemo-entrepreneurship integrated with islamic values

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Abstract

Development of an E-Practical Guidebook Based on Chemo-Entrepreneurship Integrated with Islamic Values. *The aim of this research is to determine the characteristics, feasibility and response of students to the E-Practical Guidebook based on chemo-entrepreneurship integrated with Islamic values in acid-base material. This research uses a 4D instructional development model which is limited to the development stage. The test subjects included students in class XI MIPA 5 at SMAN 12 Semarang. Data collection instruments used interviews, literature studies, and questionnaires. Characteristics of the development product in the form of an E-Practical Guidebook based on chemo-entrepreneurship which is linked to real life, equipped with economic analysis, integration of Islamic values in each practice, there is an inspiring story of Muslim entrepreneurs, and a study of halal products in the closing section, accessed via the heyzine web platform. The results of validation tests by material experts and media experts show that the E-Practical Guidebook is declared very feasible, proven by the validation results by material and media expert validators, the $\bar{X}$ values are 55.34 and 30.67 respectively. The results of student responses at the limited trial stage stated that the E-Practical Guidebook was included in the good category with an $\bar{X}$ value of 61.93 and an ideal percentage of 82.57%.*

Keywords: *CEP; Chemo-entrepreneurship; Development; Guidebook; Islamic Values*

Introduction

Chemistry teaching and learning activities really need supporting activities in the form of laboratory experiments. This is because this method is a form of procedural skill. Chemistry emphasizes scientific activities in laboratories that require media that can be operated in learning (Wikhdah, Sumarti & Wardani, 2015) . Based on the results of pre-research, namely interviews with class XI high school chemistry educators, learning only comes from textbooks and worksheets. Students also stated that chemistry practicums were rarely carried out, due to the transition of learning systems and the lack of special practicum support. On the other hand, according to the class Teachers more often use lecture and question and answer methods. However, only a few students are active, so teaching and learning activities are more teacher-centered. This condition causes the low skills of some students. Based on pre-research results, 90% of students said acids and bases were medium to difficult material. Acid-base material is classified as difficult because some students have difficulty understanding pH calculations and misconceptions about neutralization reactions in titration (Sari & Seprianto, 2018).

Aspects of the 2013 curriculum include knowledge, skills and attitudes. Practicums can improve students' skills, not only in the cognitive aspect (Qudsiyah & Hadisaputro, 2013). Based on the results of pre-research on students, there is no specific practical guidebook yet. According to the class If there is no guide, the teacher will make it himself and explain it before the practical begins. The practicum guide has not been based on or integrated with the learning base. The practicum guidebook was developed with the aim of guiding students in carrying out the practicum so that the practicum objectives can be achieved (Annisa & Sari, 2021). *E-books* were chosen because apart from being interactive media, students can open *e-book links* at any time pun and in where even before the practicum is carried out, with so students are more independent and learning is not monotonously centered on the teacher (Yulianti, Permanasari & Heliawati, 2019).

E-books can be used with innovative learning bases. One of the innovations in chemistry learning to improve skills is by conducting *Chemo-entrepreneurship* (CEP) based practicums. CEP is an approach to learning chemistry that deals with phenomena in concrete objects (Prayitno, Wijayati & Mursiti, 2017). Apart from increasing understanding of concepts, CEP can increase creativity in processing materials that can be applied to everyday life in order to create products that are useful and have economic value, thus allowing students to increase their entrepreneurial drive and interest (Wikhdah, Sumarti and Wardani, 2015).

Based on the results of interviews with the deputy principal for curriculum, 38.78% of alumni continued their studies, 53.04% chose to work, and the rest were in the other category. The pre-research questionnaire stated that after graduating some students would continue their education, while others did not yet know their purpose . According to students, entrepreneurship can be done even while studying, but some students do not have an interest in entrepreneurship. CEP-based learning has also never been implemented. Therefore, there is a need for an entrepreneurial learning base. The benefits of entrepreneurship for students who do not continue their education after graduating are that they can use the skills they have to produce products that can be bought and sold and have economic value, not only jobs for themselves, but can provide jobs for other people (Arieska & Kamaludin, 2018).

Entrepreneurship is found in the word of Allah SWT, QS. Ash-Shaf: 10-11, namely in the word *tijarat*. The meaning of the word *tijarat* means buying and selling with the aim of making a profit or profit. Entrepreneurship as found in the Koran is not only aimed at making transactions, but as a form of trading to worship Allah (Maulana, 2019). Like the story of the Prophet Muhammad SAW, who traded since he was 12 years old, thanks to his honesty in trading, he was appointed leader of the trade caravan. Honesty is one of the Islamic values that an entrepreneur must have (Ashari, 2021). Based on the results of interviews, there are no learning sources and media that integrate Islamic values. The majority of Indonesian people are Muslim. Thus, Islamic values are integrated in general, such as entrepreneurial attitudes, the concept of buying and selling, and the halalness of products being bought and sold, so that they can be implemented as KI-1 achievements at the high school level. Based on the problems, it is necessary to develop an *E-Practical Guidebook* (*e-book* practicum guide) based on *Chemo-entrepreneurship* integrated with Islamic values which aims to produce viable products and respond to students.

Method

This research uses the instructional development stages of 4-D Thiagarajan. This research is in the form of *Research and Development* (R & D). The 4D stages are divided into four stages which include defining , designing , developing *and* disseminating (Thiagarajan, Semmel and Semmel, 1974). The aim of this research is to develop *an E-Practical Guidebook* based on *chemo-entrepreneurship* integrated with Islamic values in acid-base material. The trial design was carried out on 30 students of class XI MIPA SMAN 12 Semarang. Media that has been declared suitable by the material and media validator is then implemented in learning, after which students assess the quality of the product and provide responses so that the product can be improved. Data collection techniques were carried out using interviews, literature studies, questionnaires and documentation.

Results and Discussion

This research is research on "E-Practical Guidebook Based on Chemo-Entrepreneurship Integrated with Islamic Values in the Material "Acid-Base Titration". This research uses the instructional development stages from Thiagarajan's 4-D which were modified to 3-D, namely define, design, and develop. There are several analyzes at the define stage, namely front end analysis, student analysis, task analysis, concept analysis, and learning objective analysis (Setiadi & Zainul, 2013; Guci, Zainul, & Azhar, 2017).

The *define* stage aims to establish and define instructional requirements for the development of *the E-Practical Guidebook*. The analysis begins with front *-end analysis* as a start which aims to analyze fundamental problems in learning. Analysis was carried out through observation, interviews with educators, and analysis of student needs questionnaires. The aim is to find out chemistry learning problems from the perspective of

educators and students. Based on pre-research data, it shows that problems in chemistry teaching and learning activities can be viewed from the learning media. The only media used are textbooks, worksheets and Power Point. Teachers have not used interactive media so that learning is more student-centered. Apart from that, problems can be seen from learning methods. As a result of the transition from online to *blended* to 100% face to face, practicums were only carried out on certain materials, such as acids and bases, salt hydrolysis, and titration. This happens because practical learning does not use a special practical guidebook, the only guidance available is in the form of worksheets on LKS. If there is none, the teacher will make it himself and explain it before the practicum. According to the results of the interview, chemistry learning has not used a learning base. The learning base proposed by researchers is *chemo-entrepreneurship* integrated with Islamic values.

According to educators, *chemo-entrepreneurship practicum* has never been applied to chemistry learning. *Chemo-entrepreneurship* is related to the process of how materials are transformed into something useful and has sales value. CEP-based learning is interesting because apart from being able to improve students' skills in creating products, it can also foster interest or motivation in entrepreneurship. Based on the pre-research results, it was stated that some students knew the practical rules in the laboratory. However, according to interviews with educators, many students still do not comply with the rules in the chemistry laboratory, for example eating and drinking in the laboratory, and not wearing laboratory coats. This problem is certainly the reason for developing a special practicum guide. The integration of Islamic values chosen is the concept of Islamic entrepreneurship and the study of product halalness, because, it is a general concept that can be applied in high school as an achievement of KI-1. After analyzing the problem, the researcher decided to develop learning media. The media proposed by researchers is a practical guidebook with provisions according to students' needs. These provisions are adjusted to the analysis that will be carried out at the next stage.

Second *defining* stage, namely learner *analysis*, is a study of students with the aim of knowing the character and needs of students so that they are relevant to development and design within them. The results of the student questionnaire stated that 90% of students were enthusiastic and interested if CEP-based practicum was applied in learning. However, there is no specific practicum guidebook yet, students are also interested in developing a practicum guidebook with an illustrated and colorful display. The presence of designs, attractive colors, and language that is easy to understand in teaching materials can enliven students' enthusiasm for learning (Sagita, Azra & Azhar, 2017) .

Third *define* stage is *task analysis*, the aim of this step is to identify main skills, as well as analyze other skills that are possible to achieve. The steps include assignments in material according to *the E-Practical Guidebook* , so that KI and KD can be achieved. The tasks include practical work, assignment of skills such as packaging and selling products, and calculating profits. The fourth *define* stage includes concept *analysis* which aims to analyze the main concepts that will later be put into practice, arrange them in order or levels, and divide these concepts into more critical ones. Concept analysis was made to determine the content of the material for KI and KD can be achieved. The material concept contained in *the E-Practical Guidebook* is acid-base titration material according to KD 4.13, namely the practicum for making composite soap and toothpaste and its tests which include: (1) the process of making kaolin solid soap with citronella essential oil and the saponification number test using titration method (2) The process of making composite toothpaste combining egg shells with baking soda and testing $CaCO_3$ levels using the titration method. The fifth step is formulating learning objectives (*Specifying Instructional Objectives*) which aims to convert the results of *Task Analysis* and *Concept Analysis* which produces a statement of the objectives of the teaching materials to be developed.

After the definition, the next stage is the media designing stage, namely *the design stage*. Selection of media and formats is based on students' problems and needs. The media chosen is *the E-Practical Guidebook* based on *chemo-entrepreneurship* integrated with Islamic values. *The E-Practical Guidebook* developed is accessed by students via the web platform on Google https://heyzine.com/. *Heyzine* can display images, graphics, video, audio, and links can be added to make *the e-book* look more attractive. Animation and *slideshow features* add to the feeling as if opening a printed book (Erawati, Purwati & Saraswatı, 2022).

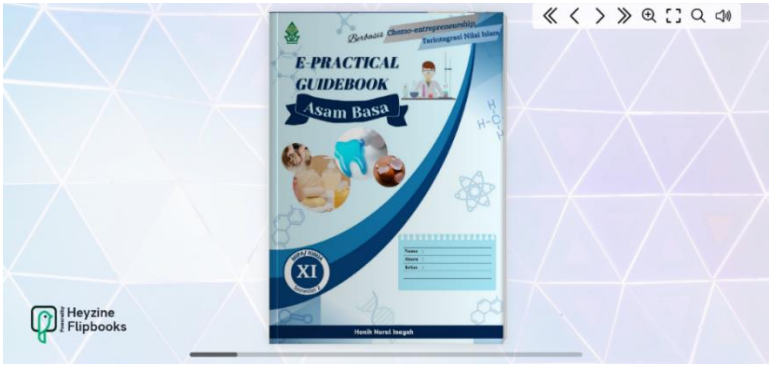

Figure 1. Appearance of *the E-Practical Guidebook* on the *Heyzine website*

The characteristics of this media are practical guidebooks based on *chemo-entrepreneurship* integrated with Islamic values which is accessed *online*. *Chemo-entrepreneurship* based practicum (CEP) aims to enable students to process materials into products that are useful and have selling value. The practicum includes (1) the process of making kaolin solid soap with citronella essential oil and testing the saponification number using the titration method; (2) the process of making composite toothpaste combining egg shells with baking soda and testing $CaCO_3$ levels using the titration method. Introduction to *the E-Practical Guidebook* This is an introduction to *CEP*. The goal is for students to know the term CEP. Because, based on the results of the questionnaire, 85% of students do not know CEP. Apart from the introduction to CEP, at the end of the practicum there is an assignment to package the practicum products along with packaging examples. The aim is to train students' creativity before starting entrepreneurship. The closing section contains an economic analysis, so that students know how to calculate capital and profits from products sold.

Islamic values in *the E-Practical Guidebook* are generally integrated, so they can be used at the high school level. The Islamic values contained in it include motivation to become an entrepreneur according to Islamic law, for example the story of Abdurahman bin Auf who has an honest, confident and never give up attitude. This attitude must of course be followed by an *entrepreneur* to achieve success. Apart from that, the practicum must use halal ingredients, because the product being practicum is related to consumption outside the body and must be considered halal. So, at the end there is a study of product halalness.

After designing the design, the next stage is *develop*. This stage begins with *an Expert Appraisal* which aims to obtain input, revisions, suggestions and validation. Expert validation includes validation by material and media experts. The material expert validation results are categorized in the very feasible range, because the value $\bar{X}$ is 55,334 with a percentage of 92.23%. Material validity criteria can be seen in Table 2 which is adapted from the formula (Widoyoko, 2009).

Table 1. Validation Results from Material Experts

No.	Material Validator	∑n	Information
1.	Validator I	56	Very Worth It
2.	Validator II	52	Very Worth It
3.	Validator III	58	Very Worth It
Average value)$\bar{X}$		55,334	Very Worth It
Percentage		92.23%	Very Worth It

Table 2. Material Validity Criteria

Percentage	Score Range	Criteria
$\bar{X}$ > 84%	$\bar{X}$> 50.4	Very Worth It
68% < $\bar{X}$≤ 84%	40.8 < $\bar{X}$≤ 50.4	Worthy
52% < $\bar{X}$≤ 68%	31.2 < $\bar{X}$≤ 40.8	Decent Enough
36% < $\bar{X}$≤ 52%	21.6 < $\bar{X}$≤ 31.2	Not Worth It
$\bar{X}$≤ 36%	$\bar{X}$≤ 21.6	Very Inadequate

The results of media expert validation are also categorized in the very feasible range, because the value $\bar{X}$ is 30.67. The percentage of validation results by media experts was 87.62% with very feasible criteria. Media validity criteria can be seen in Table 4 which is adapted from the formula (Widoyoko, 2009) .

Table 3. Validation Results from Media Experts

No.	Media Validator	∑n	Information
1.	Validator I	29	Worthy
2.	Validator II	31	Very Worth It
3.	Validator III	32	Very Worth It
Average value)$\bar{X}$		30.67	Very Worth It
Percentage		87.62%	Very Worth It

Table 4 . Media Validity Criteria

Percentage	Score Range	Criteria
$\bar{X}$> 83.65%	$\bar{X}$> 29.28	Very Worth It
67.88% < $\bar{X}$≤ 83.65%	23.76 < $\bar{X}$≤ 29.28	Worthy
52.11% < $\bar{X}$≤ 67.88%	18.24 < $\bar{X}$≤ 23.76	Decent Enough
36.34% < $\bar{X}$ ≤ 52.11%	12.72 < $\bar{X}$≤ 18.24	Not Worth It
$\bar{X}$≤ 36.34%	$\bar{X}$≤ 12.72	Very Inadequate

The validation results of material and media experts are declared valid or appropriate according to the criteria above. The results of this research are in line with research (Wati, Lathifa & Udaibah, 2019) (Wati, Lathifa and Udaibah, 2019) which results in the suitability of the material being in the feasible category, because it meets the good category. And the suitability of the media in the appropriate category is 88% seen from the aspect of presentation and appearance. After validation was carried out and declared feasible, the product was then tested on 30 students in class XI MIPA 5, SMA N 12 Semarang. Students are given a media link to *the E-Practical Guidebook* via the *WhatsApp group*. The first meeting was the introduction of the *E-Practical Guidebook media* based on *chemo-entrepreneurship* integrated with Islamic values and practical work on making composite toothpaste. Then the second meeting is titration to test $CaCO_{3\ levels}$. Then, students assess the product and then fill out the questionnaire sheet provided.

The results of the student response questionnaire show that *the E-Practical Guidebook* is in the good category, because the score $\bar{X}$ is 61.93. The results of the analysis for each aspect can also be seen in **Table 5** .

Table 5. Results of the Response Questionnaire for Each Aspect

Aspect	Mark$\bar{X}$	Criteria
Motivation	16.07	Good
Content Quality	12.06	Good
Appearance	12.74	Very good
Use	8.84	Very good
Independence	3.87	Good
Chemo-entrepreneurship is integrated with Islamic values	8.2	Good

After determining the value $\bar{X}$, then the ideality of each aspect is determined. **Figure 2** shows that the appearance aspect is categorized as very good. The results show a percentage of 84.94%, that according to students in terms of appearance, both the *cover* and content of *the E-Practical Guidebook* are attractive because there are colorful pictures, illustrations and media. This is adjusted to the analysis of student needs.

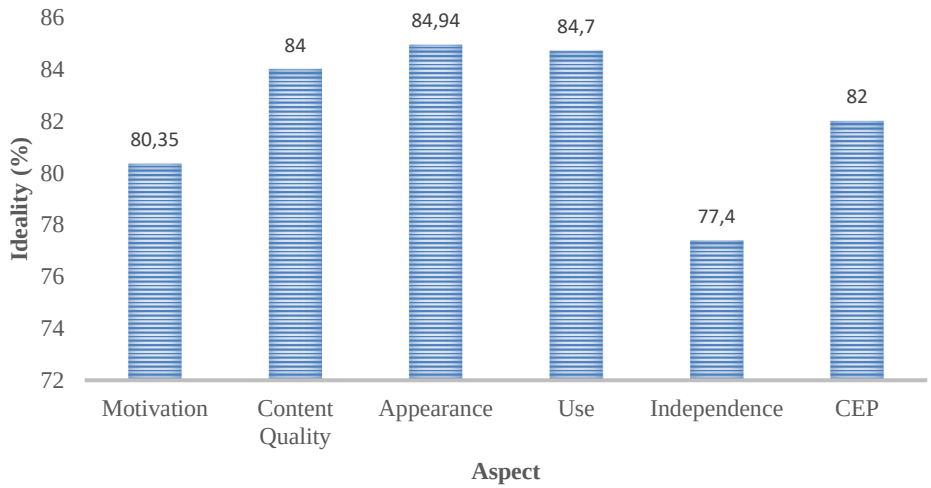

Figure 2. Graph of Ideal Results for Each Aspect of Student Responses

The characteristics of colored media complete with pictures and illustrations can increase students' learning motivation, because the media used is not monotonous like worksheets (Putri & Muhtadi, 2018) . This is in line with the motivation aspect with a percentage of 80.35%, which is included in the good category, which is proven by the students' response questionnaire answers. The *E-Practical Guidebook* makes students enthusiastic about learning. The content aspect is in the good category with a percentage of 84%, indicating the quality of the content of *the E-Practical Guidebook* Both in terms of material and language it can be understood, apart from that because the content is interesting. The usage aspect shows a very good category, namely 84.7%, indicating that the use of *the E-Practical Guidebook* is practical and easy to use because it is online based. The advantage of electronic media is that it is very practical because it is packaged in digital format so that learning can be more interactive and interesting (Mandasari, 2022) .

A spec of independence shows a good category with a percentage of 77.4%. This shows that students can learn with *the E-Practical Guidebook* independently. However, during practicum, some students still have to be accompanied by a teacher, such as when weighing, some students are still confused about using an analytical balance. Moreover, during the titration process, students are still afraid of holding the burette tap until the end point of the titration is missed. *The chemo-entrepreneurship* aspect integrated with Islamic values shows a good category with a percentage of 82%. This is proven by the students' responses that *chemo-entrepreneurship based learning* is fun and interesting, apart from being related to everyday life, CEP has never been implemented in learning. The integration of Islam also broadens students' insight.

The overall student response was 82.57% which was classified as good. So, this research is in line with the distribution of student response questionnaires resulting in criteria and responses as well as input, criticism and suggestions from students which are summarized as follows: (1) The *E-Practical Guidebook* which was developed is practical because it is accessed via the internet; (2) *The E-Practical Guidebook* developed is easy to understand and increases enthusiasm for learning; (3) The developed *E-Practical Guidebook has an attractive and creative appearance and content;* (4) The developed *E-Practical Guidebook* adds insight, especially information on chemistry and the integration of Islamic values; (5) The developed *E-Practical Guidebook* motivates entrepreneurship; (6) CEP-based practicum is interesting and fun, because it has never been done in learning; (7) CEP-based practicum is interesting and creative, because it is different from usual practicum.

Conclusion

Based on the results at the *develop stage*, namely expert assessments and trials, several conclusions can be drawn. Characteristics of *the chemo-entrepreneurship* based *E-Practical Guidebook* learning media product that links it to real life. Equipped with economic analysis in the closing section. Equipped with the integration of Islamic values in each practicum, where the acid-base products practiced are linked to the Koran and hadith. Apart from that, there is an inspiring story of Muslim *entrepreneurs* in the introduction, and a study of halal products in the closing section. *E-Practical Guidebook* is accessed via the *heyzine* web *platform* in pictorial and colored format complete with pictures and illustrations. *The E-Practical Guidebook* was declared very feasible, proven by validation results by material expert validators and the media. Appropriateness material is categorized in the very feasible range with value $\bar{X}$ as big as 55.34 with an ideal percentage of 92.23%. The suitability of the media is categorized in the range of very feasible proven value $\bar{X}$ that is 30.67 with an ideal percentage of 87.62%. The overall result of aspects of student responses to *the E-Practical Guidebook* based on *chemo-entrepreneurship* integrated with Islamic values is 61.93 with an ideal of 82.57% which is included in the good category.

References

Annisa, K., & Sari, M. (2021). Pengembangan E-Modul Praktikum Berorientasi Chemoentrepreneurship (CEP) pada Materi Sifat Koligatif Larutan Kelas XII IPA SMA. *Edusainstika: Jurnal Pembelajaran MIPA*, *1*(2), 69–72.

Arieska, H., & Kamaludin, A. (2018). Pengembangan Buku Siswa Berorientasi Chemo-Entrepreneurship (CEP) Pada Materi Ikatan Kimia SMA/MA Kelas X. *Jurnal Tadris Kimiya*, *3*(2), 199–208. https://doi.org/10.15575/jtk.v3i2.3795

Ashari, Z. (2021). Konsep Berwirausaha dengan Metode Dimensi Hablumminallah dan Dimensi Hablumminnas. *Muslimpreneur: Jurnal Ekonomi dan Kajian Keislaman*, *1*(2), 1–23.

Erawati, N. K., Purwati, N. K. R., & Saraswatı, I. D. A. P. D. (2022). Pengembangan E-Modul Logika Matematika dengan Heyzine untuk Menunjang Pembelajaran di SMK. *Jurnal Pendidikan Matematika*, *8*(2), 71–80.

Guci, S. R. F., Zainul, R., & Azhar, M. (2017). Pengembangan media pembelajaran berbasis tiga level representasi menggunakan prezi pada materi kesetimbangan kimia. *Prodi Pendidikan Kimia Universitas Negeri Padang*, *November*(November), 1–8.

Mandasari, A. (2022). Development of LKPD With A Contextual Approach to Material Opportunities In SMP. *Holistic Science*, *2*(3), 117–126. https://doi.org/10.56495/hs.v2i3.51

Maulana, F. (2019). Pendidikan Kewirausahaan dalam Islam. *IQ (Ilmu Al-Qur'an): Jurnal Pendidikan Islam*, *2*(01), 30–44. https://doi.org/10.37542/iq.v2i01.23

Prayitno, M. A., Wijayati, N., & Mursiti, S. (2017). Penerapan Modul Kimia Berpendekatan Chemoentrepreneurship untuk Meningkatkan Kecakapan Hidup dan Motivasi Belajar. *Journal of Innovative Science Education (JISE)*, *6*(2), 139 – 146.

Putri, D. P. E., & Muhtadi, A. (2018). Pengembangan multimedia pembelajaran interaktif kimia berbasis android menggunakan prinsip mayer pada materi laju reaksi. *Jurnal Inovasi Teknologi Pendidikan*, *5*(1), 38–47. https://doi.org/10.21831/jitp.v5i1.13752

Qudsiyah, F. H., & Hadisaputro, S. (2013). Implementasi Praktikum Aplikatif Berorientasi Chemoentrepreneurship Terhadap Peningkatan Hasil Belajar Kimia. *Inovasi Pendidikan Kimia*, *8*(1), 1309–1318. https://doi.org/10.15294/jipk.v8i1.4436

Sagita, R., Azra, F., & Azhar, M. (2017). Pengembangan Modul Konsep Mol Berbasis Inkuiri Terstruktur Dengan Penekanan Pada Interkoneksi Tiga Level Representasi Kimia Untuk Kelas X Sma. *Jurnal Eksakta Pendidikan (Jep)*, *1*(2), 25. https://doi.org/10.24036/jep.v1i2.48

Sari, R. P., & Seprianto, S. (2018). Analisis Kemampuan Multipel Representasi Mahasiswa FKIP Kimia Universitas Samudra Semester II Pada Materi Asam Basa dan Titrasi Asam Basa. *Jurnal Pendidikan Sains Indonesia*, *6*(1), 55–62. https://doi.org/10.24815/jpsi.v6i1.10745

Setiadi, T., & Zainul, R. (2013). Pengembangan E-Modul Asam Basa Berbasis Discovery Learning Untuk Kelas XI SMA/MA Trihanto.

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional Development for Training Teachers of Exceptional Children: A sourcebook. Leadership Training Institute/Special Education, University of Minnesota* (Vol. 14). Minneapolis: ERIC. https://doi.org/10.1016/0022-4405(76)90066-2

Wati, F. S., Lathifa, U., & Udaibah, W. (2019). Pengembangan Modul Kesetimbangan Kimia Berbasis Unity of Sciences (Uos) Dan Multilevel Representasi. *Thabiea : Journal of Natural Science Teaching*, *2*(2). https://doi.org/10.21043/thabiea.v2i2.5972

Widoyoko, E. P. (2009). *Evaluasi Program Pembelajaran*. Yogyakarta: Pustaka Pelajar.

Wikhdah, I. M., Sumarti, S. S., & Wardani, S. (2015). Pengembangan Modul Larutan Peyangga Berorientasi Chemoentrepreneurship (CEP) untuk Kelas XI SMA/MA. *Jurnal Inovasi Pendidikan Kimia*, *9*(2), 1585–1595. https://doi.org/10.15294/jipk.v9i2.4826

Yulianti, R. N. E., Permanasari, A., & Heliawati, L. (2019). Pemanfaatan E-Book Konsep Asam Basa dalam Pembelajaran Kimia untuk Meningkatkan Literasi Kimia Siswa SMA Kelas XI. *Journal of Science Education And Practice*, *3*(1999), 33–41. https://doi.org/10.33751/jsep.v3i1.1378