



E-Magazine Development with Social Emotional Learning Approach on Colloid Material in Context of Local Wisdom

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Abstract: The rapid development of education in the Industrial Revolution 4.0 in various sectors of life in science and technology is a source of its own challenges for a teacher in the learning process, especially for preparing the teaching materials. This study aims to develop an E-Magazine that is valid, practical, and effective. This study applied Research and Development method with the ADDIE model. The subjects for this research are 32 students of SMAN 9 Banjarmasin in the academic year of 2021/2022. The trial implementation consisted of individual, small group, and limited trials. Data collection techniques were validation sheets, readability and response questionnaires, and test and non-test assessments while the data analysis used descriptive analysis. The results showed that the validity of the e-magazine with an average score of 4.6 categories was very valid in terms of content, presentation, language, and media aspects. The effectiveness which was seen based on N-gain for students' conceptual understanding was 0.67 (moderate) and learning motivation was 0.45 (moderate). This study shows that the use of e-magazines with SEL approach on colloid material in context of local wisdom is effective, and can be used in chemistry learning. Implications of SEL can help the growth of problem solvers, and collaborative academics is positively synergized with SEL and local wisdom (CASEL-LW) so that students can understand and solve the problems better.

INTRODUCTION

Education is a process of forming knowledge and self-capacity that is carried out intentionally and honestly to expand the capacity building of students (Rohmah et al., 2020). Yet, the world of education now is facing the new challenge as a direct impact of the new industrial era or frequently called as the Industrial Revolution (IR) 4.0 with the rapid development in various sectors of life and the use of the more increasing internet (Crnjac et al., 2017; Madyani et al., 2020; Mian et al., 2020).

According to We Are Social's report, there are 204.7 million internet users in Indonesia or 73.7% of the total population, and social media users are 191.4 million or 68.9% of the total population in February 2022 (Rahadi et al., 2022). Such fact indicates that people much rely on information and technology (IT) in their life (Fauzan, 2018). The progress of the development of science and technology also becomes a challenge for teachers in the learning process at school, particularly in the presentation of teaching materials (Abdullah et al., 2020; Fennell et al., 2019; Rasheed et al., 2020).

The main problem of the learning process at IR 4.0 in the field of education, is that teachers must follow technological developments. At the same time, students must also learn in accordance with the time. Hence, it needs efforts from teachers to create media and meaningful learning experiences for students (Atwood-Blaine et al., 2019; Farisi, 2016; Kale & Goh, 2014; Rohmah et al., 2020), so that they can give birth to the intelligent, qualified and competitive generation (Setiawan et al., 2018). Thus, it is necessary to involve students socially and emotionally to improve their academic achievements and their better mental health (Panayiotou et al., 2019).

The results of observations and interviews at SMA Negeri 9 Banjarmasin show that the learning media used by teachers are less varied and less interactive, only providing books and worksheets in pdf form. The absence of interactive media ultimately makes the learning process less interesting or monotonous. As such, learning media innovation is of course required.

Generally, chemistry learning is only focused on the content dimension and is still dominated by a view that chemistry knowledge is merely a set of facts which must be memorized by students. Even, most students do not know the benefits of the lessons they have learned in daily life (Alkatiri, 2012; Sari et al., 2017; Virginanti et al., 2019). Many things actually can be explored in studying chemistry, one of which is a learning through the context of local wisdom (C. A. Dewi et al., 2019; Parmin et al., 2016). In this sense, what local wisdom means is a set of the virtuous values which grow and develop in society. However, in modern era like today, such values are often abandoned as considered irrelevant (Ufie, 2017). For the sake of preserving a local wisdom as well as creating an innovative leaning media, those local values can be actualized and integrated into a learning process.

It is also in line with the 2013 curriculum changes by which the learning media used in the learning system must be focused on character education. The efforts to improve character education are done by cultivating social care traits, one of which is using the Social Emotional Learning (SEL) approach (Rahmawati, 2018). In this context, the integration of the SEL approach is then presented by introducing important issues in everyday life, those of which are incorporated into chemistry learning materials. To respond it, students are invited to be more aware related to problems in their surrounding environment. They are also insisted to seek the proper solutions. Through this way, it can build students' sensitivity, particularly in the aspects of social and emotional care.

The SEL approach also provides opportunities for students to develop their knowledge, attitudes, and skills. Although in the learning process there are several similar steps toward a scientific approach, for example, in the development of knowledge and attitudes, specifically in Collaborative for Academic, Social and Emotional Learning CASEL (2015) and Yagcioglu (2017), there are five main components of SEL, comprising of self-awareness, self-management, social awareness, relationship management, and responsible decision making.

Recent research on SEL interventions shows positive effects for promoting students' academic progress in reading, math, and science learning (Corcoran et al., 2018; Durlak et al., 2011; Dymnicki et al., 2012). The way to facilitate students learning can be sourced from teaching materials designed as tools to support teachers' activity so that the learning process is able to run more effective (Asrizal et al., 2018). Teaching materials are not merely limited to books and worksheets in pdf form, but interactive and innovative media are also needed to make the learning process more interesting and have high quality.

Based on such facts, the teachers basically require the appropriate learning media as well as the pleasant learning environment which can expectedly encourage students to be more aware on the importance of learning chemistry. It can be carried on through the meaningful ways such as educational games (Chen et al., 2020; Jabbar & Felicia, 2015; Morris, 2011; Rastegarpour & Marashi, 2012; Tan et al., 2013), website-based electronic media equipped with animated digital (Iaosanurak et al., 2016), and popular science articles or e-magazines (Abdullah et al., 2020; Fitriana & Kurniawati, 2021; Kupatadze, 2017; Puri et al., 2019).

In this sense, E-Magazine is the electronic version of the magazine. Utilization of the raw components of e-magazines no longer uses paper, but in the form of digital files which can be opened via smartphones, computers and laptops (Puri et al., 2019). The choice of the magazine as learning media is considered as an alternative not only because its language is easy to understand, but also its characteristic is different from books (Fitriana & Kurniawati, 2021). Referring to previous research as conducted by Yulianto & Rohaeti (2013) has developed a chemistry magazine as a learning means in comprehending the subject matter and increasing the students' motivation and creativity.

In a meta-analysis of SEL programs, Durlak et al., (2011) found that students who participated in SEL programs significantly to improve their academic performance, attitude, and behavior. This program also can improve students' knowledge and skills (Fernandez-Rio et al., 2017; Kopparla & Goldsby, 2019; Oberle et al., 2016; Yoder & Nolan, 2018). It further stimulates students' curiosity, responsibility, self-reflection, and development of their

competency (Gul & Shehzad, 2012; Hammond et al., 2020; O'Dwyer et al., 2015; Patil et al., 2014; Yoder & Nolan, 2018).

Based on the explanation that has been described previously, it is still lack of research which focuses on developing an e magazine with a SEL approach in the context of local wisdom. The use of e-magazine with a SEL approach in context of local wisdom is believed to be able to improve the conceptual understanding and motivation of students to overcome the obstacles both in their environment and in academic assignments. Therefore, the researchers are interested in developing an e-magazine with the SEL approach about local wisdom in colloid material. This research aims to evaluate the validity, practicality and effectiveness of using e-magazine with the SEL approach on colloidal materials to improve students' motivation (SM) and students' conceptual understanding (SCU).

METHOD

Development Model

This study uses the type of research R&D (Research & Development) by using the ADDIE type of development model (Figure 1). The steps of the ADDIE model consist of Analysis, Design, Development, Implementation, and Evaluation (Rothwell & Kazanas, 2013; Sugihartini & Yudiana, 2018). The ADDIE development model is suitable for product development in the form of learning resources (Branch, 2009). The objectives which are achieved in this development study are to determine the validity, practicality and effectiveness of the use of e-magazines with an approach SEL on colloid material in the context of local wisdom to increase motivation and conceptual understanding of students.

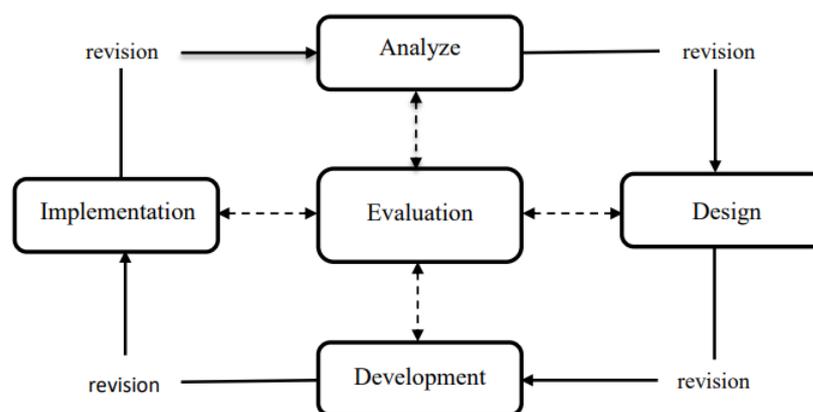


Figure 1. The ADDIE Concept (Adapted from Branch, 2009)

A need analysis is done for the development of innovative learning media. Information related to the need analysis and problem identification is carried out through the field and literature studies. Design is also known as blueprint. At this stage, the development team was also determined, including the main developer, expert validator, practitioner validator, programmer, technician and user. The main developers are the researchers themselves, programmers and technicians. Then, as expert validators, it consists of media expert validators and material experts.

Development stage is commonly known as the process of the design realization in which its product is developed based on the following steps: 1) Collecting materials for making media which is then implemented into the syntax of the learning model by using a SEL approach that is in the context of local wisdom. After that, the researcher re-checked the learning media developed before validation if it was appropriate, then the next e-magazine product development was ready to be validated; 2) Making a questionnaire on the validity of the product developed for media experts and material experts, and a questionnaire for teacher and student responses. Questionnaire validity of the material is in the form of aspects of learning, curriculum, content, interaction, and feedback. Meanwhile, the student

responses over such questionnaires are in the form of media use, usage reactions, and supporting or additional facilities; 3) The validation of the instructional media design was carried out by experts. The purpose of the validation is to obtain assessments and suggestions from media and material experts related to the suitability of the material and appearance of learning media products; 4) After obtaining input from experts and validating, the weaknesses of the developed learning media products can be known. These weaknesses are then made to improve the products that have been developed. These products are repaired and get a good predicate, then those can be continued to the next stage, namely the implementation stage.

The implementation was carried out in class XI MIA 1 SMAN 9 Banjarmasin semester 1 in the academic year of 2021/2022. The trial was taken based on the background of students in which in learning process the use of learning media tends to non-varied and less interactive. For instance, the students still use books as the learning media and worksheets in the form of pdf. During the trial, the researchers made a few notes about the weaknesses and obstacles obtained when the product was implemented. The trial design used in this research is to use a pre-experimental design in the form of a one shot case study with pretest-posttest. This study involved only one class that

has been given the treatment (X) and then observed the results (O).

Evaluation is done to investigate the media at the previous stage, especially in implementation stage, to ensure whether there are still weaknesses or not. If there is no further improvement, then the media is feasible to use. The results of this study are expected to produce learning media in the form of e-magazines which are valid, practical and effective in order to increase students' motivation and understanding of the concept of colloid material.

Research Subjects

The research was conducted at SMA Negeri 9 Banjarmasin in XI MIA 1 2021/2022. The subjects were 32 students (3 students for individual trials, 8 students for small group and 21 students for limited trials). Before the trial is carried out, it must pass the validation stage by the five experts. Validator consists of three people of the Universitas Lambung Mangkurat (ULM) chemistry education lecturers, one person of the ULM educational technology lecturer, and one person of the chemistry teacher at SMAN 9 Banjarmasin.

Data Collection and Analysis Technique

Data collection instruments used validation sheets, test instruments, readability questionnaires, teacher and student response questionnaires. Data were analyzed with qualitative and quantitative descriptive statistics to describe the symptoms of the data which are then explained to find out how the results of the research were carried out (Rosana & Setyawarno, 2017). The validity of the e-magazine, instrument tests and questionnaires are measured through validation sheets given to five validators. The validation score uses a Likert scale of 1-5. The category of e-magazine validity and instrument test with the following criteria.

Table 1. The Criteria of Validity (Irmawati et al., 2021).

Score (%)	Skills Level
$4.20 < V \leq 5.00$	Very valid
$3.40 < V \leq 4.20$	Valid
$2.60 < V \leq 3.40$	Quite valid
$1.80 < V \leq 2.60$	Less valid
$1.00 \leq V \leq 1.80$	Invalid

Practicality was measured through readability and response questionnaires. The score of the practicality used a Likert scale 1–5. The readability questionnaire was conducted on individual and small group trials, while the response questionnaire was conducted on students and teachers.

Table 2. The Criteria of Practicality

Score (%)	Skills Level
$4.20 < P \leq 5.00$	Very good
$3.40 < P \leq 4.20$	Good
$2.60 < P \leq 3.40$	Moderate
$1.80 < P \leq 2.60$	Low
$1.00 \leq P \leq 1.80$	Very low

Effectiveness of SM is measured through a questionnaire with the ARCS model (attention, relevance, confidence, and satisfaction) (Keller, 2010), while SCU is measured with ten questions of the two-tier diagnostic test in google form. The two-tier diagnostic test is one of the diagnostic tests by which the question is a two-tiered question. The first level consists of the questions with four answer choices while the second level consists of four choices of the reasons that refer to the answers at the first level (S. A. Dewi et al., 2018).

The learning achievement of pre-test and post-test was calculated to determine the N-gain of each variable. The acquisition scores and categories of SM and SCU improvement are based on the formula used by Hake (Hake, 1998), namely: (g) > 0.7 (high), $0.3 < (g) < 0.7$ (moderate), and (g) < 0.3 (low). In addition, the improvement of SM in learning process was strengthened by the results of the Wilcoxon test (non-parametric statistics), while the SCU was

strengthened by testing the use of the paired sample t-test (parametric statistics). The tested hypotheses are shown below:

H_0 : There is no a significant increase in the SM and SCU before and after participating in learning by using e-magazine media.

H_1 : There is a significant increase in the SM and SCU before and after participating in learning by using e-magazine media.

In testing the hypothesis uses a significant level $\alpha = 5\%$ (two-tailed). The rejection criteria for H_0 is based on the p-value, namely if p-value is $< \alpha$, then H_0 is rejected. If p-value is $\geq \alpha$, then H_0 is accepted.

RESULT AND DISCUSSION

Development Results

The product produced in this development research is an e-magazine with a social emotional learning approach on colloid material. E-magazines are systematically arranged with the short and clear material which is easily understood by students. Web-based e-magazine is interactive because it contains important issues, completed by pictures, animations, and videos so that students can think more realistically and obtain the interesting information and facts related to colloidal concepts and materials.

The use of this e-magazine also urges students to be more familiar with development of electronic media and can take advantages on it in learning process. One of the advantages of this e-magazine is that students can easily access it through advanced electronic devices such as smartphones, particularly during the pandemic in which learning process has to be done at home. In this situation, the learning process cannot be separated from the use of technology. As such, the use of the e-Magazine is necessary due to not only containing the interesting materials completed with videos, images and animations, but also equipping with poetry, motivational stories and articles. the e-Magazine is, therefore, useful to

learn the Colloids material practically in the context of local wisdom in accordance with a social emotional learning approach accompanied by descriptions and quizzes with prizes that can increase students' enthusiasm and motivation to learn.

This e-Magazine with a SEL approach is expected to have a positive impact on improving students' learning motivation and understanding the theory. It also hopefully can shape students' self-management and self-awareness related to the importance of local wisdom values. One of the articles related to colloids in the e-magazine with a SEL approach is "Baayak porridge "(bubur Baayak) which is used to help students to understand the difference between dispersion systems to determine the type of colloids based on the dispersed and dispersing phases in the manufacture of bulk porridge. In addition, there is also the use of colloids in the context of local wisdom, namely Gangan Humbut and the use of milk in making Soto Banjar, both of which are also included in the type of colloid emulsion.

Colloid material with the context of local wisdom that we can relate to is the water purification process (Figure 2). The values of local wisdom can cultivate social awareness, healthy and beneficial relationships and responsibility of decision making. The presentation of colloid material in such context of local wisdom can help to sharpen students' understanding toward the properties of colloid absorptions, for example, in the effectiveness of alum and clay in the treatment of river water and peat water (black water) for coagulation, and the use of adsorbent in water purification, including the adsorption properties of colloids. Adsorbents (i.e. activated carbon, alumina, chitin, chitosan) are used to remove colors and organic pollutants in wastewater (Allen & Koumanova, 2005; Syahmani et al., 2017).

Apart from it, there is also the other example related to the colloid material and local wisdom, that is betel nut extract

as a natural dye in the Sasirangan cloth related to the adsorption colloidal

properties. Figure 3 shows the e-magazine display design that has been developed.

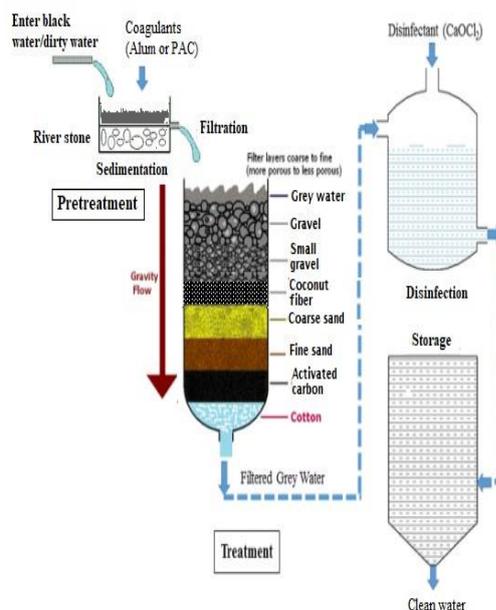


Figure 2. Water Purification Methods with Coagulation, Sedimentation, Filtration, Adsorption, and Chemical Disinfection (Syahmani, Kusasi, et al., 2021)

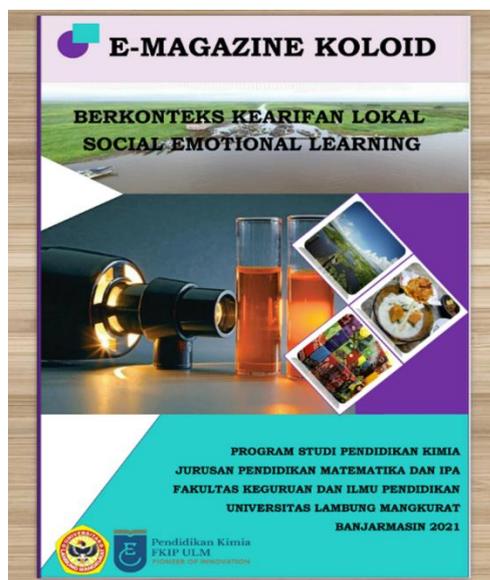


Figure 3. E-Magazine Display Design (<https://online.flipbuilder.com/klxue/qrpi/>)

E-Magazine Validity

The feasibility of the e-magazine can be determined through the assessment given by the validator by using a validation sheet which consists of four components, namely content, presentation, language and media. The developed e-magazine was tested and pointed out very valid results with

average score of 4.6. It can be seen from the content, presentation, language and media. Based on the results of the validation score, the e-magazine learning media is feasible to use without revision.

The attractively designed e-magazine media with the Flip Builder application can be used as additional insight for students. This application is

not only well-organized in writing, but also provides animation and interactive multimedia that can make learning media

more interesting and not boring (Maryati et al., 2018).

Table 3. E-Magazine Validation Results

No.	Assessment Aspect	Validation Score	Description
1.	Contents	4.5	Very Valid
2.	Presentation	4.5	Very Valid
3.	Language	4.7	Very Valid
4.	Media	4.8	Very Valid
Average		4.6	Very Valid

E-Magazine Practicality

The product which has been validated by the validator is then tested for its practicality by providing a response questionnaire to students with the aim to know the practicality of the e-magazine

that has been developed. The analysis of this practicality of the e-magazine was measured with readability questionnaires and response questionnaires of students and teachers as well. The results of the practicality test can be seen in Figure 4.

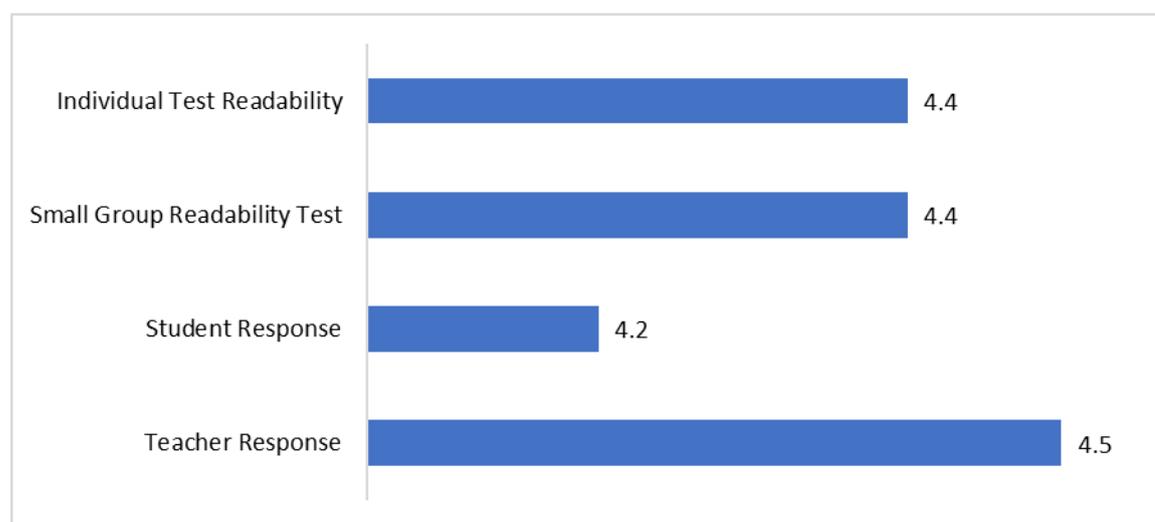


Figure 4. Practicality Test Results

E-Magazine Readability

This trial aims to determine the legibility of e-magazines in assessing the practicality of the developed products. The suggestions obtained from students will be used to revise the learning product to be tested at the next stage. The e-magazine readability test was carried out in two stages. The first stage was an individual trial on 3 students and then the second stage was a small group trial for 8 students in class XI MIA 1 SMA Negeri 9 Banjarmasin. The average value obtained in individual and small group trials is 4.4 with a very good category.

Students' Response

The response questionnaire was given to students on a limited trial, namely class XI MIA 1 SMAN 9 Banjarmasin with the aim to know the student's responses toward the use of e-magazines which were developed after being used during the learning process. The student response questionnaire also contains statement items and is given after the students do the post-test.

Based on the results of the study, the average value of the student's response was 4.2, with which it shows the good category. The existence of a positive response of 4.2 (good) indicates that e-

magazine is the appropriate learning means for students. It is also reinforced by the fact that e-magazine is an electronic adaptation of magazines. Such E-magazines are simple, paperless and in digital form that can be accessed through electronic media such as mobile phones, laptops, androids, computers, iPhones, and other technologies. It also can minimize the cost of making and using magazines and help to reduce the impact of global warming as the impact of the massive paper supplies (Fitriana & Kurniawati, 2021). Therefore, based on such reasons and facts, the use of this e-magazine in this study aims to improve students' learning motivation and also to create and distribute the innovative and interesting learning materials.

Teacher's Response

The teacher's response in using e-magazine was measured by using a response questionnaire. The results of this teacher's response over the e-magazine in

the limited trial obtained an average value of 4.5 with the very good category.

E-Magazine Effectiveness

The effectiveness of e-magazine was determined from the N-gain pre-test and post-test data presented in Table 4. Based on the N-gain test, it shows that the N-gain value of SM and SCU is 0.45 and 0.68 respectively with the moderate category. This shows that the developed e-magazine is effective for learning chemistry. Through these values, it also indicates that there is an increase in SM seen from before and after the use of e-magazine.

A significant increase in SM was strengthened through analysis by using the Wilcoxon test (non-parametric) because the data obtained were ordinal data. Meanwhile, to improve SCU, the data were distributed (Kolmogorov-Smirnov Sig. > 0.05), so that those were analyzed by using the paired sample t-test (parametric test).

Table 4. Learning Achievement of Pre-test and Post-test

Aspect	Pretest Average Score	Posttest Average Score	N-gain	Category
Students Motivation (SM)	67.89	82.30	0.45	Moderate
Students' Conceptual Understanding (SCU)	34.44	78.89	0.68	Moderate

Table 5. Result of Wilcoxon Test and the Paired Simple t-Test

Test	N	Mean	Z	t	df	Sig. (2-tailed)	Conclusion
Pretest– Posttest of SM ^a	21	.000	-4.020 ^b	-	-	.000	H ₀ rejected
Pretest– Posttest of SCU	21	-44.443	-	-23.372	20	.000	H ₀ rejected

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

The results of the Wilcoxon test and the paired sample t-test are calculated Sig. (2-tailed) with p-value < 0.05 (Table 5), so that there is a significant increase in SM and SCU before and after participating in learning process by using e-magazines with the SEL approach on colloid material in the context of local wisdom.

The SEL approach is based on Vygotsky's theory of sociocultural development (SCTD) (John-Steiner & Mahn, 2012). The main concepts of

SCTD are in line with the SEL approach, describing the hierarchical nature of the increased complex learning which is represented through: (a) current level of contextual ability; (b) zone of proximal development (ZPD); and (c) scaffolding (Fani & Ghaemi, 2011; Mishra, 2013; Shabani, 2016). Application of SEL especially conducted through cooperative and collaborative learning found that it helps for the development of the ability to empathize, building positive relationships with people, managing emotions in social

and academic context, and the ability to solve problems as well (Casel Guide, 2013; Virginanti et al., 2019).

The SEL approach serves as a prerequisite for increasing students' self-confidence and social-emotional balance (Jones et al., 2015). The application of the SEL approach focuses on five competency achievements. The first is self-awareness related to metacognitive abilities and actual behavioral effects. The second, self-management is students' skills in managing cognitions, feelings, and attitudes effectively in various situations. The third, social awareness is the ability to empathize with other so that people understand the standards of social behavior. The fourth, relationship management is the ability in directing the perspective and behavior of individuals to build and foster a beneficial cooperative relationships. The fifth, responsible decision making is the ability to make right decisions related to interactions and social attitudes (Yagcioglu, 2017).

In fact, the implementation of this e-magazine combined with the SEL approach has proven to have a positive impact for students in learning colloid chemistry. Based on Tables 5 in general, it can be seen that the use of e-magazines with SEL approach is effective in increasing SM and SCU of the colloid material that is being studied. It is actually in accordance with several researches (Durlak et al., 2011; Puspitarini & Hanif, 2019; Sakat et al., 2012), stating that the use of technology-based learning media can increase SM and participation in the learning process.

E-magazines with SEL approach create high SM and focus in learning, so that it brings the positive change and contribution in learning achievement. The use of e-magazines also effectively increases SM, response, and focus on learning, by which it has an impact on improving SCU of colloidal material. These results are in line with the findings of several studies which state that learning

media can help to improve SM and SCU (learning achievement) (Kartini & Putra, 2020; Pradilasari et al., 2019; Turkoguz, 2012; Yahya et al., 2017). Besides that, this motivation is highly correlated with students' achievements (Riswanto & Aryani, 2017), and metacognitive skills (Muna et al., 2017) which play a role in achieving SCU (Syahmani et al., 2020; Syahmani, Saadi, et al., 2021).

Furthermore, SEL training and development at all levels of education is necessary for continuing the development of professional educators, especially in systemic SEL science and practice (Greenberg et al., 2017, 2018; Jennings et al., 2019; Reichl, 2017). Finally, the design, development and implementation of the systemic SEL definitely requires ongoing commitment and evaluation.

CONCLUSION

Based on the data obtained from this study, it can be concluded that the validity of the e-magazine developed with the SEL approach on colloid material in the context of local wisdom showed an average score of 4.6 with a very valid category in the aspects of content, presentation, language and media.

The e-magazine with the SEL approach has met the practical category because the individual and small group tests obtained an average score of 4.4 (very good category). Student and teacher response questionnaires gain average score of 4.2 (good category) and 4.6 (very good category) respectively.

The e-magazine with the SEL approach has fulfilled the criteria for effectiveness of a learning media. It is proven in terms of learning motivation and students' conceptual understanding with N-gain 0.45 and 0.67 respectively with the moderate category. While the results of the statistical test of learning motivation and conceptual understanding obtained from data Sig. (2 tailed) 0.000, was a significant increase before and after using e-magazine media based on the

data. The acquisition of the two categories shows that such learning media is effective to use in the chemistry learning.

It is hoped that the development of e-magazines as learning media for further research can be carried out on a larger scale and using more innovative and up-to-date research designs and contexts. Researchers also wish that similar or even better learning media will be developed which includes other chemistry topics so that these developed teaching materials can be used or improved to be a media to complete teaching materials more easily and be a source of student learning.

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