



## Development of e-Book on Osmotic Pressure Materials for Online Learning during The Covid-19 Pandemic

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Received: November 10<sup>th</sup>, 2021 Accepted: November 11<sup>th</sup>, 2021 Online Published: December 8<sup>th</sup>, 2021

**Abstract: Development Of E-Book On Osmotic Pressure Materials For Online Learning During The Covid-19 Pandemic.** In December 2019, there was an outbreak of a virus known as Covid-10. To prevent the spread of Covid-19 in Indonesia, the government made a Work From Home (WFH) policy. The existence of this WFH policy has an impact on the education sector, namely on the implementation of teaching and learning activities which were originally face-to-face to be changed online. Online learning on osmotic pressure material is still lacking in resources. The purpose of this research was to develop an e-book on the subject of osmotic pressure, describe the validity, teacher responses, and student responses. The research method used is Research and Development according to Borg and Gall until the fifth stage. The results of expert validation of e-books on aspects of the suitability of the content of the material, aspects of readability, and aspects of design attractiveness obtained high criteria. The results of the teacher's responses on the attractiveness aspect of the material content, the readability aspect, and the attractiveness aspect obtained very high criteria. The results of student responses on the readability aspect and the attractiveness aspect obtained very high criteria. Based on the results of the study, the e-books on the material of osmotic pressure generated from this study is valid.

**Keywords:** Covid-19, Corona Virus Disease, Work From Home, E-book, Osmotic Pressure

**Abstrak: Pengembangan E-Book Pada Materi Tekanan Osmotik Untuk Pembelajaran Daring Saat Pandemi Covid-19.** Pada Desember 2019, terdapat wabah virus yang dikenal dengan sebutan Covid-10. Untuk mencegah penyebaran Covid-19 di Indonesia, pemerintah membuat kebijakan Work From Home (WFH). Adanya kebijakan WFH ini berdampak pada bidang pendidikan yaitu pada pelaksanaan kegiatan belajar mengajar yang awalnya secara tatap muka diubah menjadi secara daring. Pembelajaran daring pada materi tekanan osmotik masih sedikit akan sumber. Penelitian ini bertujuan untuk mengembangkan e-book pada materi tekanan osmotik, mendeskripsikan validitas, tanggapan guru, serta tanggapan siswa. Metode penelitian yang digunakan yaitu Research and Development menurut Borg and Gall sampai tahap kelima. Hasil validasi ahli terhadap e-book pada aspek kesesuaian isi materi, aspek keterbacaan, dan aspek kemenarikan desain memperoleh kriteria tinggi. Hasil tanggapan guru pada aspek kemenarikan isi materi, aspek keterbacaan, dan aspek kemenarikan memperoleh kriteria sangat tinggi. Hasil tanggapan siswa pada aspek keterbacaan dan aspek kemenarikan memperoleh kriteria sangat tinggi. Berdasarkan hasil penelitian maka e-book pada materi tekanan osmotik yang dihasilkan dari penelitian ini valid.

**Kata kunci:** Covid-19, Corona Virus Disease, Work From Home, E-book, Tekanan Osmotik

## ▪ INTRODUCTION

In December 2019, there was an outbreak of virus that shocked the world wide from the city of Wuhan, China, known as Covid-19 or *Corona Virus Disease*. The first case of Covid-19 in Indonesia was on March 2, 2020 (WHO, 2020). The increasing number of Covid-19 cases in Indonesia has made the government make efforts to prevent the spread of Covid-19 by making government regulations regarding PSBB or Large-Scale Social Restrictions Policy (WHO, 2020).

The PSBB policy has not been able to reduce Covid-19 cases in Indonesia, so there is a new policy, namely *Work From Home* (WFH). This WFH policy also has an impact on various fields, one of which is in the field of education, namely the implementation of teaching and learning activities. Teaching and learning activities are carried out online (Zaharah, Kirilova. GI, & Windarti, A., 2020). In general, students use textbooks or printed books as learning resources, while chemistry lessons which are generally in the form of concepts, laws and theories, as well as applications from everyday life are sometimes very difficult for students to understand (Sari, I., Sinaga, P., Hernani, Solfarina, 2020).

In today's technological developments, learning resources can be combined with technology to produce learning resources in the form of electronic media, so that they can help facilitate students' understanding of chemistry learning when learning online.

One of the innovations in learning resources combined with Information and Communication Technology (ICT) is e-books or digital books. E-books can be accessed anywhere and anytime using electronic devices (Haris, 2011). E-book contains several digital information such as video, voice, text, and can be accessed via *mobile phone* (HP) and computers (Lestari, RT, Adi, EP, Soepriyanto, Y., 2018).

Judging from the research that has been done, *e-books* on osmotic pressure material are not yet available, so this e-book can support online learning and can help students understand the osmotic pressure material.

To find out the need for e-books on osmotic pressure material for online learning during the Covid-19 pandemic, preliminary research was carried out at SMA Negeri 15 Bandar Lampung, SMA Negeri 10 Bandar Lampung, MAN 2 Bandar Lampung with a total of 3 chemistry teachers and 52 students as respondents. class XII IPA.

Based on the preliminary research obtained, teachers and students carried out online learning during the Covid-19 pandemic on the material of osmotic pressure. Sources of teaching materials used by teachers amounted to 33.33% using e-books containing sample questions. As many as 76.92% of students stated that they had difficulty understanding the osmotic pressure material during online learning, with 23.08% of students used learning resources using e-books. For the need for the development of an e-book on osmotic pressure material, as many as 100% of teachers and 98.08% of students stated that it was necessary to develop an e-book on osmotic pressure material with an e-book developed containing pictures, animations, material explanations, sample questions, practice questions, and use language that is easy to understand.

Based on the description above, research will be conducted on the development of e-books on osmotic pressure material for online learning during the Covid-19 pandemic with the aim of research to describe the validity, teacher responses, and student responses to e-books on the developed osmotic pressure material.

## ▪ METHOD

### Research Design

The method used in this research is Research and Development, with research steps according to Borg and Gall consist to 10 steps namely research and information gathering, planning, product development, initial field trials, revision of the results of initial field trials, field tests, revision of field testing, field testing, revision of the final product, as well as dissemination and distribution.

This research was carried out up to the stage of revising the results of the initial field trials, this was due to the limited time to complete the thesis.

### Subject and Research Locations

The research locations was conducted in the city of Bandar Lampung. At the preliminary study stage, it was conducted at SMA Negeri 15 Bandar Lampung, SMA Negeri 10 Bandar Lampung, and MAN 2 Bandar Lampung. At the initial field trial stage, it was carried out at SMA Negeri 15 Bandar Lampung, SMA Negeri 13 Bandar Lampung, and MAN 2 Bandar Lampung. The subject of this research is an e-book on the material of osmotic pressure.

### Research Data Source

Source of data in the preliminary study were 3 chemistry teachers and 52 students of class XII IPA. In the development stage, the data sources came from 3 validators, namely lecturers of Chemistry Education, University of Lampung. In the initial field trial stage, the data sources came from 5 chemistry teachers and 60 students of class XII IPA.

### Research Instruments

The instrument used in the preliminary study is a needs analysis questionnaire for teachers and students, at the expert validation stage using a validation questionnaire with a Likert scale on aspects of the suitability of the content of the material, aspects of readability, and aspects of attractiveness. At the initial field trial stage, a response questionnaire was used with a Likert scale consisting of teacher responses and student responses. The teacher's responses used a response questionnaire on the aspects of the suitability of the material content, the readability aspect, and the attractiveness aspect, while the students' responses used a response questionnaire on the readability aspect and the attractiveness aspect..

### Data Collection Technique

Data Collection Technique in preliminary studies, expert validation, and initial field trials through google forms provided online.

### Research Procedures and Data Analysis Technique

The first stage on this research is preliminary research, data analysis in preliminary research is carried out by: classifying the answer data, then calculating the frequency of answers, and finally calculating the percentage of answers using the following formula:

$$\%J_{in} = \frac{\sum J_i}{N} \times 100\% \text{ (Sudjana, 2005)}$$

Information :

$\%J_{in}$  = Percentage of answer choice

$\sum J_i$  = Number of respondents who answered-i

N = Total number of respondents

The next stage is the planning stage which includes the planning and product development stages, after the product is developed, an expert validation stage will be carried out with a validator to determine the validity of the e-book on osmotic pressure material. The e-book that has been assessed and given suggestions for improvement by the validator is then revised according to the suggestions for improvement. The e-book is the revised result of expert validation, then as a reference in conducting initial field trials conducted to determine teacher and student responses to e-books on osmotic pressure material. The data from expert validation and initial field trials were analyzed by: classifying data, tabulating data, calculating answer scores based on Table 1 below:

**Table 1.** Penskoran skala *Likert*.

No	Answer Options	Score
1	Strong Agree (SS)	5
2	Agree (S)	4
3	Disagree (KS)	3
4	Disagree (TS)	2
5	Strongly Disagree (STS)	1

The next step is to process respondents' answer scores, calculate the percentage of respondents' answer scores using the formula below :

$$\sum \%X_{in} = \frac{\sum S}{S_{maks}} \times 100\% \text{ (Sudjana, 2005)}$$

Information :

$\%X_{in}$  = Percentage of answers to questionnaire-i

$\sum S$  = Total answer choice

$S_{maks}$  = Maximum score

After we know the percentage of respondents' answers, then calculate the average percentage of respondents' answers with the formula:

$$\overline{\%X_t} = \frac{\sum \%X_{in}}{n} \text{ (Sudjana, 2005)}$$

Information :

$\overline{\%X_t}$  = Average percentage of questionnaire-i

$\sum \%X_{in}$  = Total percentage of questionnaire-i

n = Number of questionnaire questions

The last step is to interpret the average percentage of respondents' answer scores using the Arikunto (2008) interpretation as in Table 2 below:

**Table 2.** Tafsiran Arikunto

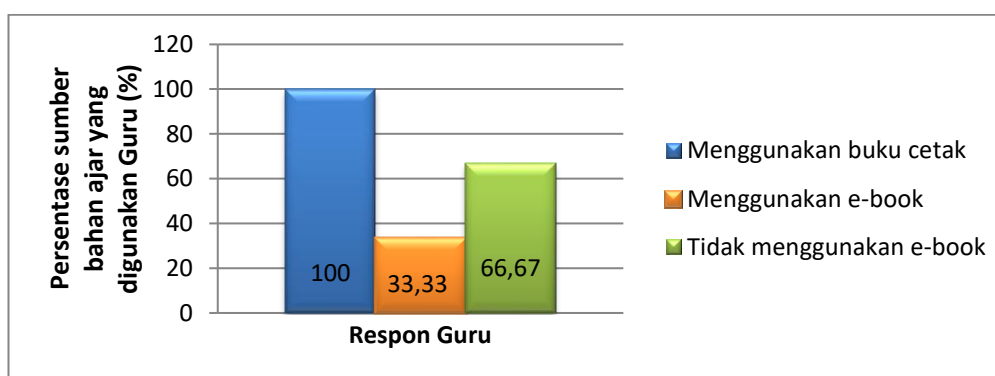
No	Percentage	Criteria
1	80,1% - 100%	Very High
2	60,1% - 80%	High
3	40,1% - 60%	Moderate
4	20,1% - 40%	Low
5	0% - 20%	Very Low

## ▪ RESULT AND DISCUSSION

### Research Result and Information Gathering

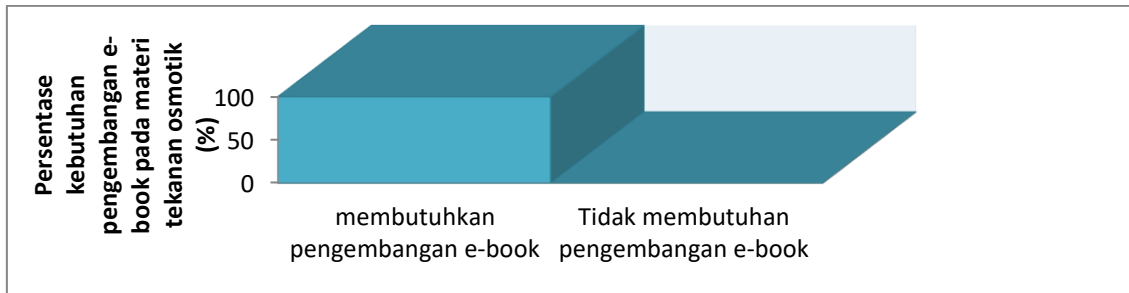
Research results and information collection consisted of two stages, namely literature studies and field studies. In the literature study, literature studies and curriculum studies are carried out, where in this literature study look for various literatures or references that support the research to be carried out, while in the curriculum study an analysis of core competencies (KI) and basic competencies (KD) on the material of osmotic pressure is carried out, namely KD 3.1, 3.2, 4.1, 4.2 which will be used as a reference in the preparation of the e-book, making indicators of achievement of basic competencies, as well as making products from e-books on the material of osmotic pressure.

The field study was conducted by conducting preliminary research at SMA Negeri 15 Bandar Lampung, SMA Negeri 10 Bandar Lampung, and MAN 2 Bandar Lampung with the number of respondents being 3 chemistry teachers and 52 students of class XII IPA. Based on preliminary research, all teachers stated that they did online learning on osmotic pressure material during the Covid-19 pandemic with the source of teaching materials used by teachers shown in Figure 1.



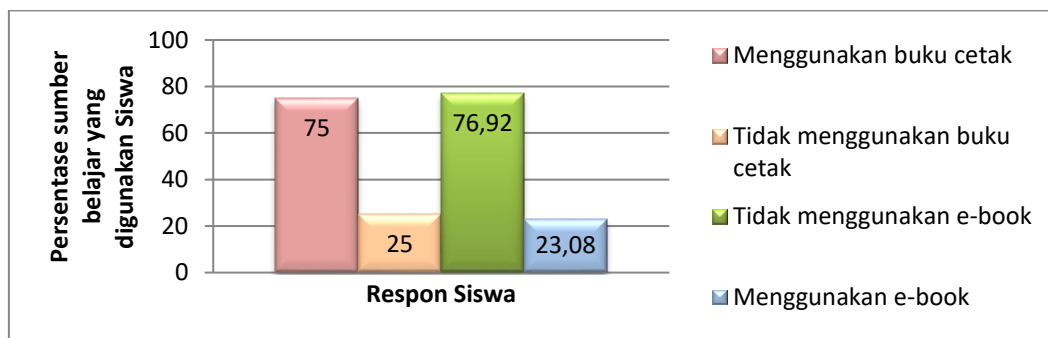
**Figure 1.** Source of teaching materials used by teachers

E-books used by 33.33% teachers contain sample questions and as many as 100% of teachers have never developed an e-book on osmotic pressure material. The need for development e-book on osmotic pressure material is shown in Figure 2.



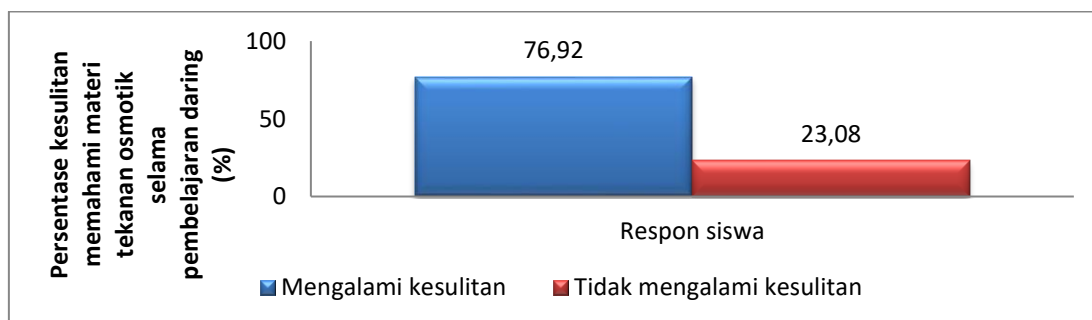
**Figure 2.** Teacher responses to the need for development e-book on osmotic pressure material

Based on data from preliminary research conducted with 52 students, as many as 76.92% of students stated experiencing difficulties in understanding the osmotic pressure material in online learning during Covid-19. Learning resources used by students are shown in Figure 3.



**Figure 3.** Learning resources used by students

Students used e-books 23.08% of as a learning resource. The need for and development e-book on osmotic pressure material is shown in Figure 4.



**Figure 4.** Student responses to the need for and development e-book on osmotic pressure material

### Product Design Results

At the design stage consists of planning and product development. The planning consists of making a storyboard containing details of the components contained in the e-book on the developed osmotic pressure material, then determining the application to be used. The application used is a book creator, then product design is carried out. The

result of product design, e-book the developed consists of 3 parts, namely the introduction, the content, and the closing section.

### Product Development Results

The results of product development, namely the product developed consists of 3 parts, namely the introduction, the content, and the closing section. The introduction section consists of *a cover* front designed as attractive as possible to attract students' reading interest, then there is an introduction, table of contents, basic competencies of osmotic pressure material, indicators of achievement of basic knowledge competencies, and learning objectives to be achieved.

The content section consists of 3 sub-chapters, namely the sub-chapters of non-electrolyte solution osmotic pressure, osmosis material in everyday life, and osmotic pressure in electrolyte solutions, where in each sub-chapter there are animations, videos, material explanations, sample questions and discussion. In the content section there is also a summary of the material and practice questions that can be done by students.

The closing section consists of references, namely various literatures as references in developing products, and there is *a cover* back which contains a brief description of the description e-book on osmotic pressure material and a brief written biography of the author.

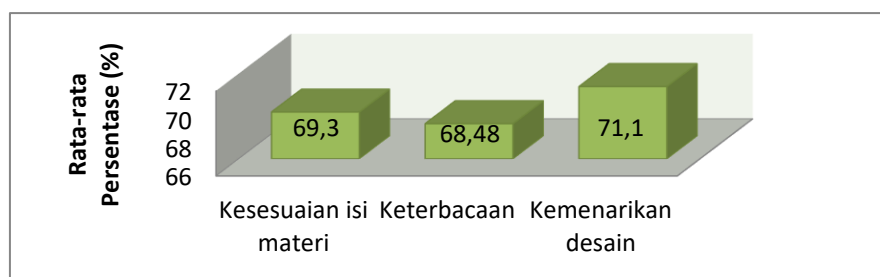
### Expert Validation Results

After the e-book on osmotic pressure material has been developed, to find out the validity of the e-book, it is done by validating 3 validators through a questionnaire.

On the aspect of suitability of the content of the material consists of the suitability of the content of the material against the KI-KD and the suitability of the content of the material in the e-book on the material of osmotic pressure. The results of expert validation on the aspect of the suitability of the content of the material obtained an average percentage of 69.30% with high criteria according to Arikunto's interpretation in Table 2.

On the readability aspect consisting of typeface, font size, font color, and the use of language in the e-book on the material osmotic pressure. The results of expert validation on readability aspect earned an average percentage of 68.48% with a high criteria in accordance with the interpretation Arikunto in Table 2.

In the aspect of the attractiveness of the design, which consists of the attractiveness of the design of the e-book, a mix of colors, images, and animation in e-book on osmotic pressure material. The results of expert validation on the attractiveness aspect of the design obtained an average percentage of 71.01% with high criteria according to Arikunto's interpretation in Table 2. The results of expert validation can be seen in Figure 5.



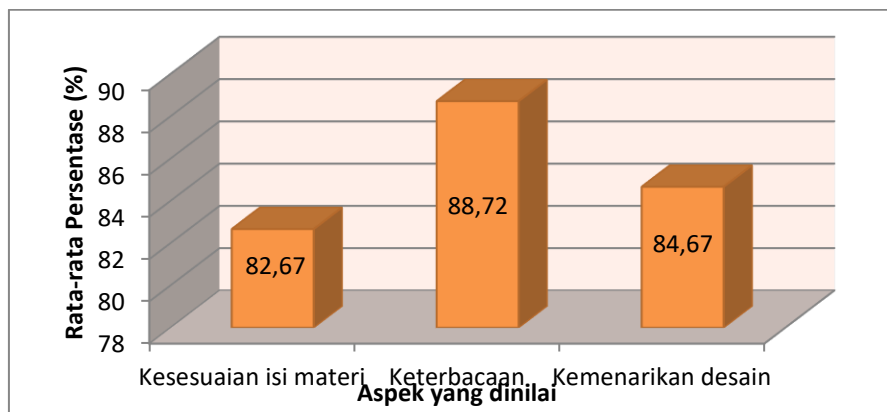
**Figure 5.** Expert Validation Results

### Initial Field Trial Results

The e-book developed that has been validated and improved in accordance with the validator's suggestions then conducts initial field trials at SMA Negeri 15 Bandar Lampung, SMA Negeri 13 Bandar Lampung, and MAN 2 Bandar Lampung. Initial field trials are carried out by providing a link e-books to teachers and students, then asked teachers and students to give responses to the e-books on osmotic pressure material through a questionnaire.

### Teacher Responses

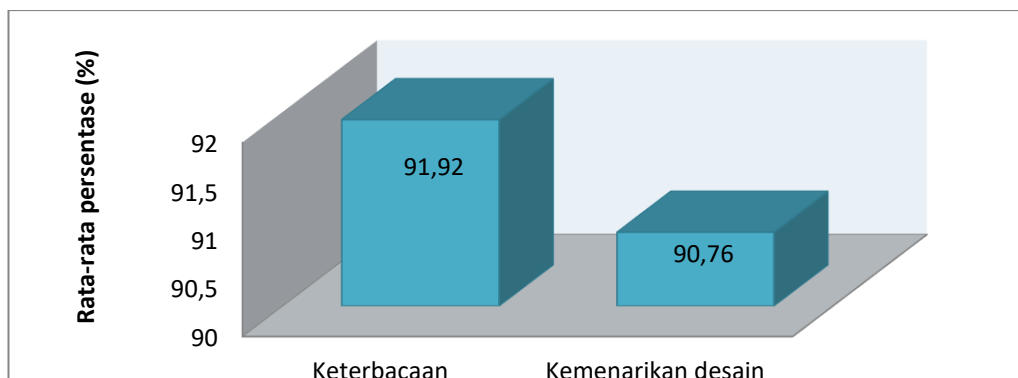
The results of the teacher's response to the e-book on the osmotic pressure material on the aspect of suitability of the content of the material obtained an average percentage of 82.67% with very high criteria, on the readability aspect it obtained an average percentage of 88.72% with very high criteria, while the attractiveness of the design obtained an average percentage of 84.67% with very high criteria. The results of the teacher's responses can be seen in Figure 6.



**Figure 6.** Results of Teacher Responses

### Student Responses

The results of students' responses to the e-book on the material of osmotic pressure on the readability aspect obtained an average percentage of 91.29% with very high criteria, and on the attractiveness aspect of the design obtained an average percentage of 90.76% with very high criteria. The results of student responses can be seen in Figure 7.



**Figure 7.** Results of Student Responses



## ▪ CONCLUSION

Based on the results of the research and discussion that have been described, it can be concluded as follows: (1) the results of expert validation of the product e-book on the developed osmotic pressure material obtained an average percentage of 69.30% for the suitability aspect of the content of the material, amounting to 68,48% for the readability aspect, and 71.10% for the design attractiveness aspect. These three aspects have high criteria, so they are declared valid. (2) the results of the teacher's response to the product e-book on the developed osmotic pressure material obtained an average percentage of 82.57% for the suitability aspect of the material content, 88.72% for the readability aspect, and 84.67% for the attractiveness aspect. design. These three aspects have very high criteria. (3) the results of student responses to e-books on the developed osmotic pressure material obtained an average percentage on the readability aspect and the attractiveness aspect of the design respectively obtaining an average percentage of 91.29% and 90.76% with the following criteria very high.

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