Journal of Educational Sciences
Journal homepage: https://jes.ejournal.unri.ac.id/index.php/JES

P-ISSN 2581-1657
E-ISSN 2581-2203

Development E-Assessment Using Kahoot! in Learning Chemistry of Electrolyte And Non-Electrolyte Solution Materials for SMA/MA

Guspatni, Mela Devi Aulya*
Chemistry Departement, Universitas Negeri Padang, Padang, 25132, Indonesia

ARTICLE INFO

Article history:

Received: 22 August 2022
Revised: 01 April 2023
Accepted: 04 April 2023
Published online: 24 April 2023

Keywords:

E-Assessment;
Kahoot;
Electrolyte and Non-electrolyte Solutions

A B S T R A C T

This research aims to develop an e-assessment using Kahoot! Valid, reliable, also practical in learning the chemistry of electrolyte and non-electrolyte solution materials. The research subjects consisted of validators in their fields, subject teachers, and class XI students of SMA Negeri 13 Padang. This development research uses the Borg & Gall development model. The instrument in conducting this study used validation sheets and practicality questionnaires. The average result from the expert validation questionnaire was obtained at 0.91, meaning the product is valid and can be used. Analysis of question items received an average validity and reliability of questions of 0.50 and 0.88, respectively, indicating that the product is valid and reliable. The difficulty level is 20 "moderate" and 5 "easy" questions, the average differentiating power is 0.42 with good categories, and all deception works well. Based on the results of the practicality questionnaire, an average field trial of 89% of student responses and 91% of teacher responses was obtained, which means that the e-assessment tool uses Kahoot! Easy to use by teachers and learners.

1. Introduction

According to the Minister of Education and Culture number 23 of 2016 concerning educational assessment standards, assessment is a process of collecting and processing information to measure the achievement of student learning outcomes. In general, the assessment process is carried out through a paper-based test. This assessment process has weaknesses in terms of the cost of paper pawning, the duration of correction time, errors in a correction, and even often causes fraudulent actions and nervousness in students (Hamid, 2016).

* Corresponding author.
E-mail: melaaulya@gmail.com
Doi: https://doi.org/10.31258/jes.7.2.p.134-147

The weaknesses in the paper-based test can be corrected using technology that can be done anywhere and anytime. The benefits of technology provide immediate feedback and enable rapid change to learners' misconceptions (Jeljeli et al., 2018). Developments in information and communication technology have had a significant influence on the methods used in assessment and have provided new opportunities to conduct electronic-based evaluations, otherwise known as e-assessments, on learning through computers, laptops, and mobile devices (Astalini & Putri, 2018).

The results of interviews conducted at several schools in Padang found that teachers have applied technology to the assessment process, but not entirely because paper and pen are still used. Students collect their answers through photos of their writings on paper and then send them to the teacher. Another problem is that students' answers are the same. Correcting the answers takes a long time because teachers must download and check the students' responses individually.

The assessment activities carried out by the teacher can also be called E-assessment. E-assessment uses digital technology to create, distribute, assess, and provide feedback for formative, summative, diagnostic, or self-assessment assessments. This process involves electronic technology for evaluating and giving feedback to specific individuals. Therefore, the function of e-assessment in education is beneficial. For example, to correct weaknesses in a paper-based grading system, such as the time required for assessment, provide high-quality data for teachers and administrators, and reduce printing costs (Ridgway & Pead, 2004).

The e-assessment process utilizes technological advances, one of which is using applications in its activities. One form of utilization is the use of Kahoot!. Kahoot! is an application and a free learning platform based on games and educational technology that can be used to create interactive tests (Zhang & Yu, 2021). The scoring system uses Kahoot! allows teachers to know students' learning outcomes immediately because the points obtained by students can be displayed after students have finished answering all questions (Heni et al., 2019). Utilizing e-assessment using Kahoot! in the material, electrolyte and non-electrolyte solutions can stimulate students' minds because they present questions with the appearance of animated videos or images as if students directly connect the material with their daily lives.

Based on the description above, developing e-assessment in electrolyte and non-electrolyte material is necessary using Kahoot!. Therefore, researchers conducted research with the aim of developing an electrolyte and non-electrolyte e-assessment using Kahoot! for SMA/MA students that are valid, reliable, and practical.

2. Methodology

This type of research is research and development (Research and Development). Research and development is a type of research used to produce a specific product as well as test the effectiveness of the product (Sugiyono, 2013). This research used a development model, according to Borg and Gall. It was only carried out in seven steps: 1) Research and information collection, finding out through interviews with several high school teachers in the city of Padang about common problems that occur in the evaluation of chemistry learning, the search for reference sources and literature review is also carried out at this stage to strengthen the solutions that will be used as a product later; 2) Planning, this stage analyzes the Basic Competencies (KD) for the formulation of learning indicators, makes a learning evaluation grid; 3) Initial product development, developing the grid into a collection of multiple-choice type questions and inputted into *Kahoot!*. Perform validations and revisions based on validator input; 4) Initial trial, initial trial stage, evaluation product using *Kahoot!* will be tested on six learners, with categories of two intelligent, two intermediate, and two less intelligent students of class XI MIPA 2. Then an analysis of the test results will be carried out to determine the level of validity, reliability, differentiability, and difficulty of the question item items; 5) Revision of the initial product; the tested results will be revised according to the suggestions and input from respondents; 6) Main field test, field trial stage, evaluation tool product using Kahoot app*!* will be trialed to one class XI MIPA 6. Then, the test results will be analyzed to determine the validity, reliability, differentiability, and difficulty of the question item items. Suggestions and input from teachers and learners are obtained to revise the product; 7) Operational product revision, the final product revision stage, is carried out after getting the results of the last field trial of one class XI at SMAN 13 Padang (Gall & D., 2007).

This research was conducted at SMA 13 Padang. The research subjects used were FMIPA UNP lecturers, chemistry teachers and students of SMA 13 Padang. The object of this study is a collection of questions on the *Kahoot application!* for electrolyte and non-electrolyte solution materials. The instruments in this study used multiple-choice tests using *Kahoot!* , validation questionnaires were given to FMIPA UNP lecturers and high school chemistry teachers, and practicality questionnaires were given to chemistry teachers and students. The validation questionnaire was analyzed using Aiken's V formula (Purnomo et al., 2016) as follows:

$$V = \frac{\sum s}{n(c-1)} \quad \text{..... (1.1)}$$

Information:
S : r – lo
Lo : lowest validity
c : highest validity
r : value given by validator
n : number of validators

Validity is acceptable if the value of the index V meets the minimum value of validity based on the coefficient of validity. The study used nine validators. In this case, the general value of V is 0.70 (Lewis, R. 1985). The degree of validity of the developed e-evaluation product will be visible after being converted to a category in Table 1 (Aiken's, 19985).

Table 1. Validity Level Conversion

Index Aiken's V	Category Validity
V < 0,70	Valid
V ≥ 0,70	Invalid

Analysis of practicality questionnaires to find out the responses of teachers and students to the media created; the data obtained is analyzed and calculated based on calculations from the Likert scale value. The practicality sheet is calculated using the formula (Purwanto, 2010):

$$NP = \frac{R}{SM} X\ 100\% \text{ ..... } (1.2)$$

Information:
NP : Percentage of the number of resonant answers on the questionnaire
R : Number of scores obtained
SM : Highest number of scores

The level of practicality of the product assessment questions using *Kahoot!* will be visible after converting to categories like Table 2 below (Yunus & Sardiwan, 2018)

Table 2. Practicality Level Conversion

Value	Practicality
86% - 100%	Very practical
76% - 85%	Practical
60% - 75%	Quite practical
55% - 59%	Impractical
≤ 54%	Very impractical

Analyze question items to determine the validation of question items, the reliability of question items, the difficulty of the questions, and the differentiating power of the questions using the formulas below:

1. Validity of question items

The validity conclusions to be obtained from the items about whether they are valid or not can be analyzed using correlation techniques. The correct correlation technique in looking at the validity of multiple-choice questions that have a variable I in the form of pure discrete data or dichotomic data and have variable II, namely continuous data, is a biserial point correlation technique that is given a symbol r_{pbi} that can be obtained using the formula:

$$r_{pbi} = \frac{M_{p-}M_t}{S_t}\sqrt{\frac{p}{q}} \text{ ..... (1.3)}$$

Information:
r_{pbi} : Biseral point correlation coefficient
M_p : Average score of the subject who answered correctly for the item for which validity was sought
M_t : Total score average
S_t : Standard deviation from the total score
p : Proportion of learners who answered correctly
q : Proportion of learners who answered incorrectly (q = 1 – p)

If the value $r_{pbi} > r_t$, then the question item is declared valid, but
If the value $r_{pbi} < r_t$, maka item soal dinyatakan tidak valid (Sudiyono, 2009).

2. Reliability of question items

Reliability of questions related to the problem of the determination of test results; if the results are arbitrary, the changes that occur can be meaningless (Arikunto, 2013). The use of Kuder-Richardson formula in this study uses KR_{20}, as for the formula as follows:

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{S^2-\sum pq}{S^2}\right) \text{ ..... (1.4)}$$

Information:
r_{11} : overall test reliability
N : The number of items in the test
p : proportion of learners who answered correctly
q : proportion of learners who answered incorrectly
N : Lots of test items
∑X : the total score of each testee

A question is said to have high reliability if it $r_{11} \geq 0.70$, while if it is smaller, the test does not yet have high reliability (Sudjono, 2011). The reliability category of a question item can be seen in Table 3 (Jihad, 2012):

Table 3. Reliability Level Conversion

Index	Coefficient Rate
$r_{11} \leq$ 0,20	Very low reliability
0,20 < r_{11} 0,40	Low reality
0,40 < r_{11} 0,70	Medium reliability
0,70 < r_{11} 0,90	High reliability
0,90 < r_{11} 1,00	Very high reliability

3. Difficulty Level of Question Items

A question is good if it is not too easy or difficult. The difficulty index number ranges from 0.00 to 1.00, and this number can be obtained using the formula proposed by Du Bois, namely:

$$P = \frac{B}{JS} \text{ ..... } (1.5)$$

Information:
P : Difficulty index
B : The number of students who answer correctly
JS : Total number of learners
The criteria for the difficulty index of the question, according to Robert L. Thorndike and Elizabeth Hagen, are found in Table 4 (Sudjono, 2011):

Tabel 4. Indeks Kesukaran Item Soal

Indeks	Difficulty Level
< 0,30	Very Hard
0,30 – 0,70	Middle
> 0,70	Very Easy

4. Differentiating Power of Problem Items

Good question items are question items that have a differential power index of 0.4 to 0.7 (Arikunto, 2013). Analyze the differentiating power of the question items using the formula, namely:

$$DB = PA - PB \text{ ..... } (1.5)$$

Information:
DB : Power difference
PA : Proportion of the upper group
PB : Proportions of the lower group
Meanwhile, to know how big a question can be stated to have an excellent distinguishing power. The basis for using the scale of the differentiating power criteria for the question is found in Table 5 (Sudjono, 2011):

Table 5. Power Index of The Difference of The Question Item

Descriptive index	Classification	Description
0,00 – 0,20	*Poor*	The item in question has poor distinguishing power
0,21 – 0,40	*Satisfactory*	The item in question has a fairly good distinguishing power (moderate)
0,41 – 0,70	*Good*	The item in question has a good distinguishing power
0,71 – 1,00	*Excellent*	The item in question has excellent distinguishing power
Negatively marked	-	The item in question has a very ugly distinguishing power

5. Deceptor

A deceiver who the learner does not choose indicates that the deceiver is ugly and too far from the material. On the contrary, deception can be interpreted as functioning correctly if the deception has great appeal to students who do not understand the concept or do not master the material. It's a good idea if at least 5%

of students choose the answer choice. The steps in determining the quality of deception in the following questions:

a) Setting P (difficulty level) on alternative answer key

$$P = \frac{B}{JS}$$

b) Determining the differentiating power of alternative answer key

$$D = PA - PB$$

The determination of deception is seen from the result of the first and second steps. An item is said to be good if the deceiver is no more than 10% of the learners' vote (Arikunto, 2013)

3. Results and Discussion

The research results on developing a collection of electronic evaluation questions that have been carried out. Then an e-evaluation tool was obtained using the help of *Kahoot!* on electrolyte and non-electrolyte solution materials for SMA / MA students. The research conducted using the Borg and Gall model with the overall research results for each stage is described as follows:

1. Research and information collection

The first stage carried out by the researcher is to identify problems in students at SMA Negeri 13 Padang; researchers obtain information about an issue related to learning evaluation activities. Before the pandemic, teachers conducted learning assessments using written tests as question sheets. Still, during the pandemic, teachers gave questions in the form of soft files and sent them in word or pdf documents, sometimes also using google forms to conduct assessments. The problem that can be obtained when collecting information is that many students do not collect answers on time or have the same answers as friends, so the students' sense of honesty is reduced. This problem was corroborated by the researchers' interviews with two teachers in two different schools who experienced the same problem.

Therefore, researchers solve these problems by developing e-assessments using *Kahoot!* on the material chemistry of electrolyte and non-electrolyte solutions. The use of *Kahoot!* in the process of e-assessment is fascinating because *Kahoot!* supported by a *back sound* when the question starts, a set time for each number, and the score obtained automatically comes out when five students get the highest score. *Kahoot!* has the advantage of being able to use during distance learning or face-to-face learning.

Another source obtained by researchers is to conduct a literature review. The literature review aims to be used for designing and developing products. Based on the results of several literature studies obtained, relevant research on evaluation tools using *Kahoot!*. In another study (Dewi, 2018), validation results from material experts got a final percentage of 82% with very feasible criteria. The

validation results from media experts received a final percentage of 83% with a decent category. The validation results from linguists got a final percentage of 84% with a decent category. The reliability obtained in the first stage was 0.943, and in the second stage was 0.537. In the assessment, students got a final percentage of 81% with fascinating criteria. So, it can be concluded that the evaluation tool using *Kahoot!* what researchers have developed can be feasible as an evaluation tool by analyzing materials that can be used in this development, namely electrolyte and non-electrolyte solutions in SMA / MA.

2. Planning

Researchers analyze the core and essential competencies per the 2013 electrolyte and non-electrolyte solution materials curriculum in this second stage. Basic competence for electrolyte and non-electrolyte solution materials, according to Permendikbud No. 37 of 2018 KI-KD SD SMP SMA, is 3.8. Analyze the properties of the solution based on electrical conductivity. Based on the KD, indicators of competency achievement can be formulated in electrolyte and non-electrolyte solution materials and a grid of questions.

IPK is based on **KD 3.8. Analyzing the properties of the solution based on electrical conductivity** is as follows:

3.8.1. Analyzing electrolyte and non-electrolyte solutions based on their characteristics
3.8.2. Analyzing the causes of a solution being electrolyte and non-electrolyte
3.8.3. Analyzing the electrical conduction strength of different types of electrolyte solutions

Before conducting research, researchers validate products first to validators who are experts in their fields if the product is valid and can be tested on students.

3. Initial product development

In addition to moving the question items, the initial product development process was created based on the question grid in *Kahoot!* , an expert assessment was also carried out at this stage which was carried out by five chemistry lecturers and four chemistry teachers. This validation involves validating the developed question items' material, construct, and language.
A collection of questions that have been made on *Kahoot!* at the next stage, validity testing will be revised by validators who are experts in their fields. Analysis of the validity of the question items was carried out using the formula Aiken's V, and the question items have a very high level of validity. The results of question validation can be seen in Table 6.

Tabel 6. Question Validation Result

No Questions	Aspects			V	Description
	Material	Construct	Language		
1	0,90	0,92	0,90	0,91	VALID
2	0,91	0,91	0,93	0,92	VALID
3	0,91	0,90	0,93	0,91	VALID
4	0,91	0,91	0,91	0,91	VALID
5	0,91	0,91	0,89	0,90	VALID
6	0,91	0,90	0,92	0,91	VALID
7	0,92	0,92	0,92	0,92	VALID
8	0,92	0,92	0,93	0,92	VALID
9	0,92	0,92	0,95	0,93	VALID
10	0,91	0,92	0,91	0,91	VALID
11	0,91	0,88	0,94	0,91	VALID
12	0,90	0,88	0,94	0,91	VALID
13	0,91	0,88	0,90	0,90	VALID
14	0,91	0,89	0,92	0,91	VALID
15	0,91	0,90	0,91	0,91	VALID
16	0,91	0,88	0,90	0,90	VALID
17	0,90	0,89	0,90	0,90	VALID
18	0,91	0,91	0,91	0,91	VALID
19	0,91	0,88	0,89	0,89	VALID
20	0,91	0,89	0,92	0,91	VALID
21	0,92	0,91	0,91	0,91	VALID
22	0,91	0,92	0,91	0,91	VALID
23	0,92	0,89	0,90	0,90	VALID
24	0,92	0,90	0,90	0,91	VALID
25	0,91	0,90	0,90	0,90	VALID
Overall Average				0,91	VALID
Average of Material Aspects				0,91	VALID
Average Aspects of The Construct				0,90	VALID
Average Language Aspect				0,91	VALID

The data on the validity analysis of question items carried out by validators show that these items are received with an average Aiken's v index of 0.91. There are suggestions and input from validators to revise the question product to be better and worth using.

4. Initial trial

After validating and revising per the input provided by the validator, the next step is the initial product trial carried out in class XI MIPA 2 SMAN 13 Padang with six students. This initial trial aims to see the implementation of *Kahoot!* and minimize errors before conducting field trials. The test results found that many students had questions that were not answered because the questions on *Kahoot!* were too fast, so it took a revision and a second trial.

5. Initial product revision

Product revision of evaluation tools using *the Kahoot app!* After getting input from the lecturer and analyzing the student's answers.

6. Main field tests

After revising, the next stage is field trials. The subjects at this stage are all class XI MIPA 6 SMAN 13 Padang students to see the validity, reliability, differentiating power and difficulty level of the question items. The data on the results of the field trials are contained in Table 7.

Table 7. Validity of The Question Item

No	r_{pbi}	Rtable	Description
1	0,02	0,374	Valid
2	0,36	0,374	Invalid
3	0,18	0,374	Invalid
4	0,73	0,374	Valid
5	0,65	0,374	Valid
6	0,17	0,374	Invalid
7	0,83	0,374	Valid
8	0,74	0,374	Valid
9	0,40	0,374	Valid
10	0,73	0,374	Valid
11	0,36	0,374	Invalid
12	0,53	0,374	Valid
13	0,38	0,374	Valid
14	0,52	0,374	Valid
15	0,42	0,374	Valid
16	0,21	0,374	Invalid
17	0,73	0,374	Valid
18	0,65	0,374	Valid
19	0,47	0,374	Valid
20	0,40	0,374	Valid
21	0,39	0,374	Valid
22	0,46	0,374	Valid
23	0,26	0,374	Valid
24	0,64	0,374	Valid
25	0,77	0,374	Valid

All questions that students have done are analyzed using formulas in Excel; out of 25 numbers, 20 valid questions indicate that the question items are positively correlated, and five invalid questions suggest that the questions are not correlated or invalid. A question can be said to have high validity if the score of the question item is aligned with the total score. This alignment can be interpreted by correlating question items with total scores (Arikunto, 2013).

Reliability test

The reliability test analyzed using the KR20 formula shows a result of 0.88, indicating that the question item is highly reliable. The reliable results during the initial product trial had a not-too-far difference of 0.78, which can be ignored. The question items' high and low validity values can influence the high and low-reliability values. Tests with a large value of question items usually have a high validity level compared to tests with only a few question items (Arikunto, 2013).

Difficulty test

The results of the calculation of the difficulty level of the question item are shown in Table 8.

Table 8. Level of Difficulty of The Question Item

No	Difficulty Level	Description
1	0,82	Easy
2	0,61	Moderate
3	0,43	Moderate
4	0,71	Easy
5	0,71	Easy
6	0,32	Moderate
7	0,36	Moderate
8	0,71	Easy
9	0,46	Moderate
10	0,64	Moderate
11	0,50	Moderate
12	0,82	Easy
13	0,43	Moderate
14	0,43	Moderate
15	0,46	Moderate
16	0,46	Moderate
17	0,39	Moderate
18	0,68	Moderate
19	0,54	Moderate
20	0,43	Moderate
21	0,46	Moderate
22	0,50	Moderate
23	0,46	Moderate
24	0,43	Moderate
25	0,36	Moderate

The results show 20 questions in the "moderate" and five questions in the easy category. A question item representing the moderate category can be done for students who are smart, medium, and not smart students. Question items with a difficulty index of 0.30 – 0.70 are categorized with a moderate difficulty level and are considered good questions to use (Arikunto, 2013).

Power test difference

The results of calculating the difference in question items in field trials are found in Table 9.

Table 9. The Power of Different Items of The Problem

No	Power Difference	Description
1	0,36	Quite
2	0,21	Quite
3	0,14	Bad
4	0,57	Good
5	0,57	Good
6	0,07	Bad
7	0,71	Very good
8	0,57	Good
9	0,36	Quite
10	0,57	Good

11	0,14	Bad
12	0,36	Quite
13	0,43	Good
14	0,57	Good
15	0,36	Quite
16	0,21	Quite
17	0,64	Good
18	0,64	Good
19	0,50	Good
20	0,43	Good
21	0,21	Quite
22	0,29	Quite
23	0,07	Quite
24	0,71	Very good
25	0,71	Very good

The difference power obtained based on the table above from the results of field trials obtained from the calculation results of the different power tests; there are very good categories of 3 questions, questions with good categories of 10 questions, questions with quite categories of 9 questions, and questions with bad categories of 3 questions. The function of analyzing the differentiability of this question item is to see the ability of a question to distinguish the abilities of students who are smart, medium and not good (Arikunto, 2013). In comparison, question items with a bad differentiating power category may be caused by deceptive factors that do not work or are not good (Latisma, 2011). The field trial tested in one class showed that the questions had a very good distinguishing power because they could distinguish students according to their abilities; this was seen from the previous values and compared to the results of students' answers to the researcher's questions.

Deception level

The results of the deception level analysis from the field trial found that all deceptions worked well, and there were only four options that did not work correctly; it's just that the option worked well if 5% of the number of test takers was selected.

7. Revision of operational products

Before the product of these questions is widely used for classes at the same level as the target object made are revised again so that later a question product will be obtained that has good quality in terms of validity, reliability, level of difficulty and differentiating power.

Level of practicality

The practicality sheet assessment is obtained from the provision of teacher and student response questionnaires which are analyzed and calculated based on calculations from the Likert scale value. The results of the practicality test calculation are shown in Figure 1.

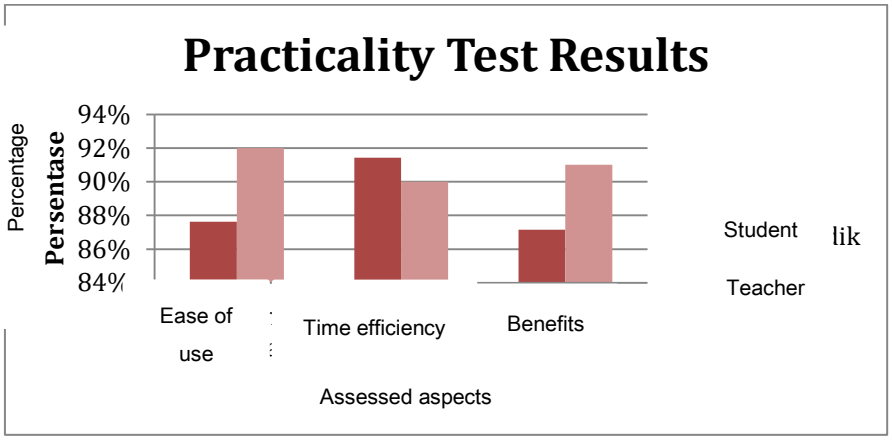

Figure 1. Practicality Test Results

The chart results from calculating the practicality questionnaire of field trials with 28 students and 3 teachers, concluding that the product is very practical.

4. Conclusion

Based on the results of research and data analysis that has been done, it can be concluded that the researchers only took questions with valid categories. Developing an e-assessment using Kahoot! in learning the chemistry of electrolyte and non-electrolyte solution materials for SMA/MA has very high reliability and is practical to use.

References

Arikunto, Suharsimi. (2013). *Dasar-dasar Evaluasi Pendidikan Edisi 2*. Jakarta: Bumi Aksara.

Astalini, dkk. (2018). Identifikasi Sikap Implikasi Sosial dari IPA, Ktertarikan Menambah Waktu Belajar IPA, dan Ketertarikan Berkarir Dibidang IPA Siswa SMP Se-Kabupaten Muaro Jambi. *Jurnal Ilmiah Kependidikan, 7(2)*, 93-108.

Dewi, Cahya Kurnia. (2018). *Pengembangan Alat Evaluasi menggunakan Aplikasi Kahoot pada Pembelajaran Matematika Kelas X*. Bandar Lampung: Universitas Negeri Raden Intan Lampung.

Gall, W. R. B., & D., M. (2007). *Borg-and-Gall-Educational-Research-Research-and-Development.*

Hamid, M. A. (2016). Pengembangan Instrumen Penilaian Hasil Belajar Siswa Berbasis TIK pada Pembelajaran Dasar Listrik Elektronika. *Jurnal Ilmiah Pendidikan Teknik Elektro*, *1*(*1*), 37–46.

Heni, V., Sudarsono, S., & Regina, R. (2019). Using Kahoot To Increase Students' Engagement and Active Learning : a Game Based Technology To Senior High School Student. *Proceedings International Conference on Teaching and Education (ICoTE)*, (*2*), 129–134.

Jeljeli, R., Alnaji, L., & Khazam, K. (2018). A Comparison Between Moodle, Facebook, and Paper-Based Tools: Student's Perception of Preference and Effect on Performance. *International Journal of Emerging Technologies in Learning, 13(5),* 86-98.

Jihad, Asep. (2012). *Evaluasi Pembelajaran*. Yogyakarta: Multi Pressindo.

Latisma. (2011). *Evaluasi Pendidikan*. Padang: UNP Press.

Lewis. R. Aiken. (1985). Three Coefficients for Analyzing the Reliability and Validity Of Ratings. *Educational and Psychological Measurement, 4(5),* 131–141.

Purnomo, A., Ratnawati, N., & Aristin, N. F. (2016). Pengembangan Pembelajaran Blended Learning Pada Generasi Z. In *Jurnal Teori dan Praksis Pembelajaran IPS, 1(1),* 70–76.

Purwanto. (2010). *Evaluasi Hasil Belajar*. Yogyakarta: Pustaka Pelajar.

Ridgway J, dkk. (2004). *Literature review of e-assessment, NESTA Futurelab Series Report 10*. Bristol: NESTA Futurelab.

Sudjono, A. (2011). *Pengantar Evaluasi pendidikan*. Jakarta: Rajawali.

Sudiyono, Anas. (2009). *Pengantar Evaluasi Pendidikan*. Jakarta: Rajawali Pers.

Sugiyono. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: CV. Alfabeta.

Yunus, Y., & Sardiwan, M. (2018). Perancangan dan Pembuatan Media Pembelajaran Berbasis Android pada Mata Pelajaran Sistem Komputer. *Jurnal Pti (Pendidikan dan Teknonologi Informasi) Fakultas Keguruan Ilmu Pendidikan Universitas Putra Indonesia "Yptk" Padang,* 31-41.

Zhang, Q., & Yu, Z. (2021). A literature review on the influence of *Kahoot!* On learning outcomes, interactions, and collaboration. *Education and Information Technologies, 26(4),* 4507-4535.

How to cite this article:

Guspatni, & Aulya, M. D. (2023). Development E-Assessment Using Kahoot! in Learning Chemistry of Electrolyte And Non-Electrolyte Solution Materials for SMA/MA. *Journal of Educational Sciences, 7(2),* 134-147.