**International Journal of Academic Multidisciplinary Research (IJAMR)**
**ISSN: 2643-9670**
**Vol. 6 Issue 7, July - 2022, Pages: 194-197**

# THE EFFECTIVENESS USING ANDROID-BASED CHEMICAL SNAKE AND LADDER GAME MEDIA ON ACID AND BASE CONTENT TOWARD STUDENTS LEARNING OUTCOMES FOR CLASS XI SMA/MA

**Putri Amanda Salsabilla[1], Iswendi[2], Irfan Ananda Ismail[3]**

Universitas Negeri Padang, Department of Chemistry, Padang, Indonesia
Email: putri.amandas12@yahoo.com[1], iswendy956@gmail.com[2], halo@irfanananda28.com[3]

***Abstract**: This research is backgound by the availability of an android-based chemical snake and ladder games on acids and bases that have not been tested the effectiveness on student learning outcomes. This research goals to reveal the level of effectiveness the of the android-based chemical snake and ladder games on acids and bases material on the learning outcomes of class XI SMA/MA students. The type of research used is quasi-experiment with non-equivalent control group design. The Population in this research are science students of XI class of SMA Negeri 1 Lubuk Alung. The research sample was taken by using the purposive sampling and that the selected XI 1st Science class as experiment class and XI 3rd Science class as control class. The instrument of this research is the test of learning result by giving a pretest and posttest in the form of an objective test with 5 answer choices with 20 questions taken from 40 questions that had been tested. The data analysis technique used are the N-Gain test and the two-average similarity test (t-test) and the result showed an increase in better learning outcomes occurred in the experimental class compared to the control class. The evidenced was showed by the average score of posttest from experimental class and control class of 81 and 54, respectively. This is also evidenced by the average N-Gain test for the experimental class of 0.78 with the high category, and supported by hypothesis testing conduct by t-test, namely tcount (2,01107) > ttable (1,99085) at the real level = 0,05. This indicates that the hypothesis is accepted.*

**Keywords:** effectiveness, android based snake and ladder game media, acids and based-learning outcomes, N-Gain,t-test.

## 1. INTRODUCTION

Acids and bases are one of the chemistry materials that are taught in the even semesters of SMA/MA. Acid and base material is a basic concept to be able to understand further material, such as acid-base titration, ion balance in salt solution, and buffer solution. Acid and base materials have factual, conceptual and procedural knowledge. Factual knowledge of acidic and basic materials, namely determining the pH of acids and bases. Conceptual knowledge of acids and bases, namely knowledge of Arrhenius, Bronsted-Lowry, and Lewis acid-base theories as well as acid-base concepts and pH calculations. Procedural knowledge of acid and base material, namely knowledge of how to test acid and base solutions. In the learning process, students are required to be active in doing exercises in order to strengthen the concept so that learning outcomes increase. To improve students' mastery of the material concepts, principles, or procedures that have been studied, practice is needed [1].

In increasing the activity of students to do the exercises, learning media is needed. The use of educational media is necessary in the context of learning activities because it can realize effective and efficient educational goals [2]. Various types of media have been developed for the creation of effective and efficient education for students. One of them can be utilized by using games or games. The game is an activity in which the players try to achieve the goals set by following the required rules [3].

The use of game media is an effort to increase student activity by providing exercises on acid and base material. With the increased activity of students in doing the exercises, it is hoped that they can strengthen the concept so that the learning outcomes obtained are better. Exercises on learning media must be able to stimulate students to be interested and more active in doing the exercises. The success of a media, can not be separated from how the media is well planned. The media is one of the determinants of the success of learning [4].

One of the learning media that can be used is in the form of games. Based on the educational curriculum, which expects the role of technology in learning. The chemical snake and ladder game has now been developed using an application on an android smartphone. The use of android-based chemical snake ladder learning media can be used as a solution for distance learning (online) due to the impact of the covid-19 pandemic that has been going on for the past few years.

Based on data on the results of studying acid and base material for students at SMA Negeri 1 Lubuk Alung before and during the covid-19 pandemic, information was obtained that student learning outcomes declined during the covid-19 pandemic.

The android-based chemistry learning can increase students' motivation and learning outcomes on solubility materials [5]. The use of android media can support students' activities in the buffer solution material [6]. In addition, the use of android-based chemistry learning media can also grow students' scientific literacy on redox and electrochemical reaction materials effectively [7].

Currently, from the research of Manja Azhari (2021) that an Android-based chemical snake and ladder game has been developed as a learning medium for acids and bases. This media has been tested for validity and practicality, with the results of research that this media is valid and practical to use in acid and base learning. However, this media has not tested its effectiveness on student learning outcomes. Based on the

description above, the authors are interested in determining the level of effectiveness these learning media on student learning outcomes with a research entitled "Effectiveness of Using Chemical Snakes and Ladders Game Media Android Based on Acids and Bases on Learning Outcomes of Class XI SMA/MA students".

## 2. RESEARCH METHOD

This type of research is a Quasi Experimental Design and the design used is non-equivalent control group design.. This study used a sample of two classes, namely the experimental class and the control class. The form of this research design can be seen in Table 1.

**Table 1 .** Non-equivalent control group design research

| Class | *Pretest* | Treatment | *Posttest* |
|---|---|---|---|
| Experiment | $O_1$ | X | $O_2$ |
| Control | $O_1$ | - | $O_2$ |

Information :

O1 = Pre-test for experimental and control classes

O2 = Post-test for experimental and control classes

X = The learning process using the game of chemical snakes and ladders

The research was conducted in May-June at SMAN 1 Lubuk Alung in the 2021/2022 Academic Year.

### 2.1 Population and Sample

The population in this research are science students of XI class at SMAN 1 Lubuk Alung in the even semester of the academic year 2021/2022 which consisted of seven classes, namely XI 1st Science, XI 2nd Science, XI 3rd Science, XI 4th Science, XI 5th Science, XI 6th Science, and XI 7th Science.

Samples can be taken using a method called sampling technique, the sampling technique in this study uses purposive sampling technique. Purposive sampling technique is a sampling technique with certain considerations [8]. Researchers will take samples based on classes taught by the same teacher and have balanced abilities. Steps in sampling based on purposive sampling is to determine the sample class with a purposive technique sampling so that two sample classes are obtained to be used as control classes and experiment. The experimental class in this study is class XI MIPA 1 and the control class is class XI MIPA 3. Previously the sample class was taken based on consideration of the value of chemistry test from both classes and normality and homogeneity tests were carried out respectively sample class. In the test on the sample, it was found that both classes of samples were normal and homogeneous.

### 2.2 Variable and Data

The variables in this study are:

a. Independent variable

The independent variable or influence variable is a variable that affects, explains and explains other variables. In this research, the independent variable was learning assisted by the android-based snake and ladder game in the experimental class and in the control class, learning was carried out as usual using chemistry textbooks.

b. Dependent variable

The dependent/dependent variable or the influenced variable is a variable that is influenced by other variables. In this research, the dependent variable is student learning outcomes obtained from the results of the pretest and posttest in the experimental class and control class.

c. Control variable

The control variable is a variable that cannot be changed and is made constant so that the independent variable on the dependent variable is not influenced by external factors that are not examined. In this study, the control variables are:

1) The ability of students at the beginning is the same

2) Learning materials, resource books and time allocation are the same

3) The teacher who teaches and the way of teaching is the same

4) The number and types of questions given are the same

Research data is information in the form of facts obtained from research so that it can be processed for decision making. The data used in this study is primary data obtained from student learning outcomes in the sample class through a pretest (pretest) and a final test (posttest). Sources of data in this study were students in the sample class.

The analysis technique used in this research are the normality test, homogeneity test, N-Gain test, and hypothesis testing. The N-Gain test was used to determine the increase in students' cognitive learning outcomes between before and after learning in the experimental class and control class. The normality test is used to see whether the sample comes from a normally distributed population or not. The homogeneity test aims to see whether the data in the two samples has homogeneous variance or not. Hypothesis testing goals to determine whether the research hypothesis can be accepted or rejected.

## 3. RESULT AND DISCUSSION

Based on research results, it was found that the learning outcomes of students of SMA Negeri 1 Lubuk Alung on cognitive competence. Assessment of learning outcomes is obtained after conducting a pretest and a posttest in the form of multiple choice questions as many as 20 items with 5 answer choices from 40 questions that have been tested. This research data begins with giving a pretest to the sample class before starting the learning process. The initial test is given to determine the students' initial abilities. In summary, the average pretest of students in the two sample classes presented in Table 2.

**Table 2.** Average of Sample Class Pretest

| Classe | N | Average of *Pretest* |
|---|---|---|
| Experiment | 40 | 12,125 |
| Control | 40 | 29,325 |

The second test is the final test (posttest) which is given after the meeting ends in the learning process which aims to determine student learning outcomes after being given treatment. In summary, the posttest results of students in the experimental class and control class can be seen in Table 3.

**Table 3.** Average of Sample Class Posttest

| Class | N | Average of *Posttest* |
|---|---|---|
| Experiment | 40 | 68,875 |
| Control | 40 | 24,675 |

### 3.1 N-GAIN TEST

The N-Gain test is used to determine the increase in students' understanding and mastery of concepts which can be seen from the cognitive learning outcomes between before and after learning. The results of the average N-Gain in the two sample classes can be briefly seen in Table 4.

**Table 4.** N-Gain Test for Sample Class

| Class | Average of N-Gain | Criteria |
|---|---|---|
| Experiment | 0,78 | High |
| Control | 0,34 | Medium |

### 3.2 Normality Test

Normality test is used to determine whether the data is normally distributed or not. The normality test conducted in this study used the Lilliefors test. The results of the normality test from the research results can be seen in Table 5.

**Table 5.** Normality Test Results for Sample Class

| Class | α | Signifikansi (Sig) | Keputusan |
|---|---|---|---|
| Eksperiment | 0,05 | 0,154 | Normal distributed data |
| Control | | 0,135 | Normal distributed data |

### 3.3 Homogeneity Test

Homogeneity test is used to see whether the data in the two samples has a homogeneous is variance or not. In this research, the homogeneity test was carried out using the F test. Table 6 shows the results of data processing for the homogeneity test.

**Table 6.** Homogeneity Test Results of Sample Class

| Class | N | A | $S^2$ | $F_h$ | $F_t$ | Description |
|---|---|---|---|---|---|---|
| Eksperiment | 40 | 0,05 | 32,48141026 | 1,7878 | 3,96 | Homogent |
| Control | 40 | 0,05 | 44,81026 | | | |

### 3.4 Hypothesis Test

Hypothesis testing is used to determine whether the research hypothesis can be accepted or not. Based on the normality test and homogeneity test of the data on the difference between the initial and final test scores, it can be seen that the learning outcomes of the two sample classes are normally distributed and have homogeneous variances. For this reason this hypothesis test using the t-test, as shown in Table 7.

**Table 7.** Hypothesis Test for Two Sample Classes

| Class | n | *X mean* | S | $t_h$ | $t_t$ |
|---|---|---|---|---|---|
| Eksperiment | 40 | 68,875 | 98,40103899 | 2,01107 | 1,99085 |
| Control | 40 | 24,625 | | | |

## 4. CONCLUSIONS

Based on research results, data processing and data analysis conducted on the effectiveness of using the android-based chemical snake and ladder game on acid and base materials on learning outcomes, it can be concluded that the use of chemical snake and ladder game can effectively improve student learning outcomes in students of class XI SMA/MA. This is evidenced by the N-Gain value that the increase in cognitive learning outcomes of experimental class students has a high category while the control class has a medium category. And supported by hypothesis testing data at a significance level of 0.05 that tcount (2.01107) > ttable (1.99085) so that H0 is rejected and H1 is accepted.

## 5. REFERENCES

**[1]** Smaldino, Sharon E, Deborah L. Lowther, & James D. Russel. (2011). Instructional Technology\& Media for Learning. United States Of America.

**[2]** Susila, Rudi dan Cepi Riyana. (2009). Media Pembelajaran hakikat, pengembangan,pemanfaatan dan penelitian. Bandung : CV Wacana Prima.

**[3]** Danim, Sudarwan. (1995). Media Komunikasi Pendidikan. Jakarta : Bumi Aksara.

**[4]** Mukminan dan Saliman.(2008). Teknologi Informasi dan Media Pembelajaran Ilmu Pengetahuan Sosial. Jurnal IPS. Vol 3(22).

**[5]** Yektyastuti, R., & Ikhsan, J. (2016). Pengembangan Media Pembelajaran Berbasis Android pada Materi Kelarutan untuk Meningkatkan Performa Akademik Peserta Didik SMA. Jurnal Inovasi Pendidikan IPA, 2(1), 88–99. http://journal.uny.ac.id/index.php/jipi .

**[6]** Fatma, A. D., & Partana, C. F. (2019). Pembelajaran Berbantu Aplikasi Android untuk Meningkatkan Kemampuan Pemecahan Masalah Kimia. Jurnal Inovasi Pendidikan IPA, Vol 5 No 1.

**[7]** Harianto, A., Suryati, S., & Khery, Y. (2019). Pengembangan Media Pembelajaran Kimia Berbasis Android Untuk Penumbuhan Literasi Sains Siswa Pada Materi Reaksi Redoks Dan Elektrokimia. Jurnal Kependidikan Kimia, 5(2), 35.https://doi.org/10.33394/hjkk.v5i2.1588.

**[8]** Sugiyono, (2013). Metode Penelitian Kombinasi. Bandung : Alfabeta.