

## The Effect of 5E-Learning Cycle Model Using Animation Media on the Learning Activity and Learning Outcomes of Students in Senior High School Class XI on Salt Hydrolysis Material

M Iqbal<sup>1</sup>, Mawardi<sup>2</sup>

<sup>1,2</sup>Chemistry Education Study Program, Universitas Negeri Padang, Indonesia

### ARTICLE INFO

#### Article history:

DOI:

[10.30595/pspfs.v3i.264](https://doi.org/10.30595/pspfs.v3i.264)

Submitted:

January 20, 2022

Accepted:

February 14, 2022

Published:

March 9, 2022

#### Keywords:

5E-Learning Cycle,  
 Animation Media, Learning  
 Activity, Learning Outcomes

### ABSTRACT

The aim of this study is to determine the effect of learning model 5E learning cycle on learning activities and student learning outcomes on salt hydrolysis material. The research was conducted at Senior High School (SMA) Negeri 10 Medan. This research used research design of Pretest-posttest control group design. The sample was taken by purposive sampling technique and the obtained sample consist of 2 class which is: XI IPA 2 as an experimental class and XI IPA I as a control class. In the experimental class was taught used learning model 5E learning cycle using animation media and in control, class was taught using direct instruction model using animation media. The research instrument used the objective test in form of multiple choice questions as many as 25 questions, which previously passed through validation test, difficulty test, the test of different power, and reliability test with reliability value 0,91. Data analysis in this study used parametric inferential statistical analysis method, which the pretest and normalized score data had to pass normality and homogeneity test.  $X^2$  count the pretest and gain score in the two study classes is greater than  $X^2$  table and F-count the pretest and gain score in both the research class is greater than F-table. The research hypothesis was tested using statistical right-tailed t-test. Based on the calculation of t-statistical using right-tailed t-test obtained t-count results 4.29 and t-table at the 0.05 significance level 1.99. Furthermore, by t-count > t-table implied that the results of this study indicate there is influence of learning model of learning cycle 5E using animation media to the student learning outcomes in SMA of class XI on salt hydrolysis and student learning activity taught by learning model 5E learning cycle using animation media equal to 64,88%, higher than the student learning activity taught by direct instruction model using animation media that is equal to 55,72%.

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).



#### Corresponding Author:

M Iqbal

Chemistry Education Study Program,  
 Universitas Negeri Padang, Indonesia

### 1. INTRODUCTION

Salt hydrolysis is one of the most difficult subjects in chemistry (5). This data was reported previously research on the identification of high school chemistry difficulties in the view of teachers and potential chemistry teachers, who claim that salt hydrolysis is a chemical matter deemed difficult by students regarding teacher views in class XI (6). In addition, other difficulties students encounter in salt hydrolysis matter are the students are less aware of the application of the concept of hydrolysis in the real context of the students or the daily lives of the

students, due to the lack of information that students have through their reference resource books. To overcome the material difficulty hydrolysis of salt required a learning model that is able to facilitate students to understand the material, as well as to increase student activity and learning outcomes. However, we found that some of the chemistry teachers were using incorrect learning model in conveying the material especially the salt hydrolysis material. This was found based on observations in several schools. Therefore, a learning model is needed that might help much more students to understand the salt hydrolysis material.

The 5E learning cycle model is a learning model that enables help students to master salt hydrolysis concept and make they play an active role in learning (4). That concept is the student-centered paradigm which is emerged with the constructivist approach with the reforms made in education. With this paradigm, students take on more active roles in learning, they design their own research, and they learn from each other by interacting with each other in group work. Teachers, on the other hand, play the roles of an arranger, a guide and a leader rather than a source of correct answers in the classroom (1).

The model consists of five phases which are: engagement, exploration, explanation, elaboration, and evaluation (6). Explain), elaboration (developing concepts), and evaluation (Evaluate). These phases aim to give students the opportunity to construct their own knowledge and experience by engaging in active learning the material meaningfully by working and thinking both individually and in groups so as to improve student learning outcomes. The results of the study (8) showed that students taught using the Learning Cycle5-E-learning model had higher average learning outcomes ( $x = 81.84$ ) than students who were taught using an expository learning model ( $x = 67, 31$ ). The results of this study have been able to prove that the 5E learning cycle model can facilitate students to receive salt hydrolysis material and improve activates and student learning outcomes.

In order for learning to take place more effectively and efficiently required a learning media that can facilitate the teacher in delivering the material, one of which is the animation media (21). Animation media is one of the learning media often used by teachers in explaining chemical reactions. Based on the research (24) on the Influence of Animation Media on Learning Outcomes and Motivation of Student Learning of Automotive Electrical System Material, showed that the result of learning of class X students using animation media is higher compared with the result of learning of class X students using media powerpoint. Therefore, the media is very appropriate animation used as a medium of learning in the learning model of the learning cycle 5E, so that the activity and student learning outcomes can be maximized (14).

Based on the background described above, we interested in conducting research with the title "The Influence Learning Model Learning Cycle 5E Using Media Animation Against Activities and Results Students High School Class XI On Salt Hydrolysis Materials". This study aims to determine the effect of the learning model 5E learning cycle using the animation media to the results of studying high school students of class XI on salt hydrolysis and to know the learning activities of students taught by learning model 5E learning cycle using animation media on salt hydrolysis material.

## 2. METHODOLOGY

This experiment was carried out in Public Senior High School 10 Medan, XI class in 2016/2017 academic years since April till Mei 2017. The data was collected by population sample involved all student in class XI of Science Major Public Senior High School 10 Medan, which consist: Sciences XI-1, Sciences XI-2, and Sciences XI-3. The sample used in this research is the students of Class XI IPA 2 consisting of 40 students in the experimental class and Class XI IPA 1 consisting of 40 students in the control class, with total 80 students participated in this experiment. However, to determine the experimental class and control class in this research we used purposive sampling technique.

### Research Design

This study utilized the quasi-experimental method in evaluating the academic performance of students in chemistry. We using a pure experimental research design (True Experimental) that is Pretest-posttest control group design which is an experiment where measurements are taken both before and after a treatment. The design means that you are able to see the effects of some type of treatment on a group. In this research design, there are two groups consisting of experimental group and control group. Where each group is given treatment that is in the experimental group is given treatment in the form of learning by using learning model 5E learning cycle using animation media and control group is given treatment in the form of teaching using direct instruction model by using animation media. For more detail can be seen in the following table:

**Table 3.1.** *Pretest- Posttest Only Control Group Design*

Class	Pretest	Treatment	Posttest
Experiment	T1	X	T2
Control	T1	Y	T2

**Research variable:**

The variable is the object of research which means of what is the point of attention of a study (2). Variables in this study consisted of: Independent variables or independent variables are variables that affect (2). The independent variable in this research is learning model 5E learning cycle using animation media. Dependent variable or dependent variable is the result variable (2). The dependent variable in this study is student learning outcomes

**Research instrument**

Instrument using for data collection tools used in this research consist of test instrument in the form of observation sheet of student learning activity and Test Instrument in the form of objective test which will be given in experiment class and control class consisting of 5 alternative choices that is A, B, C, D, and E as many as 25 questions. The test will be given as pretest and posttest.

Problems used in previous research consisted of 40 questions that have not been validated, then the problem is tested on students outside the research sample that aims to determine the validity, reliability, differentiation, and level of difficulty. Thus there will be as many as 25 questions to be used in the study that have met the required quality in the preparation of test kits to be tested in the treatment group in the actual study.

**Collecting Data**

In order to obtain relevant data, appropriate data collection methods are required. In this study, the methods used in data collection include:

Observation: Observation is the collection of data by observing and record systematically to the symptoms that appear on the object ongoing research, in the study used the observation sheet to determine student learning activities during the learning process takes place.

Test: The test is a series of questions or exercises and other tools used to measure the skills, knowledge of intelligence, abilities or talents possessed by individuals or groups (2). In using the test method, this study used an objective test instrument in the form of multiple choice questions with each item consisting of five answers (a, b, c, d and e) and there is only one correct answer. This test is given to the students before starting the lesson (pretest) and after implementing the teaching (posttest) to get the learning outcomes that have been implemented.

**Data analysis technique**

Research Instrument analysis: In this experiment, we used a test instrument to find out student learning outcomes before and after treatment. The test instruments used are analyzed first, including validity, difficulty level, problem-solving power, and Reliability using statistical equations such as those done by Silitonga. Validity is the degree of accuracy between the data that occurs in the object of research with the power that can be reported by researchers (2). Distinguishing power is the ability of a matter to distinguish between smart students (high-ability) with stupid students (low-ability). The number indicating the magnitude of the different power of an item, called the different power index (index of discrimination) is denoted by "D" where the price D ranges from -1 s.d +1. An item is eligible if D ranges from +0.20 - +1,0. Reliability is the stability/reliability of a measuring device, so if the tool is used it always gives consistent results. A reliable instrument means an instrument that, if used multiple times to measure the same object, will produce the same data. This reliability coefficient is compared with r-table in table r-product moment with  $\alpha = 0,05$ . If r-count > r-table then the test is declared reliable.

Data Analysis Score gain normalized: Normalized gain scores are a comparison of actual gain scores and maximum gain scores. Actual gain scores are the gain scores obtained by students while the maximum gain scores are the highest gain scores that students may gain. A normalized gain score data analysis was performed to test the hypothesis if the initial ability of the control group and experiment differed significantly.

**Test Requirements for Data Analysis**

Normality Test: The use of parametric statistics requires the fulfillment of many assumptions. The main assumption is that the analyzed data must be normally distributed. The normality test is performed to determine whether the continuous data obtained is normally distributed or not. If it proves that the data is normally distributed then further data analysis can be continued. Testing of data normality by chi-squared test ( $\chi^2$ ) that is by comparing the standard curve (A) with a normal curve formed from collected data (B). If B does not differ significantly with A, then it is concluded that B is a normally distributed data.

Homogeneity test: Besides the data to be analyzed must be normally distributed, in the use of one particular test must also be met with the requirement that the analyzed data should be homogeneous. Thus in using a particular test such as t-test, it is necessary to test the data variance of both groups of samples whether homogeneous or not. Homogeneity test is also called equality test of variance. Tests homogeneity variant two sample group data is done by F test This test aims to conduct testing activities on the similarity of two variance

Hypothesis test: The hypothesis is tested by using the right side t-test, ie at the significant level  $\alpha = 0.05$  and degrees of freedom (db) =  $n + n - 2$  (25).

### 3. RESULTS AND DISCUSSION

#### Result

In this research, we obtained data by consisted of pretest score data and posttest score data. The pretest score is obtained from the test result given to the students before the learning begins which aims to find out the students' initial ability and to produce a normal and homogeneous distribution sample, whereas the posttest score is obtained from the test result given to the student after all completed learning which also aims to know student learning outcomes. Based on the statistical calculation of pretest and posttest score, statistical data of the research results in the experimental class and control class are summarized in the descriptive statically table below:

**Table 4.4** Summary of Descriptive Statistics of Research Results

Data	Statistic	Class	
		Experiment	Control
<i>Pretest</i>	Average ( $\bar{X}$ )	8,97	8,4
	Standard Deviation (S)	2,16	2,39
	Varians ( $S^2$ )	4,68	5,72
<i>Posttest</i>	Average ( $\bar{X}$ )	19,23	17,09
	Standard Deviation (S)	2,30	2,45
	Varians ( $S^2$ )	5,30	5,96

#### Normalized Gain Score

Normalized gain scores are a comparison of actual gain scores and maximum gain scores. Actual gain scores are the gain scores obtained by students while the maximum gain scores are the highest gain scores that students may gain. Based on the calculation of statistics Gain Normalized score obtained statistical data Gain Normalized in the experimental class and control classes are summarized in descriptive statically table below:

**Table 4.5** Summary Descriptive Statistics Gain Scores Normalized

Data	Statistic	Class	
		Experiment	Control
<i>Gain</i>	Average ( $\bar{X}$ )	0,65	0,53
	Standard deviation (S)	0,12	0,11
	Varians ( $S^2$ )	0,015	0,011

#### Student Learning Activities

In this study, we also conducted an assessment of student learning activities seen during the learning process takes place from the beginning to the end of the meeting. The assessment is performed by an observer with an assessment consisting of the aspects related to the student learning activities and assessed based on the observation sheets contained in the lesson planning plan. Where each aspect has indicators and each indicator has a score of each with a maximum score of three and a minimum score of 1. Scores that have been obtained are changed to the value of student learning activities. Based on the calculation results obtained data on student learning activities in the class of experiments and dics are:

**Table 4.9** First Student Student Learning Activity

Aspect	Experiment Class	Control Class
A. Working in groups	57,14%	48,57%
B. Bring out opinions or ideas	56,19%	53,33%
C. Asking a question	60%	55,24%
D. Make a conclusion	61,90%	55,24%

**Table 4.10** Second Student Student Learning Activity

Aspect	Experiment Class	Control Class
A. Working in groups	71,43%	56,19%
B. Bring out opinions or ideas	71,43%	60%
C. Asking a question	72,38%	58,10%
D. Make a conclusion	68,57%	59,05%

**Table 4.11** Average Student Learning Activity

Aspect	Experiment Class	Control Class
A. Working in groups	64,29%	52,38%
B. Bring out opinions or ideas	63,81%	56,67%
C. Asking a question	66,19%	56,67%
D. Make a conclusion	65,24%	57,14%
<i>Average</i>	64,88%	55,72%

Based on the average table of student learning activities above, we can be made a small conclusion that the student learning activities for all aspects of the experimental class is higher than the control class. This indicates that the learning model 5E learning cycle using animation media is also effective to improve student learning activities.

### Discussion

The research was conducted at SMA Negeri 10 Medan in April of academic year 2016/2017 with population of all grade XI IPA which consist of 3 classes, then we did sampling research with purposive sampling technique and obtained by 2 sample class which consist of class XI IPA-2 as an experimental class and class XI IPA 1 as a control class. This research begins by giving pretest tests to both class samples, namely experimental class, and control class. Where the matter of pretest amounted to 25 items that have met the requirements ranging from the validity, reliability, difficulty and differentiation levels. A pretest was conducted with the aim to know the student's initial ability, student's normal distribution and the homogeneity of the research sample. The learning process was conducted twice and ended with one meeting for posttest giving with the same number of questions as the pretest of 25 items. During the learning process, the two sample classes were given different treatment, in which the experimental class was taught by using learning model 5E learning cycle using animation media and in control class taught by direct instruction model using animation media.

In this study we want to see is the influence of the learning model on student learning outcomes. Based on the results of the data analysis and hypothesis testing that has been done, it can be concluded that there is an effect of learning model 5E learning cycle using an animation media to the result of learning of high school students of class XI on salt hydrolysis, where students taught using learning model 5E learning cycle using animation media have a higher average learning outcome score than students taught using direct instruction model using animation media. This is in accordance with the research conducted (15) on the implementation of 5E learning cycle (Learning Cycle 5E) along with portfolio assessment to improve process quality and learning outcomes on solubility materials and solubility results of grade XI IPA 2 SMA Negeri 1 Kartsura Lesson Year 2011/2012 which shows that the implementation of learning model 5E learning cycle along with concept maps can improve the quality of student learning process and the quality of student learning outcomes. In addition to using animation media, 5E learning cycle learning model in this study also comes with student activity sheet (LKS). With this LKS will facilitate the implementation of a learning model 5E learning cycle, so that will affect student learning outcomes. This is in accordance with the research conducted (23) on the Implementation of Learning Cycle 5E equipped worksheet to improve the creativity and achievement of students on the subject of salt hydrolysis class XI IPA 1<sup>st</sup> Semester, even SMP 3 Boyolali Lesson Year 2013/2014. This was indicated that implementation of the learning cycle learning model 5E with worksheet can improve students' creativity and learning achievement. In addition to seeing the effect of student learning outcomes in this study also seen student learning activities. Based on the observations on student learning activities in the experimental class showed the higher results than in the control class in every aspect, such as the aspect of working in groups, wherein the experimental class has an average value of 63.98% while in the control class only 50.54%, then on the aspect of expressing opinions or ideas, where the experimental class has an average value of 63.44% while in the control class only 56.45% then on the aspect of asking questions, where the experimental class has an average value of 65.59% while the control class is only 51.61% and the last on the aspect of making conclusions, where the experimental class has an average value of 66.13% while the class control only 57.53%. From the above explanation can be concluded that the student learning activities taught by learning model 5E learning cycle using animation media is higher than the student learning activities taught by a direct instruction model using animation media. This is in accordance with the research (26) on the implementation of learning cycle learning model 5E assisted by Macromedia flash with student worksheet (LKS) to improve student learning activity and achievement subject of the addictive substance and psychotropic class VIII SMPN 4 Surakarta Lesson Year 2011/2012. Which shows that by applying the learning model of the learning cycle 5E assisted by Macromedia flash equipped with LKS, able to increase student activity and achievement. In addition, it is also because the concept of the learning model 5E learning cycle that involves students actively during the learning process, so as to increase student learning activities. Thus 5E

learning cycle learning model is very appropriate for use in chemistry learning process, especially for salt hydrolysis material.

#### 4. CONCLUSION

Based on the results of this study, it can be concluded that there is an effect of learning model 5E learning cycle using animation media to student learning result of SMA XI grade on salt hydrolysis material, where students taught using learning model 5E learning cycle using animation media has average score of learning result of 19.22, much more higher than the average score of student learning outcomes taught using direct instruction model using animation media with a score of 17.08. Student learning activity taught by learning model 5E learning cycle using animation media equal to 64,88%, higher than student learning activity taught by direct instruction model using animation media that is equal to 55,72%.

#### REFERENCES

- [1] Anderson R D. 1997. *The science methods course in the context of the total teacher education experience. Journal of Science Teacher Education*, 8(4): 269-282
- [2] Arikunto S. 2010. *Prosedur Penelitian Suatu Pendekatan Praktek*. (Rineka Cipta Press, Jakarta)
- [3] Astutik S. 2012. Meningkatkan Hasil Belajar Siswa Dengan Model Siklus Belajar (Learning Cycle 5E) Berbasis Eksperimen pada Pembelajaran Sains di SDN 1 Patrang Jember, *Jurnal Pendidikan Sekolah Dasar*, 2(1): 143 -153.
- [4] Handayani I G A, I W Sadra, I M Ardana. 2014. Pengaruh Model Siklus Belajar 5E Berbasis Pemecahan Masalah Terhadap Kemampuan Pemecahan Masalah Matematika Ditinjau Dari Pengetahuan Awal Siswa, *Jurnal Program Pascasarjana Universitas Pendidikan Ganesha*. 3.
- [5] Haryani S, Prasetya A T, Saptarini. 2014. Identifikasi Materi Kimia SMA Sulit Menurut Pandangan Guru dan Calon Guru, *Proc*. September 2014.
- [6] Husna S. 2012. Pengaruh Model Pembelajaran Learning Cycle 5E Pada Materi Hidrokarbon Terhadap Hasil Belajar Siswa Kelas XI SMK Negeri 2 Batu Program Keahlian Agribisnis Hasil Pertanian, *Laporan Hasil Penelitian, FMIPA Universitas Negeri Malang*.
- [7] Lantajo J T. 2017. The Use of STAD Model in Teaching Chemistry: Its Effect to Students' Academic Performance. *CEBU Int., Conf., on Studies in Business, Management, Education and Law (SBMEL-17)*: 169-173
- [8] Made W. 2009. *Strategi Pembelajaran Inovatif Kontemporer: Suatu Tinjauan Konseptual Operasional*, (Jakarta: PT. Bumi Aksara)
- [9] Meltzer D E. 2002. The relationship between Mathematics Preparation and Conceptual Learning Grains in Physics: A Possible "HiddenVariable" in Diagnostice Pretest Scores, *American Journal Physics*. 70.
- [10] Ngalimun. 2016. *Strategi dan Model Pembelajaran*. (Yogyakarta: Aswaja Pressindo).
- [11] Purwanto N. 1984. *Psikologi Pendidikan*, (Bandung: Remdja Karya)
- [12] Rachmawati T, Daryanto. 2015. *Teori Belajar dan Proses Pembelajaran yang Mendidik*, (Yogyakarta: Gava Media Press).
- [13] Rahayuningsih R, Masykuri M, Utami B. 2012. Penerapan Siklus Belajar 5E (*Learning Cycle 5E*) Disertai Peta Konsep Untuk Meningkatkan Kualitas Proses dan Hasil Belajar Kimia Pada Materi Kelarutan dan Hasil Kali Kelarutan Kelas XI IPA SMA Negeri 1 Kartasura Tahun Pelajaran 2011/2012. *Jurnal Pendidikan Kimia*, 1(1):51-58
- [14] Sanjaya W. 2008. *Perencanaan & Desain: Sistem Pembelajaran*. (Jakarta: Kencana)
- [15] Sari S D C, Mulyani B, Utami B. 2013. Penerapan Siklus Belajar 5E (*Learning Cycle 5E*) Dengan Penilaian Portofolio Untuk Meningkatkan Kualitas Proses dan Hasil Belajar Pada Materi Kelarutan dan Hasil Kali Kelarutan Siswa Kelas XI IPA 2 SMA Negeri 1 Kartasura Tahun Pelajaran 2011/2012, *Jurnal Pendidikan Kimia*, 1(2): 1-6
- [16] S Sen, O O Oskay. 2017. *The Effects of 5E Inquiry Learning Activities on Achievement and Attitude toward Chemistry. Journal of Education and Learning*. 6(1): 1-9
- [17] Silitonga P M. 2011. *Statistik teori dan Aplikasi dalam Penelitian*, FMIPA UNIMED, Medan.
- [18] Sofyan A, Feronika T, Milama B. 2006. *Evaluasi Pembelajaran IPA Berbasis Kompetensi*, (Jakarta: UIN Press)
- [19] Suardana I N, Redhana I W, A A Istri Agung Rai Sudiarmika, I N Selamat. 2018. Student's Critical Thinking Skills in Chemistry Learning Using Local Culture-Based 7E Learning Cycle Model. *International Journal of Instruction*. 11(2): 309-412
- [20] Sudjana N. 2009. *Penilaian Hasil Proses Belajar Mengajar*, (Bandung: PT Remaja Rosdakarya)

- 
- [21] Sukiyasa K and Sukoco. 2013. *Pengaruh Media Animasi Terhadap Hasil Belajar dan Motivasi Belajar Siswa Materi Sistem Kelistrikan Otomotif*, *Jurnal Pendidikan Vokasi*. 3:126-137.
- [22] Sukmadinata, N Syaodih. 2009. *Landasan Psikologis Proses Pendidikan*. (Bandung: PT. Remaja Bandung. Rosdakarya)
- [23] Tri S, Utomo S B, Yamtinah S. 2014. Implementasi Learning Cycle 5E dilengkapi Worksheet untuk Meningkatkan Kreativitas dan Prestasi Belajar Siswa Pada Materi Pokok Hidrolisis Garam Kelas XI IPA 1 Semester Genap SMA Negeri 3 Boyolali Tahun Pelajaran 2013/2014, *Jurnal Pendidikan Kimia*, 4(3): 1-6
- [24] Syah M. 2011. *Psikologi Pendidikan Dengan Pendekatan Baru*, (Bandung: Remaja Rosdakarya)