

# Enhancing Students Higher Order Thinking Skill through Instagram based Flipped Classroom Learning Model

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**Abstract**—This study aims to describe the use of Instagram-based flipped classroom models in enhancing higher order thinking skills in buffer solution materials. Data were collected and analyzed using the pre-experiment technique while observation sheets were the instruments used. The research was made up of 38 Chemistry Education Study students. The results showed that on average student's activities at home is in the excellent category, while their class activities are tagged good. The results of the posttest value analysis were higher than the pretest in the medium category. This means that there is an increase in higher order thinking skills after the implementation of an Instagram-based flipped classroom learning model.

**Keywords**—higher order thinking skills; buffer solution; instagram-based flipped classroom model

## I. INTRODUCTION

Higher order thinking skill is an essential educational factor used to produce outstanding human resources capable of participating in global challenges [1]. It is the ability to think creatively using knowledge and experience in order to correlate, manipulate, and solve problems [2]. Higher order thinking skills need to be developed by educators in each subject field including that of chemistry. This is because chemistry lessons assist students in thinking outside the box, work scientifically with high-level thinking skills [3,4].

One of the chemistry materials that need to be understood with a high cognitive process is the buffer solution. This is a reasonably complex material, owing to its numerous concepts, calculations, and applications in our everyday life. However, the buffer solution material is not sufficiently understood in low-level cognitive processes; therefore, it is necessary to process, analyze, evaluate, and synthesize it in order to master its usage [5,6].

Based on results obtained from interviewing basic chemistry lecturers at UIN Sunan Gunung Djati Bandung, high-level thinking skills have been applied to the chemistry learning process, without optimal results. This is because students tend to memorize concepts more than they understand it. Secondly, there is a submicroscopic level difficult for students to understand such as the working principle of buffer

solutions. Thirdly, students are usually faced with the challenge of having limited time to study numerous materials. These above-listed points are some of the reasons why lecturers find it challenging to guide students to enhance their thinking skills. Therefore, there is a need for a learning model that can improve students' high-level thinking skills despite irrespective of the limited amount of time and learning media.

One of the relevant learning techniques used to solve this inconsistency is the flipped model of Instagram-based classroom, a model used to improve the learning process at home, which also aids students to understand educational materials using computer technology with internet networks [7]. This is then continued in the classroom, with discussions held about content that has not been recognized [8]. The flipped classroom-based classroom learning model is integrated with Instagram. Instagram, helps one to visualize abstract materials owing to its video features. This therefore, can increase student their learning and higher order thinking skills.

## II. METHOD

The research method used was a pre-experiment with one group in the pretest-posttest design. This study was carried out without a comparison group using pretest and posttest [9]. The study began with a pretest to determine the initial ability of high-level thinking students. Furthermore, treatment was given in the form of classroom flipped learning model, and posttest was given to ascertain any enhancement in the students' high-level thinking skills. The magnitude of the effect of treatment was measured by comparing the results of the pretest with that of the posttest [10].

To determine students thinking level, a new learning model is applied, after which the hypothesis test is carried out. Before doing this, the pretest and posttest data were tested for normality to analyze the statistical calculation method used later. The data used in this study is typically distributed; hence, the hypothesis test is carried out using the t-test method.

### III. RESULTS AND DISCUSSION

Increasing higher order thinking skills using the flipped classroom learning model is divided into two parts, namely learning at home and studying in class. In-home learning, students are given several tasks, including edugram (educational Instagram), understanding learning videos, creating resumes from learning videos and working on online questions. While in classroom learning, students hold discussions and work on practice questions with high level cognitive levels.

Home learning activities are carried out based on given timeframes, therefore, making time a vital assessment tool. Based on the results of the study, almost all students did the assignments well and according to the procedure and on time. Therefore, the implementation of all tasks at home is categorized as very good. Examples of using edugram can be seen in figure 1 and 2.



Fig. 1. A material uploaded of buffer solution in Instagram.

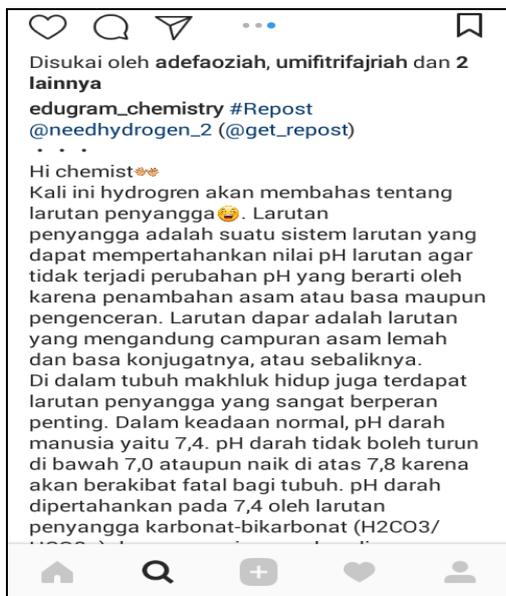


Fig. 2. An explanation of buffer solution application in Instagram caption.

The edugram activity was carried out in groups. Nearly all groups worked on edugram assignments according to the specified time. The implementation percentage of implementation was 92.98% with a very good category. Despite its excellent type, a particular group was unable to upload on time as shown in figure 3. The deadline for the edugram assignment set by the researcher before learning in class is March 20. Based on Figure 3, it can be seen that the Four-floor group uploaded their work into the edugram late on March 21.



Fig. 3. Late postings of groups.

The next step is the use of learning videos made using screencast applications, which are online applications that can record audio-visual activity on a computer. This application makes it easy for teachers to deliver materials to students without having to meet face to face. The researcher only prepared power points and explained them in front of the computer like teaching in the classroom. The power point and the researcher's voiceover is automatically recorded using the screencast application, thereby, creating a learning video that can be used by students. The appearance of the screencast application's home page can be seen in the figure 4.

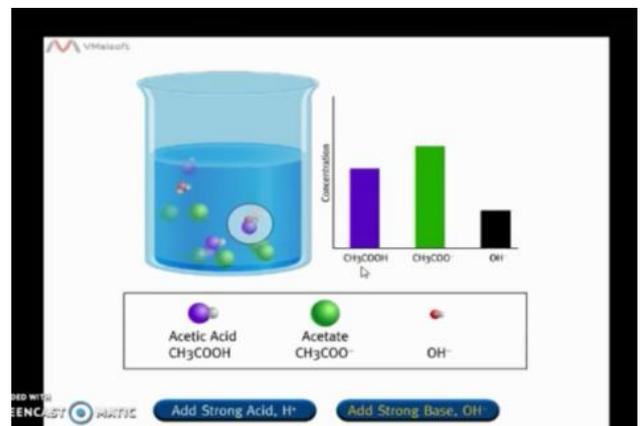


Fig. 4. Learning videos that have been made with the screencast application.

This video is a Power Point slide about the buffer solution materials described by the researcher and recorded with a screencast application. The video contains sentences, pictures, and several animations used to facilitate the understanding of the material. The next step is for students to make a resume using the videos created by the researcher with the aim of understanding the material. Reports made are then sent to the researcher via email at the specified time limit. This will enable researchers to determine if students have worked on the learning video assignments. Examples of resume assignments conducted by students can be seen in figure 5.

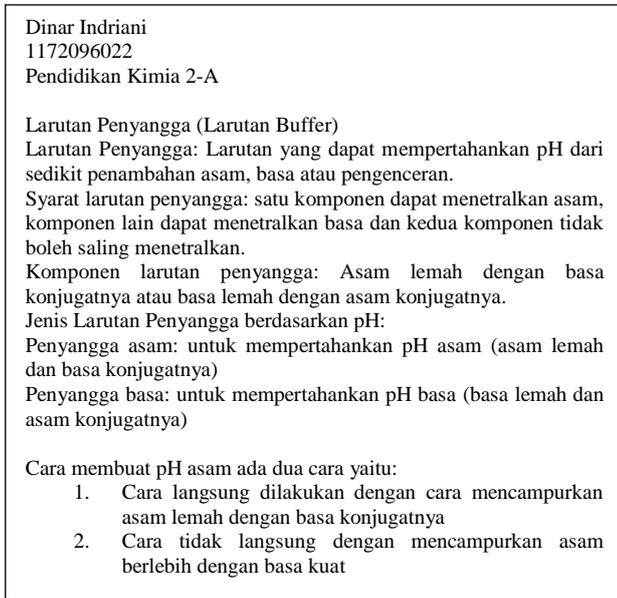


Fig. 5. Examples of resume assignments conducted by students.

Figure 5 consists of a student's resume. The researcher determines the paper size, type, and size of the letters, and the minimum and maximum number of pages of resume writing. This provision is one aspect of the assessment and is made to work on a uniform task. The implementation percentage of resume assignments in accordance with the provisions of the researcher is 91.23% with an excellent category. 4 out of a total of 38 students didn't have optimal scores because they worked late on their resumes. Three of them were more than 3 hours late, while the other was less than two hours late.

Furthermore, students filled in online questions, which were given in form of evaluation of the learning material. This online question was made using high-level thinking categories, namely C-4, C-5, and C-6. Students did online questions and sent to the researchers by e-mail. The task was executed using a writing format determined by the researcher. The percentage used to implement the online problem assignments is 100% which is a perfect category, because all students worked on the assignment. All home learning activities were carried out in accordance with the given timeline. Therefore, timeliness is one aspect of its assessment. Based on the results, almost all students executed the tasks accurately, according to the procedure and on time, thereby, categorizing all home tasks as "very well." For more details, the percentage of home learning activities can be observed in table 1.

Based on table 1, it can be seen that the highest percentage of student activity is answering questions online (100%), while the lowest is sending video resume via email (91%). Nevertheless, all aspects of student activities fall into the "very good" category with an average of 94%. Home student learning outcomes in online assignments with HOTS levels based on achievement groups can be observed in table 2.

TABLE I. PERCENTAGE OF STUDENT ACTIVITIES AT THE LEARNING STAGE AT HOME

No	Student Activities	Percentage of Implementation (%)	Remarks
1.	Work on edugram project assignments	93 %	Very good
2.	Send video resume results via email	91 %	Very good
3.	Send the results of answers to questions online via email	97 %	Very good
4.	Answer questions online	100 %	Very good
	Average	94 %	Very good

Based on table 2, it can be seen that student who learn at home, generally work on questions with a high-level thinking ability to produce an average score of 72.04 which is in the "good category." The upper and middle group students got an average score of 82.2 and 74.42 respectively with a good predicate, while the lower group got an average score of 58.5 with a moderate predicate.

TABLE II. STUDENT LEARNING OUTCOMES AT HOME BASED ON PERFORMANCE GROUPS

No	Group	Score average	Predicate
1	Upper group	82,2	Well
2	Medium group	75,42	Well
3	Lower Group	58,5	Is being
	Average	72,04	Well

Student learning activities in the classroom are carried out with two activities, namely, discussion and working on practice questions. Learning begins with a discussion of buffer solution materials not understood by students. While watching these learning videos at home, they are expected to understand and follow up with practicing the questions independently. A discussion is carried out to optimize students' understanding of the buffer solution. The technical implementation is carried out in groups with a group made up of an average of 4 people. Each group asks questions and each other response to the questions and answers.

After the discussion is complete and all the material is conveyed, students are given the task of working on practice questions with a high level of thinking. Each student works in their respective notebooks; after which they are asked to explain the answer in front of the class. Students who do not understand the explanation of their friends ask questions and are responded by the narrator. After that, the researcher confirms each Student's answer.

Overall, students are active in classroom learning activities. The percentage of student activity in class learning using a flipped classroom model can be seen in table 3.

TABLE III. PERCENTAGE OF STUDENT ACTIVITIES IN CLASSES

No	Student Activities	Activity Percentage	Remarks
1	preliminary	100 %	Good
2	group discussion	50,75 %	moderate
3	Doing problem training	85 %	Good
	Average	78,58 %	Good

In table 3, we can see that the percentage of student activity in the class at the preliminary stage is 100%. This introduction is in the form of directing learning activities using the flipped classroom method, delivered by researchers to students. This is the highest percentage compared to other such as group discussion (50.75%) and problem training (85%). Based on learning activities using flipped classroom-based Instagram methods, high-level thinking skills were analyzed based on N-Gain values and hypothesis test results. Increased high-level thinking skills based on N-Gain are specified concerning the achievement class and cognitive process dimensions. This can be seen in table 4.

TABLE IV. PRETEST, POSTTEST AND N-GAIN VALUES

Mean Pretest	Average Posttest	N-Gain	Interpretation
24.855	58.25	0.44	Moderate

Table 4 shows that there is an increase in high-level thinking skills, after the use of a flipped classroom model with N-gain 0.44 and this is in the medium category. The number of students based on the increasing category can be observed in table 5.

TABLE V. NUMBER OF STUDENTS IN EACH INCREASE CATEGORY

No	Upgrade category	Number of students
1	High	5
2	Moderate	25
3	Low	8

Based on table 5, it can be seen that the majority of students have a moderate improvement category, which amounts to 25 people. However, students in the low category numbered 8 people, while those in the high increase category amounted to 5.

Based on table 6, it can be concluded that the upper group experienced an increase in high-level thinking skills with the largest N-Gain value (0.61) found in the medium category. The group with the smallest N-Gain is the lower group in the low category. Increased ability of high-level thinking students can be seen in table 6. This was reviewed based on achievement groups, namely the upper group, the middle group, and the lower group.

TABLE VI. INCREASED HIGH-LEVEL THINKING ABILITY BASED ON PERFORMANCE GROUPS

Achievement group	Pretest	Posttest	N-Gain	Interpretation
Above	31,2	73,5	0,61	moderate
moderate	24,27	57,21	0,43	moderate
Low	18	36,5	0,22	Low
Average			0,42	Medium

Table 6 this shows that the posttest value is higher than that of the pretest, with N-Gain of 0.42 (medium category). This means that there is an increase in high-level thinking skills after the implementation of an Instagram-based classroom flipped learning model. This increase is influenced by the application of the dimensions of cognitive processes at each learning stage. Analyzes, evaluation, and creation are the dimensions of the cognitive process. All levels are applied when learning at home and in class in the form of questions. This is in accordance with the theory which states that to realize high-level thinking skills, the learning process level of thinking must be integrated [11].

Increasing the ability of high-level thinking in students is also influenced by learning activities combined with technology and internet networks. The use of this technology helps students understand abstract material such as submicroscopic representation in the working principle of buffer solutions. One of the uses of this technology is the use of learning videos that can visualize abstract materials. Therefore, this makes it easier for students to study. Moreover, the presentation of learning material in video technology will also motivate students. This is in line with [12] definition which states that the use of technology in learning will feel more interesting and allow students to interact directly with teaching materials, thereby, improving their thinking skills.

The use of internet networks in this flipped classroom model helps students optimize learning. This increases high level thinking skills in students and also grants them access to material anywhere and at any time [13]. Students can also carry out their assignments at home or other comfortable places. Students can also consult with researchers without having to meet in person, and researchers can assist students online. This makes the learning process fast and not limited by time.

Assessments were given by students in comments train evaluation skills. The assessment given was as a result of studying, analyzing, and connecting existing theories. In addition to this, the assessment in edugram made students think correctly and encourages them to make good judgments [14]. This is in line with theory which states that evaluations conducted on social media such as Instagram, encourage students to be more careful in carrying out assessments because their statements will be stored for a long time.

#### IV. CONCLUSION

The results showed that the average aspect of all student activities at home was in the excellent category with an average of 94%. Student activities in the class are in a good category

with an average of 78.58%. The results of the analysis of posttest values were higher than the value of the pretest with N-Gain of 0.42 (medium category). This means that there is an increase in high-level thinking skills after an Instagram-based flipped classroom learning model is applied.

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