

Effectiveness of Flipped Classroom in Teaching Organic Chemistry at Standard XI

S. Birundha

Research Scholar, Bharathiar University, Coimbatore, Tamil Nadu, India

OPEN ACCESS

Manuscript ID:
EDU-2020-09013567

Volume: 9

Issue: 1

Month: December

Year: 2020

P-ISSN: 2320-2653

E-ISSN: 2582-1334

Received: 15.09.2020

Accepted: 25.10.2020

Published: 01.12.2020

Citation:

Birundha, S. "Effectiveness of Flipped Classroom in Teaching Organic Chemistry at Standard XI." *Shanlax International Journal of Education*, vol. 9, no. 1, 2020, pp. 198-204.

DOI:

<https://doi.org/10.34293/education.v9i1.3567>



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Abstract

A flipped classroom is a setting in which what is traditionally, done in class is performed at home and vice versa. The students attend classes after they have watched their videos at home. They spend the class hours discussing concepts they find difficult to understand with their teachers and other students. They are indulged in more activities which promote their understanding in a better manner. The availability of videos recorded is a vital factor in a flipped classroom. A preparation procedure is to be chalked out by the teacher to record the appropriate materials. After the students get a clear deep understanding discussion goes on. Students construct their own knowledge. The principles of constructivism are associated with flipped classroom. Flipped classroom, obviously, aims at minimizing the lecturing hours is spent in the classroom. Students go in for discussion, form pairs and do group work engaging themselves in activities. Basal (2016) summarized that videos are recorded before the class time and mailed to students through the internet. Extra materials besides videos are added to avoid boring learning climate. The learners are active participants the aim of the study was to trace the effectiveness of flipped class in enriching the knowledge of organic chemistry of students. The study is an experimental one four strategies were employed in the study namely Buzzer session, Think pair and share Blooms taxonomy and activity the strategies proved to be effective.

Keywords: Flipped classroom, Strategies four pillars, Experimental design effectiveness

Basics of Flipped Classroom

According to Arnold Garza (2014) the flipped classroom is a teaching method that delivers lecture content to learners at home via electronic means and uses class time for practical applications; activities only be useful for information literacy instruction. Learners receive instruction at home and utilise class time to in for interaction among the learners and the teacher.

According to Bergmann and Sams (in Basal 2015) a flipped classroom is a setting in which what is traditionally, done in class is performed at home and vice versa.

The students attend classes after they have watched their videos at home. They spend the class hours discussing concepts they find difficult to understand with their teachers and other students. They are indulged in more activities which promote their understanding in a better manner.

Four Pillars

Direction is given based on contents. The students are familiar with what they are going to learn. Hang (2016) indicated that a variety of materials are available to students in different format: text book, power point slides, video clips, practice sets, and discussion forum.

Four pillars of Flipped learning: The constituents of the four pillars of flipped learning flexible environment, learning culture, intents and content and professional educators, flipped learning.

1. Flexible Environment

Flexibility is a key note in flipped learning the content are recorded according to the convenience of the teacher. The learners have occasion to watch the videos sans limitation of time and place. Students can learn at ease in an autonomous climate.

2. Learning Culture

The teacher is the main source of information in a traditional class room. The students lend their ears passively listening to the teacher. They receive the information sans any contribution. A shift from teacher centred class room to learner centred ones takes place Knowledge is constructed as students take active roles in their learning process.

3. International Content

The content of the videos should be appropriate to needs and interest of the learners

4. Professional Educator

Teachers role in a flipped classroom is alienated from a traditional one. The knowledge is shared. Students improve their knowledge accepting and forbearing the criticism advocated in the class room. As the students are (Chang, 2016) expected to be attentive the class room with prerequisite knowledge obtained due to video lessons .The teacher is ready to answer a volley of questions shot by the students.

Implementing Flipped Class room

The availability of videos recorded is a vital factor in a flipped classroom. A preparation procedure is to be chalked out by the teacher to record the appropriate materials. After the students get a clear deep understanding discussion goes on .Students construct their own knowledge. The principles of constructivism are associated with flipped classroom.

Based as their own experience and discussion, given information is accepted (Durak Uguen, 2016)

Flipped classroom, obviously, aims at minimizing the lecturing hours is spent in the classroom. Students go in for discussion, form pairs and do group work engaging themselves in activities.

Bascl (2016) summarized that videos are recorded before the class time and mailed to students through the internet. Extra materials besides videos are added to avoid boring learning climate. The learners are active participants

Problem Restated

What is the extent of effectiveness of Flipped class in teaching organic Chemistry to the students of standard XI?

Objectives of the Study

1. To study the effectiveness of Flipped Classroom in teaching Chemistry.
2. To find out the extent of achievement in Chemistry of the students of standard XI.

Developing of Flipped Classroom Modules

The Chemistry for standard XI were considered for developing System Approach with the objectives of developing knowledge Chemistry so as to facilitate students in acquiring writing skill.

Sampling Design

The sample consisted 100 students for the pilot study and 90 for the final study. The sample was constituted by pupil studying in Std XI Control group and experimental group were formed. The two groups were first matched before the treatment.

Instrumentation

For evaluating the performance of students in Organic Chemistry the researcher developed and validated. the following tools

1. Flipped Classroom
2. Achievement Test in Organic Chemistry

Table 1: Summary of Analysis of Variance

Component (Sources of variation)	Sum of squares (SS)	DF	Mean square (MS)	F
Between sets	1460	5	292	21.16
Within sets	4887	354	13.80	

Hypothesis 1

Null Hypothesis (H₀)

There will be no significant difference between Control group and Experimental group in the pre-test performance in Achievement in Organic Chemistry in respect of Corporation schools, Government schools and Management schools.

Table 2

Group	N	Mean	SD	"t" value	Significance
CCG	30	10.83	2.98	0.36	NS
CEG	30	10.57	2.80		
Group	N	Mean	SD	"t" value	Significance
GCG	30	10.97	3.08	1.01	NS
GEG	30	10.47	2.78		
Group	N	Mean	SD	"t" value	Significance
MCG	30	11.47	3.16	0.66	NS
MEG	30	10.73	2.43		

"t" value is not significant at any level. Hence, the null hypothesis is accepted. There was no significant difference between experimental group and control group in the pre-test performance in Achievement in Organic Chemistry.

Hypothesis 2

Null Hypothesis (H_0)

There will be no significant difference between pre-test and post test performance for Achievement in Organic Chemistry in respect of Corporation schools, Government schools and Management schools for control group.

Table 3

Test	N	Mean	SD	"t" value	Significance
CC pre	30	10.83	2.98	1.95	NS
CC post	30	12.37	3.10		
Test	N	Mean	SD	"t" value	Significance
GC pre	30	10.97	3.08	1.42	NS
GC post	30	12.07	2.85		
Test	N	Mean	SD	"t" value	Significance
MC pre	30	11.47	3.16	1.44	NS
MC post	30	12.57	2.85		

"t" value is not significant at any level. Hence null hypothesis is rejected. There no significant difference between pre-test and post test performance for control group.

Hypothesis 3

Null Hypothesis (H_0)

There will be no significant difference between pre-test and post test performance for Achievement in Organic Chemistry in respect of Corporation schools, Government schools and Management schools for Experimental group.

Table 4

Test	N	Mean	SD	"t" value	Significance
CE pre	30	10.57	2.80	6.38	S
CE post	30	15.37	3.02		
Test	N	Mean	SD	"t" value	Significance
GE pre	30	10.47	2.78	7.97	S
GE post	30	15.20	3.12		
Test	N	Mean	SD	"t" value	Significance
ME pre	30	10.73	2.43	6.20	S
ME post	30	15.87	2.56		

"t" value is significant at both level. Hence the null hypothesis is rejected. There was a significant difference between pre-test and post test performance for experimental group.

Hypothesis 4

Null Hypothesis (H_0)

There will be no significant difference between post-test performance of control group and experimental group for Achievement in Organic Chemistry in respect of Corporation schools, Government schools and Management schools.

Table 5

Test	N	Mean	SD	"t" value	Significance
CC post	30	12.37	3.10	3.79	S
CE post	30	15.37	3.02		
Test	N	Mean	SD	"t" value	Significance
GC post	30	12.07	2.85	4.72	S
GE post	30	15.20	3.12		
Test	N	Mean	SD	"t" value	Significance
MC post	30	12.57	2.85	4.06	S
ME post	30	15.87	2.56		

“t” value is significant at both level. Hence the null hypothesis is rejected. There was a significant difference between experimental group and control group in the post test performance in Achievement in Organic Chemistry.

Gap Closure

Gap closure is the difference between the mean score obtained by the group and the maximum score, called perfect score. The gap closing score is the percentage up to which the gap to wards perfection gets closed for a group. Percent gap closed is defined by a variable which might be termed percentage of ignorance gap closed and stated as percentage

Hypothesis 5

Null Hypothesis

There will not be significant difference between Experimental and Control groups in gap closures in respect of Corporation schools, Government schools and Management schools.

Table 6: Gap Closure for Control Group and Experimental Group

S. No.	Group	Gap Closure
1	CCG	16.79
2	CEG	46.34
1	GCG	12.18
2	GEG	49.63
1	MCG	12.90
2	MEG	55.45

The percentage of gap closure for all the experimental group in corporation schools, Government schools and management schools is greater than the control groups. The null hypothesis is accepted.

Hypothesis 6 (Effect Size)

Null Hypothesis (H_0)

There will be no significant difference in the effect size for Achievement in Organic Chemistry in respect of Corporation schools, Government schools and Management schools for control group.

Table 7

Test	N	Mean	SD	ES
CC pre	30	10.83	2.98	53.28
CC post	30	12.37	3.10	
Test	N	Mean	SD	ES
GC pre	30	10.97	3.08	37.42
GC post	30	12.07	2.85	
Test	N	Mean	SD	ES
MC pre	30	11.47	3.16	36.61
MC post	30	12.57	2.85	

The calculated ES value is greater than the table value. Hence, the null hypothesis is rejected. There was a significant difference in effect size for performance of Control group.

Hypothesis 7 (Effect Size)

Null Hypothesis (H_0)

There will be no significant difference between pre-test and post test performance for Achievement in Organic Chemistry in respect of Corporation schools, Government schools and Management schools for Experimental Group.

Table 8

Test	N	Mean	SD	ES
CE pre	30	10.57	2.80	133.33
CE post	30	15.37	3.02	
Test	N	Mean	SD	ES
GE pre	30	10.47	2.78	160.33
GE post	30	15.20	3.12	
Test	N	Mean	SD	ES
ME pre	30	10.73	2.43	206.01
ME post	30	15.87	2.56	

The calculated ES value is greater than the table value. Hence, the null hypothesis is rejected. There was a significant difference in effect size for performance of experimental group.

Findings of the Study

Hypothesis 1: Significant difference in the mean scores of Achievement in Organic Chemistry in the pre-test between Control group and Experimental group of students of Corporation schools, Government schools and Management school was not found.

Hypothesis 2: For Control group of students of Corporation schools, Government school and Management schools difference in the mean scores of Achievement in Organic Chemistry between the pre-test and post-test was not found.

Hypothesis 3: For Experimental group of students of Corporation schools, Government schools and Management schools difference in the mean scores of Achievement in Organic Chemistry between the pre-test and post test was traced.

Hypothesis 4: Significant difference in the mean scores of Achievement in Organic Chemistry in the post test between Control group and Experimental group of students of Corporation school .Government school and Management school was observed.

Hypothesis 5: With respect to gap closure experimental group revealed significant higher percentage than the Control group.

Hypothesis 6: Significant difference in the Effect size in Achievement in Organic Chemistry between the pre-test and post-test performance of Control group was revealed.

Hypothesis 7: There was significant difference in the Effect size in Achievement in Organic Chemistry between the pre-test and post-test of Experimental group.

Limitations of the Study

The limitations of the study is presented below

1. This study was limited to the students studying in standard XI in Coimbatore district
2. The sample was not selected in random manner
3. The spell of experiment was limited to a short period

Implications

The interventions planned in the form of peer group participative learning manipulating the science learning material by students and brief question answer interlude improved the performance of students on the test.

Self-regulated learners employ meta-cognitive processes to learn; they are motivated by a belief in their own capabilities, and they implement actions to attain academic goals.

Think Pair and Share activities, Quiz programmes, Teaching based on Blooms taxonomy and e- learning exhibited better gain in achievement in learning organic chemistry compared to those taught through traditional instruction. Goal setting, self-efficacy, and self-regulation are directly related in a reciprocal manner and vary together in a positive manner.

Suggestions and Recommendations

There are some suggestions put forth by psychologists in order to motivate the students.

- a) The students should be aware of what he is learning and what is the practical applicability of the learning material.
- b) New method of teaching should be based on old system of education. It should not deviate from the old norms of education.
- c) The learning material should be arranged in order and organised in a definite way. It should be in the ascending order of difficulty.
- d) The student should not be under pressure and he should not be compelled to master a particular lesson.
- e) Reward should not be given in terms of any object. It should be symbolic and signify his development.
- f) A student should not be punished for his wrong response. The teacher can explain him his error and show him the right way. Punishments should be given only at the time of changing a particular behaviour.
- g) The teacher should intimate the student about all his achievements.
- h) Competition should be conducted groupwise. It should not touch personal life.
- i) Above all, the role of the teacher is the most important. He is the friend, philosopher and guide to the student. So he should try his best to motivate students which will ensure their journey to success in their life

Suggestion for Further Research

1. The experiment may be conducted at different level
2. The experiment may be performed to develop the other skills of the Chemistry subject
3. Comparative study may be undertaken in relation to rural with urban, Low SEs with High SEs, slow learners with fast learners studying in different types of schools.
4. More instructional material for employing programmed learning method may be given.
5. Exposure to the teacher in developing may be given.

Conclusion

It could be observed through experimentation that Flipped Classroom was at an advantageous point over the traditional method in teaching Chemistry effectively .

References

- Broman, K., and Johnels Dan. "Flipping the Class – University Chemistry Students' Experiences from a New Teaching and Learning Approach." *De Gruyter*, vol. 1, no. 1, 2019, pp. 1-8.
- Üğüten, Selma Durak, and Ozgul Balci. "Flipped Learning." *Journal of Süleyman Demirel University Institute of Social Sciences*, no. 26, 2017, pp. 253-265.
- Cormier, Caroline and Bruno Voisard. "Flipped Classroom in Organic Chemistry has Significant Effect on Students' Grades." *Frontiers in ICT Original Research*, vol. 4, 2018.
- Paristiowatia, Maria., et al. "The Effect of Inquiry-Flipped Classroom Model toward Students' Achievement on Chemical Reaction Rate." *4th International Conference on Research, Implementation, and Education of Mathematics and Science*, 2017.
- Yestrebksya, Cherie L. "Flipping the Classroom in a Large Chemistry Class-Research University Environment." *Procedia Social and Behavioral Sciences*, vol. 191, 2015, pp. 1113-1118.
- Pavanelli, Renata. "The Flipped Classroom: A Mixed Methods Study of Academic Performance and Student Perception in EAP Writing Context." *International Journal of Language and Linguistics*, vol. 5, no. 2, 2018, pp. 16-26.
- Bell, M.R. *An Investigation of the Impact of a Flipped Classroom Instructional Approach on High School Students' Content Knowledge and Attitudes toward the Learning Environment*, 2015.
- Kenneth, Mark Camiling. "The Flipped Classroom: Teaching the Basic Science Process Skills to High-Performing 2nd Grade Students of Miriam College Lower School." *IAFOR Journal of Education*, vol. 5, 2017, pp. 213-230.
- Tütüncü, Nurhan and Meral Aksu. "A Systematic Review of Flipped Classroom Studies in Turkish Education." *International Journal of Social Sciences and Education Research*, vol. 4, no. 2, 2018, pp. 207-229.
- Pennington, R. "Echo 360 Preparatory Videos as Aids to "Flipping the Classroom"." *International Journal for the Scholarship of Technology Enhanced Learning*, vol. 1, no. 1, 2016, pp. 135-144.
- Demirel, Eda Ercan. "Basics and Key Principles of Flipped Learning: Classes Upside Down." *International Journal of Languages, Literature and Linguistics*, vol. 2, no. 3, 2016, pp. 109-112.
- Su, Chien-Yuan and Cheng-Huan Chen. "Investigating the Effects of Flipped Learning, Student Question Generation, and Instant Response Technologies on Students' Learning Motivation, Attitudes, and Engagement: A Structural Equation Modeling." *EURASIA Journal of Mathematics, Science and Technology Education*, vol. 14, no. 6, 2018, pp. 2453-2466.
- Bäcklund, J., and M. Hugo. "The Paradox of the Flipped Classroom: One Method, Many Intentions." *Problems of Education in the 21st Century*, vol. 76, no. 4, 2018, pp. 451-464.
- Smallhorn, Masha. "The Flipped Classroom: A Learning Model to Increase Student Engagement Not Academic Achievement."

Student Success, vol. 8, no. 2, 2017,
pp. 43-53, pp. 43-53.

Nwosisi, Christopher et al. "A Study of the Flipped
Classroom and its Effectiveness in Flipping

Thirty Percent of the Course Content."
*International Journal of Information and
Education Technology*, vol. 6, no. 5, 2016,
pp. 348-351.

Author Details

S. Birundha, *Research Scholar, Bharathiar University, Coimbatore, Tamil Nadu, India*