

Flipped Classroom in the New Normal Setup: A Learning Pedagogy

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Highlights

- The students had positive attitude towards the use of flipped classroom as a learning pedagogy.
- The video courseware had helped the students in their learning.
- The learning management system using Canvas is helpful in the use of the flipped classroom

Abstract

The pandemic had brought a lot of abrupt changes in the modalities of learning in the engineering education, from fully online to hybrid set up. This paper aims to focus on evaluating the use of flipped classroom as a teaching pedagogy in the civil engineering classes. Descriptive research was utilized using a questionnaire. The data was analyzed using descriptive statistics, analysis of variance and correlation. Among the 242 respondents, the majority are male, 21 to 22 years old, third year students, and from old curriculum. The findings revealed that the respondents showed a positive response to the use of the flipped classroom, the video courseware and canvas are helpful in their learning. As the age of the student matures, their attitude towards the flipped classroom and the use of video courseware become positive. Moreover, there is a strong correlation between the year level and the perception on the use of video courseware. The analysis of variance reveals that gender does not affect the satisfactory level of the implementation of the flipped classroom. The year level does not have significant differences on their experiences on flipped classroom and the use of canvas. The attitude of the respondents on the use of video courseware varies on their year level. The findings showed that whatever specialization the students are pursuing, it does not affect their perceptions on the implementation of a flipped classroom. The paper concludes that flipped classroom can be used as teaching pedagogy in the civil engineering subjects, with the inclusion of the use of video courseware and Canvas as a platform. For the improvement of the learning pedagogy, it is recommended to revisit and continually improve the strategy in the hybrid set up to help students who are experiencing barriers in adapting to the new normal to attain satisfactory experience in learning.

Key Words: civil engineering; flipped classroom; learning pedagogy; online learning; pandemic

1. Introduction

The impact of the Corona Virus Disease (COVID-19) in the Philippines educational set-up is significant (Dy *et. al*, 2021). For the past two (2) years of the pandemic, different teaching modalities and pedagogies were utilized on different academic institutions and finding solutions on how the learning environment becomes more satisfactory while classes is rendered online. In civil engineering, it becomes a challenge, since most of the courses offered in the civil engineering program are board examination subjects. This difficulty is being experienced in the Civil engineering department of FEU Institute of Technology. Aside

from remolding its learning management system, different teaching strategies were used by each of the professors depending on the level of difficulty of the subject.

In the past two (2) years of online classes, the schools and universities came up with different strategies to deliver academic quality education to students (Poso, 2021). FEU Institute of Technology with its aim to promote excellence even during the pandemic period had tried to implement the flipped classroom on selected subjects in civil engineering department. Although, the online classes still yielded challenges on quality learning, another consideration is that students have problems on the access to technology and required gadgets for the conduct of the flipped classroom. Other factors that affected the students' learning experience were linked to their learning environment at home, mental health, finances, and mobility (Barrot et al., 2021). The flipped classroom technique uses a strategy that the students can learn the lesson outside of the classroom and still uses the normal setup of the classroom for active learning (Newman et. al, 2016).

The paper focuses on the perception of the students on the implementation of flipped classroom method of learning in terms of knowledge acquisition to the civil engineering students at FEU Institute of Technology. The new normal setup had changed the paradigm of the teaching environment and one of the strategies that was used is the flipped classroom teaching. The current pressures for the hybrid or blended strategy of teaching had pushed the academic institutions to look for innovative approach that can maintain the quality of education most specifically to the engineering programs that has board examination. The flipped method of teaching exposes the learners to a subject material before the normal classes which allows a more increased and intense student-teacher interaction (Ellis Steed, & Applebee, 2006). In the case of FEU Institute of Technology, a blended flipped classroom was used which utilizes technological platforms with the use of Canvas as a platform. A revised learning management system (LMS) was used as a learning tool in the new norm to online educational services. LMS is an online-based technology that can be developed to improve the learning process through planning, application, and evaluation in educational institutions (Alias & Zainudin, 2005).

2. Methods

2.1 Data gathering and analysis

The researchers conducted an online survey involving the students enrolled in civil engineering courses that used the flipped classroom at FEU Institute of Technology during the first term of 2022-2023. The survey was distributed online using Google Forms.

2.2 The respondents and sampling

There are 242 total respondents who participated in the online survey for the flipped classroom. The civil engineering department of FEU Institute of Technology offers two (2) specializations, namely, water resources and structural engineering while other respondents belong to the old curriculum that does not have specializations. Convenience sampling was employed in the study where the link to the google forms were sent through canvas of all the classes that uses a flipped classroom. The researchers set one (1) week for the students to fill out the questionnaires and a total of 242 students responded. Only those who voluntarily responded on the survey were included in the study. The students who participated in the survey are those classes which uses flipped classroom where both face to face and online set-up of learning is being utilized. Students are required to view the video courseware and read the learning materials in canvas before their scheduled classes. During the face-to-face classes, the professors conduct assessments based on the

learnings of the students during the asynchronous classes and perform additional solving problem activities as enhancement measures.

2.3 The Research Instrument

The research questionnaire used in the study was patterned from the study of Nouri (2016). Minor modifications were made to fit with the purpose of the current study. The questionnaire was divided into four (4) parts, the profile of the respondents, the experiences of the students on flipped classroom, the use of video courseware and the use of Canvas as a platform in the flipped classroom.

2.4 Scoring and Interpretation

The 5-Likert scale was used, one (1) as the lowest and five (5) as the highest score from strongly disagree, disagree, neutral, agree and strongly agree. The weighted mean for each of the items in the questionnaire is interpreted based on the criteria shown in Table 1.

Table 1. Interpretation Table

Weighted Mean	Interpretation
1.00 – 1.50	Strongly Dissatisfied
1.51 – 2.50	Dissatisfied
2.51 – 3.50	Neutral
3.51 – 4.50	Satisfied
4.51 – 5.00	Very Satisfied

2.5 Statistical Analysis

To describe the data gathered, the descriptive statistics were used. Analysis of variance (ANOVA) was utilized to test the differences of the responses based on the profile of the respondents. Pearson product moment of coefficient correlation test, r , was used to test the relationship of the dependent and independent variables (Poso and Nebrida, 2022).

3. Results and discussion

3.1 Basic profile characteristics

Table 2 reveals that civil engineering program is dominated by males, majority are in the age of 21 and 22, in the third-year level. The data on specialization shows that majority of the respondents belong to the old curriculum which has no specialization with 124 or 51.24%.

Table 2. Profile of the Respondents.

Sex	Number of Respondents	Percentage (%)
Male	147	60.74
Female	95	39.26
TOTAL	242	100.00
Age	Number of Respondents	Percentage (%)
19	3	1.24
20	35	14.46
21	78	32.23
22	69	28.51
23	37	15.29

24	9	3.72
25	5	2.07
26	3	1.24
27	2	0.83
28	1	0.41
TOTAL	242	100.00
Year Level	Number of Respondents	Percentage (%)
2	22	9.09
3	137	56.61
4	65	26.86
Terminal	18	7.44
TOTAL	242	100.00
Specialization	Number of Respondents	Percentage (%)
Water Resources	19	7.85
Structural Engineering	99	40.91
None	124	51.24
TOTAL	242	100.00

3.2 Perception of students towards the flipped classroom

3.2.1 Experiences on flipped classroom

Table 3 shows the responses of the respondents on their experiences on a flipped classroom set up of learning. The table shows that the highest item rated by the respondents is item number 5 “*I have to take more responsibility for learning*” with a weighted mean of 4.16 interpreted as “Satisfied”. The students agreed that using the flipped classroom set up during the pandemic period trained them on being more responsible in their learning. The lowest item rated is number 2 “*I have a prior experience of flipped classroom*” with a weighted mean of 3.14 interpreted as “neutral”. This can be attributed to the fact that flipped classroom was only introduced to them during the hybrid set up. Overall, the weighted mean is 3.56 interpreted as satisfied. Implying that the students have a positive response to the use of the flipped classroom, which is similar to the findings of Nouri (2016). Students got accustomed on blended learning set-up where students studied the content of the subject at their home during asynchronous schedule and perform solving problem at school. Flipped classroom is the reverse of the traditional learning where the topic is discussed at school and then assigning homework and projects at home.

Table 3. Experiences on Flipped Classroom

No	Flipped Classroom	1 SD	2 D	3 N	4 A	5 SA	Weighted Average	Interpretation
1	I have a positive attitude towards flipped classroom after the course	6	21	83	92	40	3.57	Satisfied
2	I have a prior experience of flipped classroom	18	52	75	71	26	3.14	Neutral
3	I appreciate learning with video	12	18	53	85	74	3.79	Satisfied
4	I am more flexible and mobile as learner	9	18	87	84	44	3.56	Satisfied
5	I must take more responsibility for learning	5	6	31	103	97	4.16	Satisfied
6	I can study in my own pace	6	16	65	103	52	3.74	Satisfied
7	My learning processes are more supported	6	13	88	105	30	3.58	Satisfied
8	The non-traditional classroom activities were meaningful	7	23	91	94	27	3.46	Neutral
9	It is easier and more effective to learn	4	17	98	89	34	3.55	Satisfied
10	I do more studying/learning on my own spare time	10	15	71	107	39	3.62	Satisfied

11	I feel more alone	13	44	83	69	33	3.27	Neutral
12	I am more motivated as learner	9	29	92	81	31	3.40	Neutral
13	I am more active as a learner	9	14	89	96	34	3.55	Satisfied
14	I learn more	7	21	98	91	25	3.44	Neutral
15	I feel an increased workload that is stressful	9	10	60	92	71	3.85	Satisfied
16	I experience stronger peer-collaboration	8	27	94	86	27	3.40	Neutral
17	It feels like a distance course	2	26	91	96	27	3.50	Neutral
AVERAGE MEAN							3.56	Satisfied

3.2.2 Experience of using video courseware in learning

Table 4 shows the highest weighted mean is item 2 “Useful to rewind video” with a value of 4.43 which shows that the students feel satisfied in using the video courseware since they can replay the videos anytime. Further, the data implies that the students believe that the video courseware cannot totally replace the traditional lectures in the normal classroom. Overall mean is 3.79 interpreted as “satisfied” that further implies that the students are positive that the use of video courseware in the flipped classroom is helpful in their learning. The study of Nouri (2016) reveals that there is a strong correlation on the use of the videos as a tool in assimilating knowledge to the positive attitude of students towards learning.

Table 4. Experience of using video courseware for learning

No	Video for learning	1	2	3	4	5	Weighted Average	Interpretation
1	Useful to pause video	4	3	24	100	111	4.29	Satisfied
2	Useful to rewind video	4	2	14	88	134	4.43	Satisfied
3	Useful to fast-forward video	8	3	35	89	107	4.17	Satisfied
4	Useful to watch lectures in a mobile way	5	6	43	91	97	4.11	Satisfied
5	The combination of video and non-traditional lectures was useful	2	7	52	105	76	4.02	Satisfied
6	Video made learning more effective	8	9	73	96	56	3.76	Satisfied
7	Video quality was satisfactory	2	15	89	88	48	3.68	Satisfied
8	Video made me learn more	5	13	84	86	54	3.71	Satisfied
9	Video motivated me to learn	6	20	101	75	40	3.51	Satisfied
10	Video can replace traditional lectures completely	33	52	76	49	32	2.98	Neutral
11	I rather have traditional lectures than video	3	23	99	73	44	3.55	Satisfied
12	Learning through video resulted in more peer discussions	15	29	97	66	35	3.32	Neutral
AVERAGE MEAN							3.79	Satisfied

3.2.3 Experience on using the Canvas as a platform for online learning

Table 5 reveals that item 2 “Canvas supported my learning” got the highest weighted mean of 3.79 interpreted as “satisfied” which means that the respondents agrees that the Canvas had helped them in the learning process. Overall rating is 3.63 interpreted as “satisfied” and this implies that the students experience in the use of canvas had a satisfactory contribution to their learning in the flipped classroom set-up. The findings are somewhat like the study of Nouri (2016) that the students appreciated the support of the learning management system (LMS) used.

Table 5. Experience of using Canvas

No	Experience of using Canvas	1	2	3	4	5	Weighted Average	Interpretation
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1	It was useful to see other students' questions and teacher answers in Canvas	12	13	60	106	51	3.71	Satisfied
2	Canvas supported my learning	3	12	60	124	43	3.79	Satisfied
3	It was useful to communicate with teachers through Canvas	13	24	60	99	46	3.58	Satisfied
4	Canvas motivated me to learn	4	23	104	83	28	3.45	Neutral
	AVERAGE MEAN						3.63	Satisfied

3.6 Statistical analysis result

3.6.1 Correlation results

The analysis used 0.05 level of significance with 242 total of samples and 240 degrees of freedom. It can be gleaned from Table 6 results that the gender of the respondents is not significantly correlated to the perceptions of the students towards the implementation of the flipped classroom. In terms of age, there is a strong correlation for age and the respondent's perception on their experience on the use of flipped classroom and the use of video courseware. There is a positive correlation that as the age of the student matures, their attitude towards the implementation of the flipped classroom and the use of video courseware become positive. Pertaining to the year level of the respondents, the findings revealed that there is a strong correlation between the year level and the perception on the use of video courseware.

Table 6. Correlation result

Variables	r Value	P Value	Interpretation
Gender and Experience on Flipped Classroom	0.072	0.268	Not Significant
Gender and Video courseware	-0.041	0.525	Not Significant
Gender and Canvas	0.114	0.076	Not Significant
Age and Experience on Flipped Classroom	0.169**	0.008	Significant
Age and Video courseware	0.182**	0.004	Significant
Age and Canvas	0.048	0.454	Not Significant
Year Level and Experience on Flipped Classroom	0.032	0.621	Not Significant
Year Level and Video courseware	0.189**	0.003	Significant
Year Level and Canvas	-0.041	0.528	Not Significant
Specialization and Experience on Flipped Classroom	0.042	0.516	Not Significant
Specialization and Video courseware	0.078	0.224	Not Significant
Specialization and Canvas	0.097	0.131	Not Significant

Note: ** Correlation is significant at 0.01 level

3.6.2 Analysis of variance results

As regards to gender of the respondents, the perception on their experience on flipped classroom, use of video courseware and use of canvas got a P value of 0.268, 0.525 and 0.076, respectively, which are greater than the 0.05 as shown in Table 7. This further means that whether the respondents are male or female, they have the same attitude towards the implementation of the flipped classroom in the civil engineering subjects.

Table 7. ANOVA Table for Gender and the Perception on Flipped Classroom

Variables	Source of Variation	SS	df	MS	F	P value
Gender and Experience on Flipped Classroom	Between Groups	0.284	1	0.284	1.234	0.268 ^{ns}
	Within Groups	55.233	240	0.230		
	Total	55.517	241			
Gender and Use of Video courseware	Between Groups	0.114	1	0.114	0.406	0.525 ^{ns}
	Within Groups	67.445	240	0.281		
	Total	67.559	241			
Gender and Use Canvas	Between Groups	1.754	1	1.754	3.181	0.076 ^{ns}
	Within Groups	132.389	240	0.552		
	Total	134.144	241			

Note: *s* – significant
ns – not significant

As regards to the year level of the respondents, the perception on their experience on flipped classroom, use of video courseware and use of canvas got a P value of 0.556, 0.002 and 0.009, respectively. Table 8 reveals the year level of the students does not have significant differences on the perceptions on their experiences on flipped classroom and the use of canvas, while for use of video courseware reveals a significant difference. It can be attributed that as the students matures, they tend to become more responsible in their studies even using the video courseware during asynchronous classes.

Table 8. ANOVA Table for Year Level and the Perception on Flipped Classroom

Variables	Source of Variation	SS	df	MS	F	P value
Year level and Experience on Flipped Classroom	Between Groups	0.482	3	0.161	0.695	0.556 ^{ns}
	Within Groups	55.035	238	0.231		
	Total	55.517	241			
Year level and Use of Video courseware	Between Groups	4.014	3	1.338	5.011	0.002 ^s
	Within Groups	63.545	238	0.267		
	Total	67.559	241			
Year level and Use Canvas	Between Groups	3.480	3	1.160	2.113	0.099 ^{ns}
	Within Groups	130.663	238	0.549		
	Total	134.144	241			

Note: *s* – significant
ns – not significant

As regards to the specialization of the respondents, the perception on their experience on flipped classroom, use of video courseware and use of canvas got a P value of 0.091, 0.064 and 0.045, respectively. Table 9 reveals the specialization of the students does not have significant differences on the perceptions

on their experiences on flipped classroom and the use of video courseware, while significant in the use of canvas. This can be implied that whatever specialization the students are pursuing, it does not affect their perceptions on their experience in a flipped classroom and use of video courseware.

Table 9. ANOVA Table for Specialization and the Perception on Flipped Classroom

Variables	Source of Variation	SS	df	MS	F	P value
Specialization and Experience on Flipped Classroom	Between Groups	1.100	2	0.550	2.417	0.091 ^{ns}
	Within Groups	54.417	239			
	Total	55.517	241			
Specialization and Use of Video courseware	Between Groups	1.533	2	0.767	2.775	0.064 ^{ns}
	Within Groups	66.025	239	0.276		
	Total	67.559	241			
Specialization and Use Canvas	Between Groups	3.435	2	1.718	3.141	0.045 ^s
	Within Groups	130.708	239			
	Total	134.144	241			

Note: *s* – significant
ns – not significant

4. Conclusions

The pandemic had significantly altered the structure of learning in the engineering institutions, specifically in the civil engineering program. The learning pedagogies were abundantly shifted to hybrid set-up. The civil engineering department of FEU Institute of Technology had adopted several strategies and methods to adopt with the demands of the situation. Flipped classroom is one of the methods used by some professors to augment the need for a hybrid set up of learning. The findings revealed that majority of the respondents are male, 21-22 years of age, third year level and majority are from the old curriculum. The respondents agreed that they must take responsibility for learning and showed a positive response to the use of the flipped classroom, the students agreed that the video courseware and Canvas are helpful in their learning. It is concluded that as the age of the student matures, their attitude towards the implementation of the flipped classroom and the use of video courseware become positive. There is a strong correlation between the year level and the perception on the use of video courseware. As the students matures, they tend to become more responsible in their studies in using the video courseware during asynchronous classes. It is concluded that whatever specialization the students are pursuing, it does not affect their perceptions on the implementation of a flipped classroom. In general, the researchers concluded that flipped classroom can be used as teaching pedagogy in the civil engineering subjects, with the inclusion of the use of video courseware and innovative learning management system such as the use of Canvas as a platform.

References

- Alias, N. A., & Zainuddin, A. M. (2005). Innovation for Better Teaching and Learning: Adopting the Learning Management System. *Malaysian Online Journal of Instructional Technology*, 2, 27–40.
- Barrot, J. S., Llenares, I. I., & del Rosario, L. S. (2021). Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10589-x>

Dy, E. A. Z. *et al.*, "Construction Labor Productivity in Construction Sites During the COVID-19 Pandemic Using Relative Importance Index (RII)," *2021 IEEE 13th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM)*, 2021, pp. 1-6, doi: 10.1109/HNICEM54116.2021.9731928

Ellis, R. A., Steed, A. F., & Applebee, A. C. (2006). Teacher conceptions of blended learning, blended teaching, and associations with approaches to design. *Australasian Journal of Educational Technology*, 22(3), 312-335.

Newman, G. *et al.*, "The Perceived Effects of Flipped Teaching on Knowledge Acquisition," *The Journal of Effective Teaching*, Vol. 16, No.1, 2016, 52-71

Nouri, J. (2016). The flipped classroom: for active, effective, and increased learning – especially for low achievers. *International Journal of Educational Technology in Higher Education*, 13:13, doi 10.1186/s41239-016-0032-z

Poso, F. Jr. and Yano, K. A. V., *Pandemic Learning Modalities in Civil Engineering Correlation Courses: For the Improvement of Learning Management System*, 7th International Conference on Engineering Education Philippines (ICEE-PHIL) 2022, December 3-4, 2021

Poso, F. Jr., and Nebrida, J. (2022), *Mathematics in the Modern World*, Pluma Publications, Inc., Quezon City, Manila.