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In

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Submitted By

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UNDER THE GUIDANCE OF

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DECALARATION

ACKNOWLEDGEMENT

I would like to take this opportunity to express my profound sense of gratitude and respect to all those who helped me throughout our project.

This report acknowledges to the intense driving and technical competence of the entire individual that have contributed to it. It would have been almost impossible to complete this project without the support of these people. I extend thanks and gratitude to, **Dr Sumita Gupta,** Department of Computer Science and Engineering who have imparted me the guidance in all aspects. They shared their valuable time from their busy schedule to guide me and provide their active and sincere support for my activities.

This report is authentic record of my own work which is accomplished by the sincere and active support by all the teachers of my college. I have tried my best to summarize this report.

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ABSTRACT

Learning is a process of achieving knowledge, skill, and performance. Thus, learning is ultimately considered one of the fundamental pillars of imminent and required entity of all times. Nowadays, technology has obviously made our lives easier. That means internet technology has been considered as an important medium for many aspects of our lives including academic learning. Elearning or online learning has received much attention in recent years globally, with an estimated 5-7 million students now are enrolling in at least one online course each year. The objective of the experiment is to analyse and gather insights of which method is the most suitable for the target demographs for better data retention in student mind and hence to improve the quality of education.

In this project a number of students were put into an experimental study where there were two groups of students under different circumstances and evaluated based on their individual responses. The students were enlightened with the same concepts in two different methods of teaching. One through offline person to person teaching and doubt clearing sessions, the other being an online video class. Although the concepts taught were the exact same and the teacher also was the same, the results were comparably different and the data acquired through the results from the exams of these students of the same exam questions were analyzed and insights were gathered from the same data using multiple algorithms and methods that gave insights as to which methods were proven to be more efficient on what grounds and so on.

Unlike other recent research papers published, this project involves a hybrid approach of true experiment as well as a quasi-based experiment. The average was calculated from both the experiment so that the overall error from both the experiments will be eradicated or atleast reduced to a large extent compared to that of the recently published papers of the same topic and research interest. This project will be able to help people understand the intensity and depth of the methods in which any topic or concept that is being explained to the group of students.

CONTENTS

CHAPTER1: INTRODUCTION

1.1. BACKGROUND

There are many ways in which you can conduct an experiment through which you can gather insights from the data that we acquire from the experiments some of which are True experiment, Quazi experiment.

True Experiment

A true experiment is a type of experimental design and is thought to be the most accurate type of experimental research. True experiment supports or refutes a hypothesis using statistical analysis. It is also thought to be the only experimental design that can establish cause and effect relationships. There are three criteria that must be met in a true experiment Control group and experimental group, Researcher-manipulated variable, randomization [1].

True experiment must have control group, which is a group of research participants that resemble the experimental group but do not receive the experimental treatment. The experimental group is the group of research participants who receive the experimental treatment. True experiments must have atleast one control group and one experimental group, though it is possible to have more than one experimental group. In true experiments, the researcher has to change or manipulate the variable that is hypothesized to affect the outcome variable that is being studied. The variable that the research has control over is called **independent variable**. The outcome or affect that the researcher is studying is called **dependent variable** [2] **.** The dependent variable is also called outcome variable. The researcher does not manipulate the dependent variable. Each participant must have an equal chance of being assigned to each sample group. Research participants have to be randomly assigned to either the control or experimental group [3].

For example :

Hypothesis : Drug X causes decrease in anxiety level

Independent Variable: Drug X (can be manipulated)

Dependent Variable: anxiety level

Sample population 600

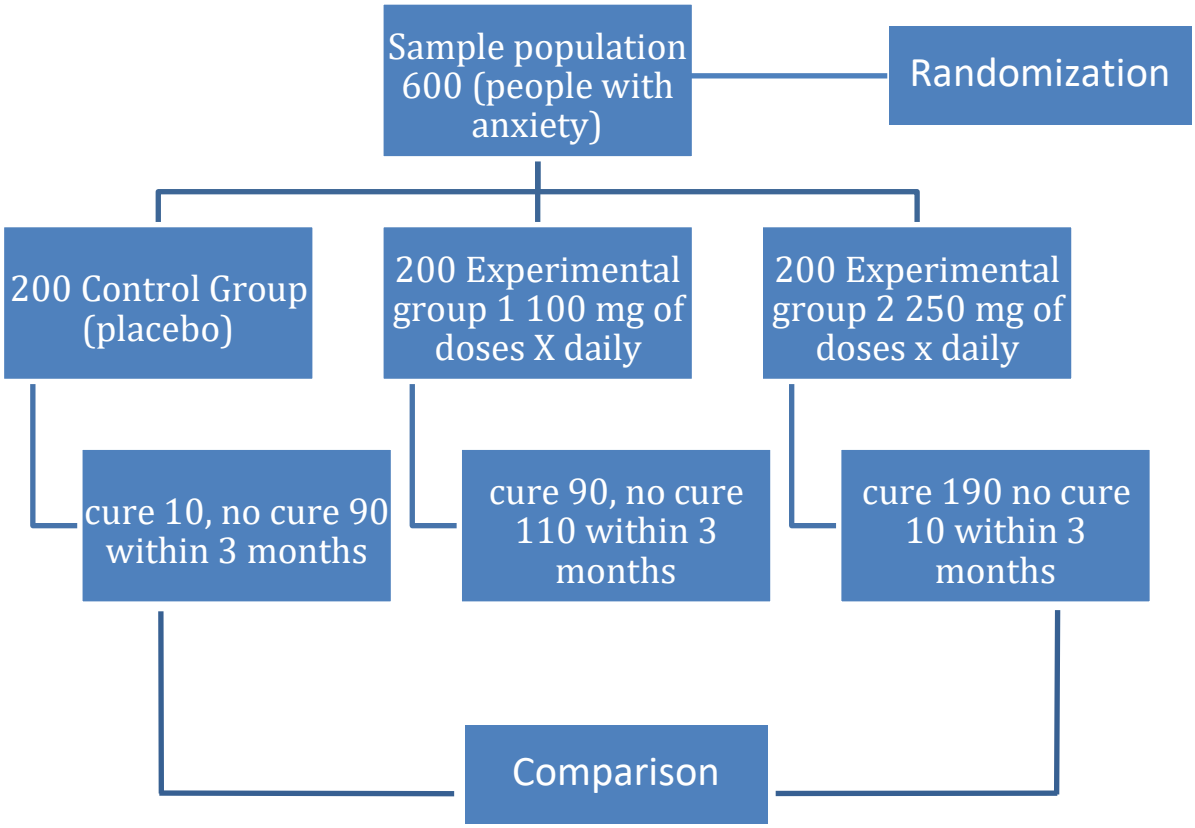

Fig. 1 Flow chart example (True experiment)

Quazi Experiment

Quazi experimental research design involves the manipulation of independent variable to observe the effect on dependent variable. The study unlike true experimental study, lacks atleast one of the characterstics (randomization, control, etc). Quazi experimental designs have an element of manipulation. Quazi experiments are in most cases used to establish the causality in the situations where researchers are unable to randomly assign the subjects to groups for multiple reasons. Quazi independent variable are used instead of independent variables and dependent variable which is not manipulated in complete controlled situations.

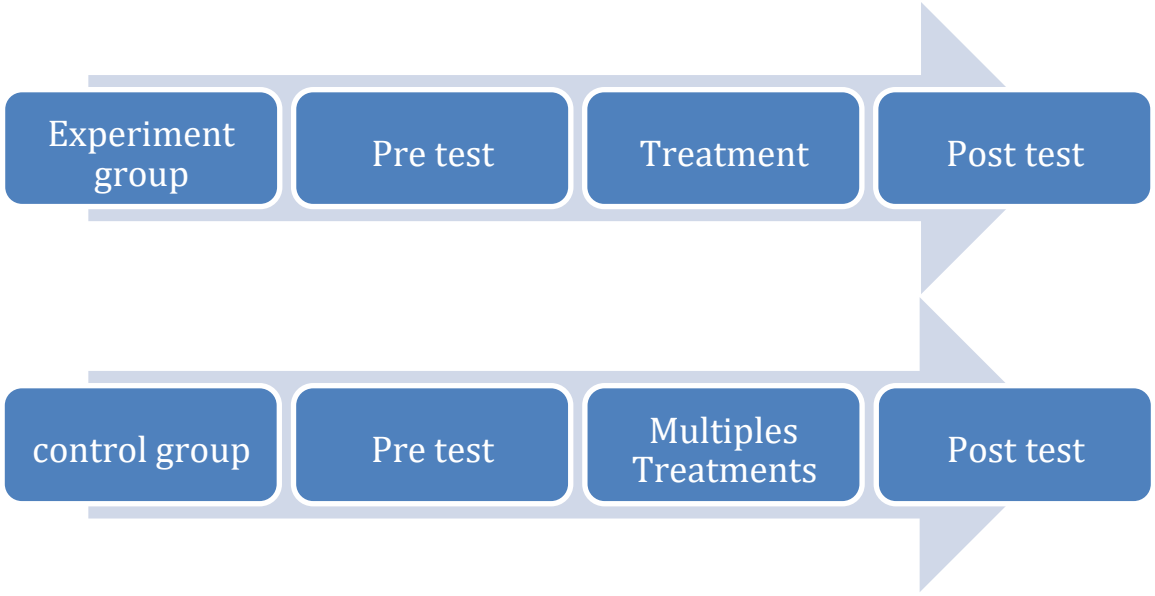

Fig. 2 Quazi control group design

A number of recent researches on online learning either explains about benefits of online learning, offline learning or compares the effectiveness of both but not many researches online compares both on basis of data retention with the help of true or quazi experiments but there aren't any particular research that uses hybrid approach of true and quazi experiment to conclude the effectiveness of online and offline learning. A crucial condition to be noticed is that there is no precice overall method to calculate the effectiveness of student retention in online as well as offline learning. But there are three major factors which the effectiveness of student learning depends upon:

• Age groups

• Subjects

• Interaction

These are the three key demographs that almost every research paper is focused on when designing the experiment.

1.2. PURPOSE

This research is based on comparison of data retention in student mind during offline and online learning and by reading the literature reviews of various papers I decided that this paper needs to be very specific so this research will be focusing on following factors. Only one type of age group and one type of subject and the same faculty that will be teaching all the teams in order to maintain same level of interaction as well as the communication. This research project will be using hybrid approach that will be performing both experiment and

obtaining the average of both the result to increase the accuracy of the result compared to that of the previous performed experiments.

In this research project, The experimental groups are sujected to a time series experimentation in which they are evaluated over a series of time and the required treatment for the improvement of the subjects is provided based on the results obtained from the evaluation.

This Hybrid design is useful when the researcher intends to measure the effects over a long period of time. The researcher would continue to administer the treatment and measure the effects multiple number of times during the course of experiment and use the obtained results for the treatment of the experimental groups.

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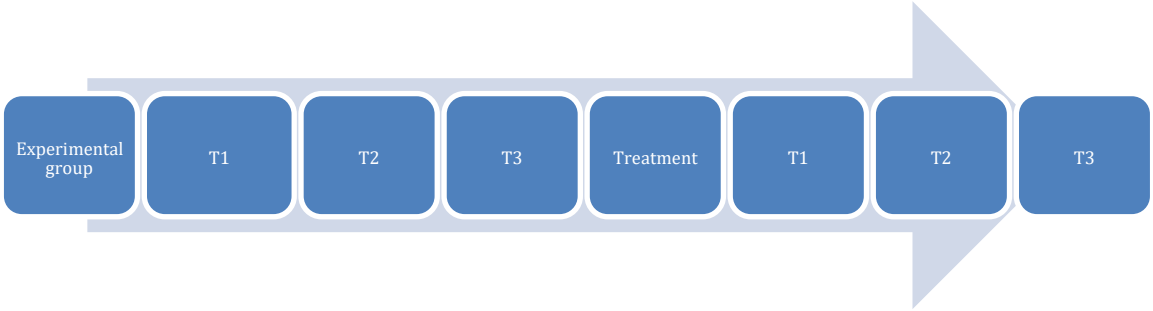

Fig. 3 Hybrid design

In hybrid design, the test subjected for both control and experimental group will not be randomized. Considering the hypothesis that online results will be better, the time frame will be adjusted for offline group until they meat the same result as that of online. Independent variable will be time from the first group and dependent variable will be the time from second group. Based on the result conclusion will be provided.

1.3. OBJECTIVE

The objective of this project is to compare the impact of online learning and offline learning and then analyzing the data to see if the selected demography that is age group and subject is better suited for online teaching or offline teaching, thereafter giving the conclusion from the data.

1.4. REPORT STRUCTURE

The project is organized into following number of chapters:

- Chapter 1: This section broadly introduces our project. It gives a basic idea about what the project is, what the motivation is and what objectives were targeted and achieved.
- Chapter 2: This chapter provides an explanation of various concepts that are the foundation of our project. The concepts discussed have a role in the creation of the steps of implementation.
- Chapter 3: this chapter deals with the proposed work of our project.
- Chapter 4: It deals with the design of our project along with the methodology adopted to complete the project, steps that lead to the results are discussed in detail.
- Chapter 5: This chapter illustrates the results of all the objectives that conclude the project. • Chapter 6: It mentions the conclusion and describes the future prospects of the project.

CHAPTER 2: PAPER REVIEW / RELATED WORK

S.NO.	TITLE	YEAR	DESCRIPTION	METHOD USED
1	The effectiveness of interactive distance education technologies in K-12 learning: A metaanalysis. *International Journal of Educational Telecommunications*	2001	Meta-analysis of 19 studies that compared the effects of distance education and traditional methods on K-12 academic achievement reported that all online courses except language courses had positive effect sizes. Specifically, Cavanaugh identified a small positive effect size of 0.43 in online Englishlanguage courses, but a somewhat larger negative effect size of 0.8 in online foreign-language courses, as compared to their respective face-to-face counterparts	Quazi experiment
2	Classroom and Online Learning: Teaching Research Methods by Anna Ya Ni	2016	It majorly focuses on interaction part between teacher-student and student-student in classroom learning and online learning. It tells that Online courses often substitute classroom interaction with discussion boards, synchronous chat, electronic bulletin boards, and emails.	True experiment
3	Online learning amid the COVID-19 pandemic: Students' perspectives by Muhammad Adnan and Kainat Anwar	2020	It's a survey based research paper which concludes the lack of interaction with instructor, response time and the absence of	Survey based

			traditional classroom socialization leads to	
			difficulty in completing the courses(focuses on interaction part). And hence leads to dropouts this research paper is new	
4	Predicting online learning success: Applying the situational theory of publics to the virtual classroom	2013	This research paper is bsed on the theory of publics.	Survey
5	Analytics in online and offline language learning environments: the role of learning design to understand student online engagement	2017	This research paper combines the learning analytics and big data with the design of learning. They took the weekly progress of the students and based on that the results were conluded.	Learning analytics and big data
6	Online Learning: A Panacea in the Time of COVID-19 Crisis.	2020	This research paper tell us about the importance of learning, strengths and weakness of online learning which is need of the hour in the pendamic of covid-19 and why we should promote online learning among small and middle aged students.	Knowledge
7	Constructivism and emerging online learning pedagogy: a discussion for formal to acknowledge and promote the informal	2004	This research is based on Silent Construction and Informal Online Learning among the school and college students	Review

8	Learning online, offline, and in-between: comparing student academic outcomes and course satisfaction in face-to-face, online, and blended teaching modalities	2018	This research paper focuses on three way comparison that is face to face, online teaching and blended teaching and then comparing the results using their own proposed two factor model based on which the conclusion is provided	Modified quazi based experement
9	Engaging online learners: The impact of Web-based learning technology on college student engagement	2009	In this research paper hierarchial linear model is used along with multiple regression to analyze the impact of online learning among the students who enrolled for online classes and also predicting how many percentage of students are likey to enroll in online based course instead of offline course.	HLM and multiple regression
10	A dynamic analysis of the interplay between asynchronous and synchronous communication in online learning: The impact of motivation	2013	this research focuses on dynamic analysis using asunchronous and syncharonous approach and then prediction the result	and asynchronous synchronous communication
11	The Perceptions of Primary School Teachers of Online Learning during the COVID-19 Pandemic Period: A Case Study in Indonesia	2020	This paper is based on case stdy of a program that is developed in Indonesia called school from home during Covid -19 pendamic. All the data was collected through a survey based method and some of the data was collected through the mode of interview. The conclusion was made after studying the patterns from the data.	Survey

12	The Impacts of System and Human Factors on Online Learning Systems Use and Learner Satisfaction	2011	This research paper is based on SEM modal in which sample of 674 students was obtained who were atleast enrolled in one onlince ourse and based on that results were given	SEM
13	Efficiency of Online vs. Offline Learning: A Comparison of Inputs and Outcomes	2012	The authors use Data Envelopment Analysis (DEA) to estimate a model of student efficiency. Demographics, student experience and student preferences are examined as differentiating attributes. The sample is taken from a course offered both online and in a traditional	DEA (Data envelopement analysis)
			classroom setting, with both formats being taught by the same instructor in a single semester.Implications include a better understanding of the strengths and weaknesses in efficiency of different course formats.	

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Chapter 3: PROPOSED WORK

3.1 Selection and segregation of students for the experimental groups:

A group of students will be separated into two groups with all possible capability bounds, that is, from low scoring students to high. the overall scoring ability will be approximately equal in both these groups. The groups will have equal numbers of students and equal numbers of students of the same abilities to score. Group-1 will be the control group and Group-2 will be experimental group. Age of the test subjects will be from 14 to 16 years. Subject will be mathematics.

Fig. 4 Selection and segregation

3.2 Setting target concepts for the groups:

A total of 2 targets will be set. The overall score of the group as well as time taken to complete the given target subject's concept. Each group will be analyzed on how long it takes for the students to complete a concept as well as how well they have understood the concept through an online exam conducted by the faculty. Both the experimental groups will be evaluated using the same questions hence avoiding the possibility of a difference in the examination difficulty.

3.3 Recording the time and effort taken to complete the task:

The time taken to complete each task for each group will be noted and recorded. The exams will be conducted, evaluated without any bias by not recording the student's name in the exam. All the exams will be conducted online only regardless the mode of teaching so as to get more consistency in the result

3.4 Comparing the experimental groups:

The time taken and the scores achieved will be compared and based on the differences, the treatment, that is in this case, extra classes and more detailed explanation with examples will be provided to the required group in the required concept at the cost of increasing the time variable in the evaluation of the effectiveness of the experimental group for that concept. This is to make sure that both the group eventually achieves similar scores average for the same concept.

3.5 Analyzing and evaluating the groups:

The analysis of the groups will be based on the time taken for completing the concept and if at all a treatment (extra classes) is necessary, will be added thus jeopardising the overall effectiveness of the experimental group. Evaluation of the experimental groups is going to be uniform as it is going to be a multiple choice question paper and there will be only one correct option out of the given options. This will be evaluated and the overall average score of each group will be calculated and compared.

3.6 Treatment applied on the groups:

Since the groups will be subjected to different methods of learning, there will be a difference in understanding and thus resulting in the reduction of overall score compared to that of the other group due to external factors. This will be neutralized by conducting extra classes for the group which lacks behind compared to the other group which can be coarsely noted during the classes itself through the completion of the concept in time or it can also be finely noted after an examination through the results of that particular exam. In case of which, a re exam with a different set of questions but of the same or similar difficulty will be conducted and considered instead of the previous examination.

3.7 Rechecking if the treatment has provided improvements:

After the treatment is applied, the second exam will be compared with that of the previous exam and if the improvement is not as much as required compared to the other group that is able to complete the concepts faster and are able to score the better results will be noted. This will be used to increase the classes and time taken to complete the course more than what was assumed to be sufficient and can be evaluated again after the next examination.

3.8 Conclusion of the experiment:

After all the exams and evaluations and treatments, the overall time taken to complete the cumulative of all the concepts will be calculated and the overall average score for the whole subject will also be calculated and compared to that of the other group which will also be evaluated in the same manner. This will be useful to know and notice which of the two methods will be more useful and effective in making the students understand better and faster and also score more.

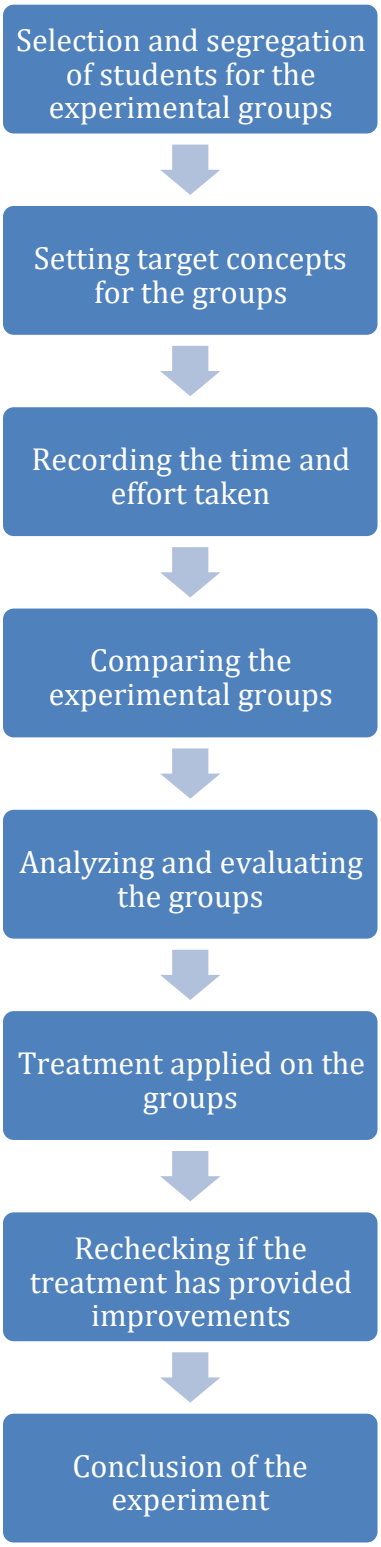

Fig. 5 methodology

CHAPTER 4: DESIGN AND METHODOLOGY

4.1 Selection and segregation of the students for the experimental group

First group that is Group-1 contains 40 students with 10 good scoring students, 20 average scoring students and 10 below average scoring students. (students were judged based on previous test scores). This croup is the control group. This group is subjected to online classes, assignments etc.
Second group is Group-2 contains 40 students with 8 good scoring students, 24 average scoring students and 8 below average scoring students. (students were judged based on previous test scores). This group is the experimental group. This group is subjected to offline classes, assignments etc.

4.2 Setting target concepts for the groups

The target for the groups are two as follows:

Subject will be mathematics and chapters will be Polynomials, Herons formula and surface area and volume.

The time taken to complete each and every chapter for each group will be:

Polynomials : 8 hours
Herons Formula: 4 hours
Surface area and Volume: 12 hours

4.3 Recording the time and effort taken

The effort taken by the students will be analysed through the time of submission of the complete assignment. If the student is able to submit the assignment before the due date it implies that the student is strong and further concepts can be explained with the previous pace.
On the other hand if the student is uable to submit the assignment on the given time, it will be considered that the student requires more time to understand the concept, hence increasing the over time in completing the concept.

4.4 Comparing the experimental groups

The methods in which students will be compared are as follows:

4.4.1 The time taken to submit the assignment

4.4.2 Their scores in the exam of each topic

4.4.3 The responsiveness of the students for the questions asked during each session

4.4.4 The level of difficulty that the students are able to solve in the assignment as well as class sessions.

4.5 Analyzing and evaluating the groups:

After completion of the first topic that is polynomials Group-1 was able to submit assignment in the given time frame whereas 8 students in Group-2 took 1 day more than the given time.

Mean score of Group one in first topic was 16.5 marks out of 20 marks. On the other hand mean group score of Group-2 in first topic was 14 25 out of 20 marks.

On analysing the students while teaching both the groups were equally responsive.

When difficult questions were posed on the paper the average students in group-1 were able to solve it with some little extra time whereas in group-2 average students had hard time solving the difficult questions.

4.6 Treatment applied on the groups

Since average student in Group-2 face a lot of problems when a difficult question were posed in the assignment, it was imminent that extra time was required to explain the topic more briefly and with more clarity to Group-2 in order form them to solve the difficult questions in the next assignment easily. On analyzing the Group-2 faculty decided to give extra 2 classes to Group-2 students (each class 1 hour) giving them a total extra time of 2 hours.

4.7 Rechecking if the treatment has provided improvements

The extra time that was given to student significantly improved their results and was at par with the Group-1

4.8 Conclusion of the experiment

All the students and all the concepts were completed the data is as follow:
Group-1
Teaching time: 26 hours
Time duration for 3 assignments : 5 hours
Mean score in all the exams: 79%

Responsiveness: GOOD

Group-2
Teaching time: 34 hours
Time Duration for 3 assignments: 8 hours
Mean score in all the exams: 80%
Responsiveness: GOOD

CHAPTER 5: RESULT AND DISCUSSION

The results for the main aspects of the projects are as follows:

5.1 Time taken to submit the assignment

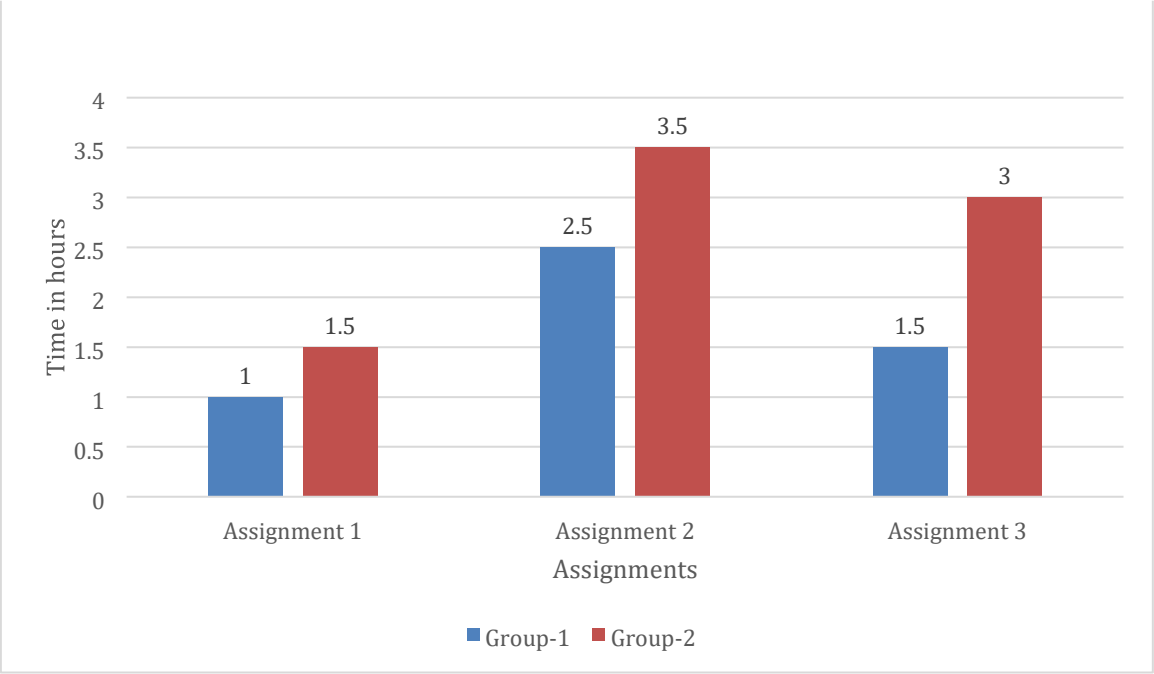

Fig. 6 Lower is better

Overall time taken to complete all the assignments by Group-1 was 5 hours whereas over all time taken by Group-2 to complete the assignments was 8 hours.

5.2 The responsiveness of students.

The responsiveness of both the groups were equal and was satisfactory. There was no difference in the responsiveness between the groups.

5.3 The scores in exam of each topic

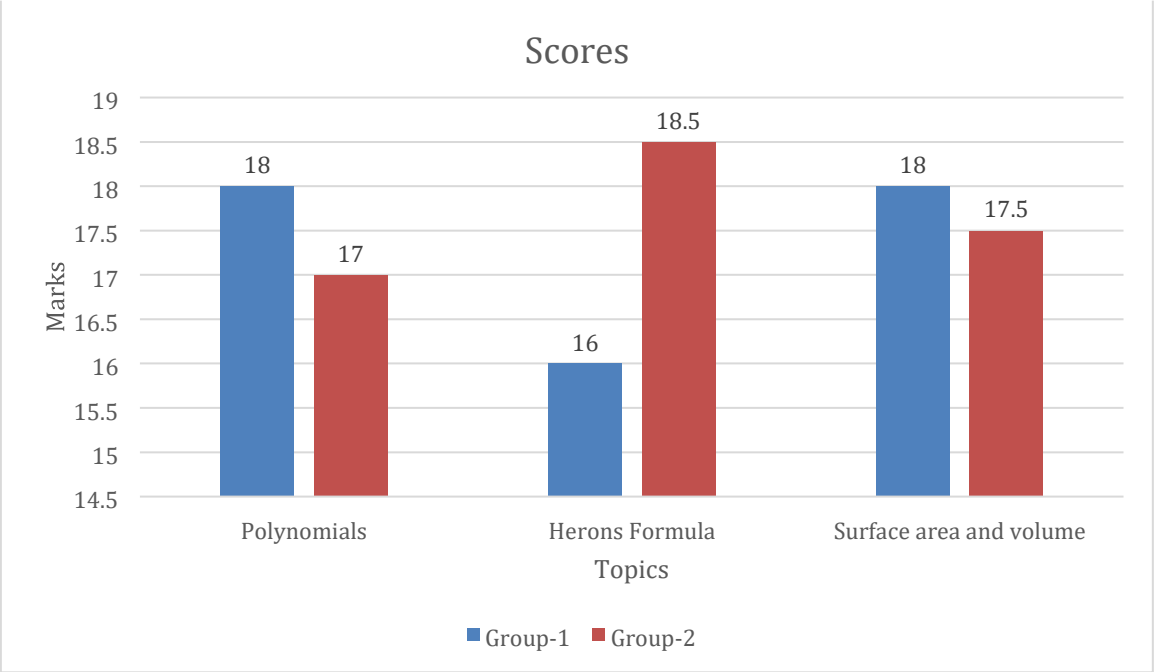

Fig. 7 Higher is better

Overall result scored by Group-1 in percentage is 86.66. on the other hand result scored by Group-2 in percentage is 88.33.

5.4 The level of difficulty that the students are able to solve in the assignment as well as class sessions

After giving weak group extra time to make their concepts clearer they were able to perform equal with the strong group, in fact slightly better than the strong group.

5.5 Overall teaching time taken by each group

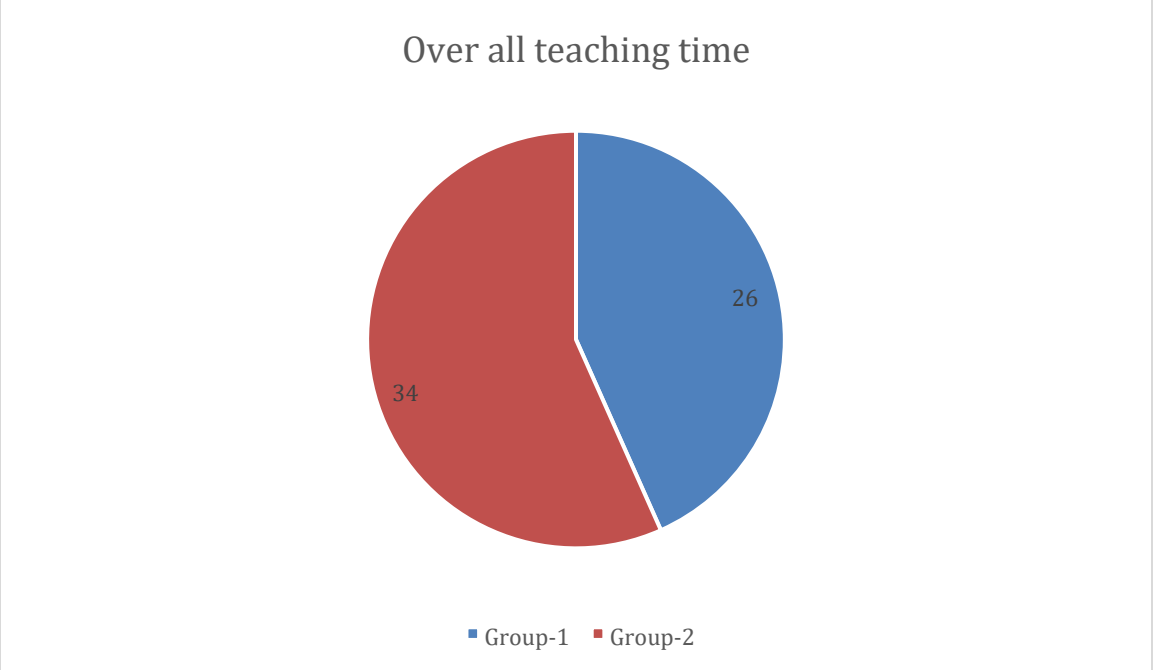

Fig. 8 Lower is better

Group-1 took 26 hours of teaching time to understand all the concepts whereas group-2 took 34 hours of teaching time to understand all the concepts.

CHAPTER 6: CONCLUSION AND FUTURE PROSPECTS

6.1 CONCLUSION

Based on the experiment analysis, it was conclusive that the students who were subjected to the offline classes required more time to communicate as well as indulge in the discussion with the faculties in order to be able to solve hard problems, whereas the students who were taking the same classes through online medium were able to acquire and grasp the concept's depth faster than that of the students taking it offline.

Since students were able to grasp the concepts faster, they were able to submit the assignments in time and sometimes even before the given time frame, it is conclusive that the students were able to understand and self-evaluate themselves when it comes to solving hard problems for the assignment. On the other hand, the students that were taking the offline classes were unable to submit the assignments that required hard problem solving and hence required more time to complete and thus submit the assignments late.

Based on the final average scores of the end examination of all the concepts, the end score of both the experimental group as well as the control group have achieved very close scores that concludes that the students have achieved relatively significant improvement through the classes but the time taken to achieve similar results explains that the students that take the online classes were able to complete the required task in time and able to understand the concepts that the faculty expects them to in that time. The offline classes taking students proved that the score is achievable but at the same time they were unable to reach the same target goal in the allotted time and required special attention and extra classes in order to solve harder problems of that topic.

Although the students were equally responsive to the faculty regarding the concepts and problem solving, the response to the hard problems were noticeably weak in case of the students taking offline classes compared to that of the students taking online classes.

6.2 FUTURE PROSPECTS

We can conduct this hybrid approach in various demography by changing the age group or by changing the subjects and compare the results. It will help to understand the learning curve for various age groups and it will also help in finding that which subject is more suited for online means of teaching and which subject is better suited for offline means of teaching.

For example: mathematics is a concept based topic whereas biology is visualization based and even in mathematics the chapters which include graph representation can be better understood with 3 dimensional animations.

This will help segregate the demography and subjects and will provide better quality of education.

REFERENCES

[1] True Experiment: Definition & Examples. (n.d.). Retrieved November 17, 2020, from https://study.com/academy/lesson/true-experiment-definition-examples.html

[2] Center for Innovation in Research and Teaching. (n.d.). Retrieved November 17, 2020, from https://cirt.gcu.edu/research/developmentresources/research_ready/experimental/design_types

[3] Gordis, L. (2009). *Epidemiology*. Philadelphia: Elsevier/Saunders.

[4] Jaikumar, M. (2018, July 31). QUASI EXPERIMENTAL DESIGN. Retrieved November 17, 2020, from https://www.slideshare.net/maheswarijaikumar/quasi-experimental-design108088766

[5] Kruger-Ross, M. J., & Waters, R. D. (2013). Predicting online learning success: Applying the situational theory of publics to the virtual classroom. *Computers & Education, 61*, 176184. doi:10.1016/j.compedu.2012.09.015

[6] Rienties, B., Lewis, T., Mcfarlane, R., Nguyen, Q., & Toetenel, L. (2017). Analytics in online and offline language learning environments: The role of learning design to understand student online engagement. *Computer Assisted Language Learning, 31*(3), 273293. doi:10.1080/09588221.2017.1401548

[7] Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems, 49*(1), 5-22. doi:10.1177/0047239520934018

[8] Gulati, S. (2004, May 06). Constructivism and emerging online learning pedagogy: A discussion for formal to acknowledge and promote the informal. Retrieved November 17, 2020, from http://www.leeds.ac.uk/educol/documents/00003562.htm

[9Yen, S., Lo, Y., Lee, A., & Enriquez, J. (2018). Learning online, offline, and in-between: Comparing student academic outcomes and course satisfaction in face-to-face, online, and blended teaching modalities. *Education and Information Technologies, 23*(5), 2141-2153. doi:10.1007/s10639-018-9707-5

[10] Chen, P. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of Web-based learning technology on college student engagement. *Computers & Education, 54*(4), 1222-1232. doi:10.1016/j.compedu.2009.11.008

[11] Giesbers, B., Rienties, B., Tempelaar, D., & Gijselaers, W. (2013). A dynamic analysis of the interplay between asynchronous and synchronous communication in online learning: The impact of motivation. *Journal of Computer Assisted Learning, 30*(1), 30-50. doi:10.1111/jcal.12020

[12] Rasmitadila, R., Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. (2020). The Perceptions of Primary School Teachers of Online Learning during the COVID-19 Pandemic Period: A Case Study in Indonesia. *Journal of Ethnic and Cultural Studies, 7*(2), 90. doi:10.29333/ejecs/388

[13] Alshare, K. A., Freeze, R. D., Lane, P. L., & Wen, H. J. (2011). The Impacts of System and Human Factors on Online Learning Systems Use and Learner Satisfaction. *Decision Sciences Journal of Innovative Education, 9*(3), 437-461. doi:10.1111/j.15404609.2011.00321.x

[14] Alexander, P., P. A.. Alexander, T., M. S.. Aldenderfer, R., S. A.. Barab, B., S. A.. Barab, B., S. A.. Barab, B., . . . A.. Wise, J. (1992, January 01). Online learning: Learner characteristics and their approaches to managing learning. Retrieved November 17, 2020, from https://link.springer.com/article/10.1007/s11251-007-9039-0

[15] Anderson, T. (2008). *The theory and practice of online learning*. Edmonton: AU Press.

[16] Hixon, E. (2016, February 29). The Impact of Previous Online Course Experience RN Students' Perceptions of Quality. Retrieved November 17, 2020, from https://eric.ed.gov/?id=EJ1096379

[17] Journal of Online Learning and Teaching. (n.d.). Retrieved November 17, 2020, from https://jolt.merlot.org/vol8no2/ashong_0612.htm

[18] Kemp, N., & Grieve, R. (2014). Face-to-face or face-to-screen? Undergraduates' opinions and test performance in classroom vs. online learning. *Frontiers in Psychology, 5*. doi:10.3389/fpsyg.2014.01278

[19] Ndubisi, N. (2006, October 01). Factors of Online Learning Adoption: A Comparative Juxtaposition of the Theory of Planned Behaviour and the Technology Acceptance Model. Retrieved November 17, 2020, from https://www.learntechlib.org/p/6173/

[20] Online Learning in Higher Education: A review of research on interactions among teachers and students. (n.d.). Retrieved November 17, 2020, from https://www.tandfonline.com/doi/abs/10.1080/14636310303143

[21] Rebecca Eynon, E. (1970, January 01). Adults learning online: Digital choice and/or digital exclusion? - Rebecca Eynon, Ellen Helsper, 2011. Retrieved November 17, 2020, from https://journals.sagepub.com/doi/abs/10.1177/1461444810374789

[22] Setyawan, H. (2019). Blended Method: Online-Offline Teaching And Learning, On Students' Reading Achievement. *English Education: Jurnal Tadris Bahasa Inggris, 12*(1), 22-33. doi:10.24042/ee-jtbi.v12i1.4432

[23] Storkel, H. L., Bontempo, D. E., & Pak, N. S. (2014). Online Learning From Input Versus Offline Memory Evolution in Adult Word Learning: Effects of Neighborhood Density and Phonologically Related Practice. *Journal of Speech, Language, and Hearing Research, 57*(5), 1708-1721. doi:10.1044/2014_jslhr-l-13-0150

[24] Valle, R. D., & Duffy, T. M. (2007). Online learning: Learner characteristics and their approaches to managing learning. *Instructional Science, 37*(2), 129-149. doi:10.1007/s11251-007-9039-0

[25] Xie, K., Yu, C., & Bradshaw, A. (2013, September 24). Impacts of role assignment and participation in asynchronous discussions in college-level online classes. Retrieved November 17, 2020, from https://www.sciencedirect.com/science/article/abs/pii/S1096751613000328

[26] You, J. W. (2016). Identifying significant indicators using LMS data to predict course achievement in online learning. *The Internet and Higher Education, 29*, 23-30. doi:10.1016/j.iheduc.2015.11.003