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Leveraging E-Learning through Google Classroom: A Usability Study

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Abstract: In the modern day and age, technology is very much ubiquitous, in other words it is anywhere and everywhere. The most interesting aspect of this trend is that the educational systems are adapting to technology at a rapid pace. This is increasingly assisting the careers of students as well as the teacher. The technology which is most often right on the fingertips, keeps everything and everyone updated while the rest is getting outdated. Classroom teaching can do wonders with the implementation and usage of technology since the modern world is in need of it. The current trend is to learn online, where almost everything is available on the screen right in front of the learner. These E-Learning techniques are epitomized in Google Suite for Education which offers a plethora of opportunities for the learners to explore various options in front of them to leverage E-Learning. A study has been carried out to assess the effectiveness of assignments when submitted manually to the teachers as opposed to submission through an E-Learning facility like Google Classroom and the results show overwhelming success when this activity was carried out with the help of technology. This paper discusses incorporating technology in classroom learning, diverse ways of leveraging it in the classroom, its benefits and a number of relevant issues.

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1. Introduction

The traditional classroom cannot compare to most modern technology-enabled classrooms because the intensity of the knowledge acquired is much more. The teacher teaches and clarifies any doubts related to the particular topic, giving real-world examples in an attempt to do so. Also, the same concept is presented in many different ways in a technology-enabled classroom, so that the learners with varied pace and needs, get to absorb the concepts taught learn over a period of time. Of-late, the curriculum is increasing due to the industry standards and requirements which cannot be covered within the given schedule for the academics. To solve these inherent problems and also to give a boost to the traditional educational strategies, there have been a lot of emerging technologies which go hand-in-hand.

E-Learning is the buzzword in modern times which has a given a new shape to the traditional classroom learning. Cloud Computing forms the base for these E-Learning [1] techniques wherein teacher [2] as well as students can collaborate from their comfort zone and experience learning [3] in a creative way. With E-Learning techniques, the learners are encouraged to get knowledge at their own pace and

space. There are a variety of E-Learning tools [4] out there and one prominent one among them is the Google Suite for Education [5]. It may be seen as a collaborative solution for the needs of both a teacher and a student [6, 7].

Google Suite for Education includes Google App tools like Drive, Gmail and Docs [8], Forms, Sheets and Slides that can be collaborated with apps like Google Classroom and YouTube which provide a vast variety of knowledge and information for students and teachers alike. A teacher can create a Google Classroom for any particular subject comprising of all the students belonging to that class and can also include more teacher for the same subject, which helps the learners to gain additional ideas on the same topic from multiple teachers as well as online resources too for further sustenance. The topics to be covered, the reference materials may be intimated to students well in advance so that students can come well prepared for the topic that can add more interaction in the overall learning. The students get notification to their emails, devices installed with the same app whenever an activity is initiated in the Google Classroom, like posting any announcements, assignments, etc by the facilitator, when a learner of the class asks any doubts related to any particular topic, or even when they start a new discussion. In addition to this, Google Classroom fits perfectly into the category of flipped classrooms [9] which are becoming increasingly popular.

There is a lot of scope for having such technology embedded in our education system since most of educational institutions and universities are getting benefited out of E-Learning. So the best use of all these approaches can be achieved by using an appropriate tool that can be accessed and free for everyone following the Educational Social Responsibility.

This paper focuses on a study which is based on the implementation of Google Suite for Education to a set of students and another set with the conventional teaching pedagogies.

2. Literature Review

A. E-Learning

Elizabeth et al [10] describe the usage of network technology to deliver training as the revolution in the field of E-Learning and takes on a practitioners approach to asses of E-Learning, look into its drawback and the challenges in this field. Zhang et al [7] discuss the possibilities of E-Learning replacing classroom learning by assimilating suitable pedagogical methods, to enhance system interactivity and personalization and for the continuous engagement of the learners. Thavamalar Govindasamy [11] shows the pedagogical considerations in the successful implementation of E-Learning by stating that the pedagogy plays a very crucial role in the success or failure of this implementation. It is also found that understanding how learning takes place online can fix most of the issues associated with unsuccessful implementation of E-Learning. Tavangarian et al [12] point out the importance teachers in early E-Learning models and defines a flexible multidimensional data model which focuses on learners rather than teachers thereby influencing individual learning.

B. Cloud Computing

Sultan [1] brings out the need to incorporate Cloud Computing strategies in educational institutes to innovate and realize the true potential of techniques such as web services, virtualization and grid computing. The relevance of Cloud Computing becomes increasingly important as it is expected to offer flexibility and pay as you go cost structure.

C. Google Suite for Education

Herrick [5] describes the usage of Google Apps for collaboration by stating the successful migration that took place at Colorado State University which provides a lot of advantages to all the stakeholders of the university. Railean [13] provides an overview of opportunities offered by Google Apps by covering both theory and practicalities of the apps and the advantages in terms of competency development. Hocutt [14] developed a usability study which examines the perceptions of student community and assesses the usability of Google Apps for Education. It is observed that the students find Google Apps relatively easy while widely appreciating its collaborative affordances. Blau and Caspi [15] experimented to test the differences between sharing and collaborating using various tools which included Google Docs and the implications show that collaboration is found to be superior to sharing among students. Lindh and Nolin [16] discuss the surveillance and privacy aspects in the implementation of Google Apps for Education and

conclude that even though there are a lot of advantages associated with its usage, it is found that the back end strategies are relatively hidden from the users of technology. A research study was conducted by Cahill [17] and an attempt was made to gauge the perception of university professors about the impact of integration of Google Apps in the daily activities of the universities. The results show that the professors are in favor of integrating Google Apps into their instructional strategies provided they are equipped with appropriate professional development and training.

D. Google Classroom

Iftakhar [18] describes the working of Google Classroom with the help of the data collected over a period of time and presents an analysis in terms of teachers and students perspectives. Based on these perspectives, some suggestions are discussed and it has been concluded that adaptation of new and upcoming technologies like virtual classroom is a must to impart quality education.

3. Methodology

Assessments are an integral form of education system and more so in engineering education. Assignments are one of the assessment techniques to gauge the learning and have proved to be a very effective tool in doing so. The study here is based on assignments handed over to students from one particular class and the results show the effectiveness of applying E-Learning technique in evaluation as opposed to the traditional manual way of submitting assignments.

A. Participants

The participants for this study were 31 second year, full time students from post graduate department in computer applications and two teachers of the same department.

B. Study Design

As a part of this study, the students were handed over two distinct assignments pertaining to two courses handled by the respective teachers. As a first phase of this study, one of the teacher members asked the students to submit the assignments in the traditional way wherein each student had to submit a handwritten assignment within the deadline specified by the teacher. The second teacher, who had leveraged Google Classroom as a part of E-Learning, asked the students to submit the assignments through Google Classroom itself. In the second phase of this study the teacher leveraging Google Classroom, asked the students to submit yet another assignment pertaining to his subject.

C. Data Analysis

The analysis performed on the assignments submitted by students showed that the intrinsic problem with manual submissions is that the difficulty in understanding the handwriting of some of the candidates. Another more severe problem was to keep track of the late submissions and reduce the grades accordingly.

Fig 1 depicts the data collected when the submission was manual. The teacher had to personally keep track of the assignments submitted beyond the deadline and had to reduce the scores accordingly. The last date for the submission of this assignment was 30th September but some of the students exceeded this deadline and some of the submissions were made in the month of October. This becomes an additional burden on the teacher. One way to solve this issue was to reject the submissions beyond deadline but the general tendency of students is to submit the work just on the stroke of the deadline or a couple of days beyond the deadline.

Principles of User Interface Design

Name	USN	Last Date	Date of Submission (Deadline: Sept-30)	Score	Penalty for not Submitting on time	Final Score
Student 1	15MCA01	30-Sep	17-Oct	9	3	6
Student 2	15MCA02	30-Sep	25-Sep	9	0	9
Student 3	15MCA03	30-Sep	30-Sep	5	0	5
Student 4	15MCA04	30-Sep	10-Oct	6	3	3
Student 5	15MCA05	30-Sep	17-Oct	7	3	4
Student 6	15MCA06	30-Sep	17-Oct	9	3	6
Student 7	15MCA07	30-Sep	10-Oct	9	3	6
Student 8	15MCA08	30-Sep	10-Oct	7	3	4
Student 9	15MCA09	30-Sep	30-Sep	6	0	6
Student 10	15MCA10	30-Sep	30-Oct	9	3	6
Student 11	15MCA11	30-Sep	18-Oct	6	3	3
Student 12	15MCA12	30-Sep	30-Oct	9	3	6
Student 13	15MCA13	30-Sep	30-Sep	6	0	6
Student 14	15MCA14	30-Sep	30-Sep	7	0	7
Student 15	15MCA15	30-Sep	30-Sep	7	0	7
Student 16	15MCA16	30-Sep	18-Oct	7	3	4
Student 17	15MCA17	30-Sep	10-Oct	6	3	3
Student 18	15MCA18	30-Sep	30-Oct	5	3	2

Fig. 1 Representation of data collected through the manual submission of assignments

Computer Networks				Sept 30	Oct 31
Total Students : 31				Assignment 1	Assignment 2
OPEN CLASSROOM				10	10
Students Not Attended				14	1
Class average			54.83%	3.7	7.27
Student 1	15MCA01	15MCA01@sjec.ac.in	75.0%	5	10
Student 2	15MCA02	15MCA02@sjec.ac.in	75.0%	8	7
Student 3	15MCA03	15MCA03@sjec.ac.in	40.0%	0	8
Student 4	15MCA04	15MCA04@sjec.ac.in	55.0%	6	5
Student 5	15MCA05	15MCA05@sjec.ac.in	40.0%	0	8
Student 6	15MCA06	15MCA06@sjec.ac.in	25.0%	0	5
Student 7	15MCA07	15MCA07@sjec.ac.in	40.0%	0	8
Student 8	15MCA08	15MCA08@sjec.ac.in	75.0%	5	10
Student 9	15MCA09	15MCA09@sjec.ac.in	85.0%	9	8
Student 10	15MCA10	15MCA10@sjec.ac.in	55.0%	5	6
Student 11	15MCA11	15MCA11@sjec.ac.in	30.0%	0	6
Student 12	15MCA12	15MCA12@sjec.ac.in	60.0%	6	6
Student 13	15MCA13	15MCA13@sjec.ac.in	25.0%	0	5
Student 14	15MCA14	15MCA14@sjec.ac.in	75.0%	7	8
Student 15	15MCA15	15MCA15@sjec.ac.in	75.0%	8	7

Fig. 2 Representation of data collected for assignments submitted through Google Classroom

Both these issues were overcome with the other method where the students had to submit their assignments online through Google Classroom. This mode of submission not only cleared the issues with respect to handwriting, it also provided a mechanism by which the submissions beyond the deadline were automatically disabled as shown in Fig 2. This reduced the burden on the teacher of keeping track of the assignments submitted beyond the deadline. In this case, there were two assignments up for submission as depicted in the figure. The deadline for the submission of the first assignment was 30th September. The response to this was rather lame and the there were 14 students who took it lightly and did not submit the work on time. This was mainly due to the fact that the students assumed that they could submit the assignments beyond deadline and the teacher would still accept it as they normally do in the case of manual submissions; little did they know that Google Classroom itself restricts all submissions beyond the deadline. It becomes easy for the teacher to keep track of all the submissions this way. As a result of it, the average score of the class (out of 10) was only 3.7 as many people lost out on the opportunity to even submit their assignment.

The same set of students were given yet another assignment which was to be submitted on 31st October and due to their previous experience, the students became more serious and all but one submitted the assignment before the deadline. The average score of the class shot up to 7.27 as a result and overall, the teacher was able to manage as score of 54.83% over the course of both the assignments.

When this analysis was presented to the other teacher members of the department, they were of the opinion that even though the E-Learning tool is found to be very efficient, it can only be utilized to the fullest when the teacher and students are properly trained [17] to use the technology.

4. Results and Discussion

The graphs in Fig 3 and 4 demonstrate the assessment for the submissions made manually.

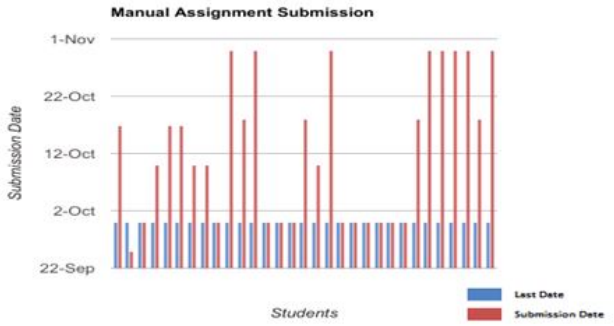

Fig. 3 Graphical representation of manual submissions

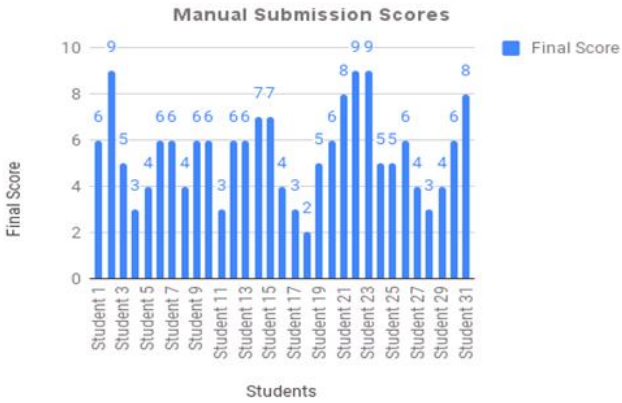

Fig. 4 Graphical representation of manual submissions showing performance assessment

The results shown in Fig 5, 6 and 7 present the statistics and graphs with respect to the submissions made through Google Classroom.

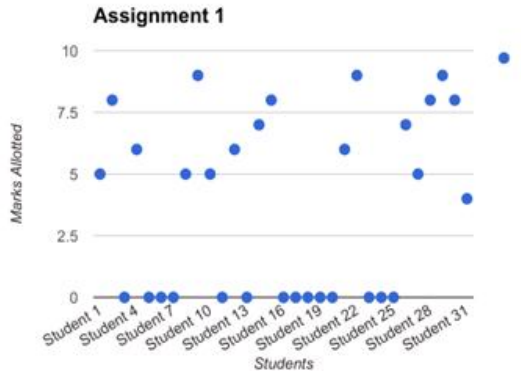

Fig. 5 Graphical representation of the first assignment submitted through Google Classroom

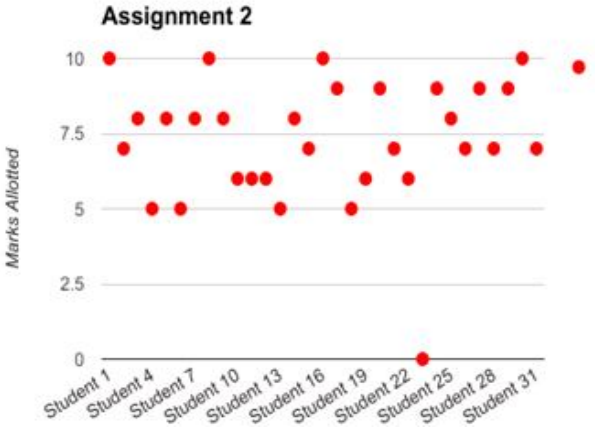

Fig. 6 Graphical representation of the second assignment submitted through Google Classroom

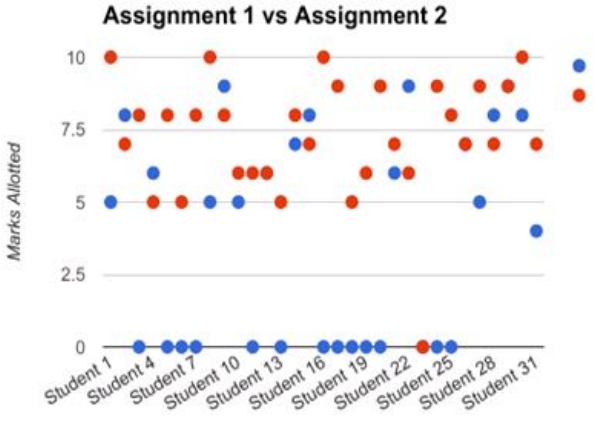

Fig. 7 Graphical comparison of both the assignments submitted through Google Classroom

The inherent problems with manual submissions are overcome by using Google Classroom as a tool for submission. The graphical representations depicted in Fig 3 shows the graph derived from the data collected after the manual submission of assignments. The teacher in this case was handicapped with the limited options available to work with the data. The data collected by Google Classroom submissions, provide an efficient way to perform a number of operations on the data as shown in Fig 4, Fig 5 and Fig 6. A few of the options available to the teacher have been explored and depicted whereas Google Classroom provides numerous other ways to analyze the data.

At the end of the course, a survey was conducted to collect the feedback from the teachers as well as the learners to better understand their opinion on the use of this technology. Fig 8 shows a subset of the feedback collected. As seen, most of the participants of the survey have expressed the need to migrate from traditional ways to more sophisticated E-Learning tools. Along with the feedback, the stakeholders were also interviewed to analyse the impact of this pedagogy.

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Feedback on Google Classroom
Class: V Semester MCA
Coordinator: Ragesh Raju

Sl No	Name	Role	How you rate the Google Classroom?	After using Google Classroom, do you prefer the traditional method or Google Classroom?	Which is the best thing you like in Google Classroom?	Suggestions/Opinions
1	Athokpam Bikramjit Singh	Faculty	8/10	Both	Drive repository	All departments should implement this
2	Prithvi V Shet	Student	10/10	Google Classroom	Mobile App	No tension about searching classnotes during Xams
3	Likith Sai	Student	9/10	Google Classroom	Real time updates	-
4	Chaithra Rai	Student	10/10	Google Classroom	Google Classroom Mobile App	Nothing
5	Samarpan Preethi	Student	9/10	Google Classroom	Objective type questions	Youtube Videos in notes is superb :-)
6	Hareesh B	Faculty	9/10	Traditional Method	Tracking assignment	technology is good, but teaching learning process should happen in traditional method only.
7	Johnson D'Souza	Student	10/10	Google Classroom	Everything	No Comments

Fig. 8 Subset of feedback collected at the end of the course to assess the effectiveness of Google Classroom

One problem with E-Learning solutions is that if one of the students solves the assignment and share the document with his/her friends group, there are chances that entire group would use the same document for submission or make minimal changes to the document and submit the same. It becomes a major concern with this mode of submission as there will always be qualms with respect to the originality of the work done by the students in the preparation of the assignments. This concern can easily be overcome by applying plagiarism check on the assignments in order to find out the novelty of the work.

5. Conclusion

The study and the subsequent results clearly show that it is easy to keep track and assess the assignments

submitted through the E-Learning tool as opposed to the traditional manual way of submission. The assignments submitted through manual mode are prone to handwriting and violation of deadline issues, while the Google Classroom submissions seem to be impervious to these issues. One concern with this mode of submission is the qualms with respect to the originality of the work done by the students in the preparation of the assignments. This concern can easily be overcome by applying plagiarism check on the assignments in order to find out the novelty of the work. The teachers, as well as the students, who have taken part in this study express the need to migrate from traditional ways to more sophisticated E-Learning tools so as to improve the overall quality of learning. This study mainly focuses on the impact of the usage of Google Classroom as an E-Learning tool as opposed to the traditional methods of learning. The introduction of concepts like reward points for the work done could not only innovate teaching-learning process but can also intrinsically enhance the performance.

References

[1] Sultan, Nabil. "Cloud computing for education: A new dawn?." International Journal of Information Management 30.2 (2010): 109-116.

[2] Khmelevsky, Youry, and VolodymyrVoytenko. "Cloud computing infrastructure prototype for university education and research." Proceedings of the 15th Western Canadian Conference on Computing Education.ACM, 2010.

[3] Thomas, P. Y. "Cloud computing: A potential paradigm for practising the scholarship of teaching and learning." The Electronic Library 29.2 (2011): 214-224.

[4] Georgiev, Tsvetozar, EvgeniaGeorgieva, and Angel Smrikarov. "M-learning-a New Stage of E-Learning." International conference on computer systems and technologies-CompSysTech.Vol. 4.No. 28. 2004.

[5] Herrick, Dan R. "Google this!: using Google apps for collaboration and productivity." Proceedings of the 37th annual ACM SIGUCCS fall conference: communication and collaboration. ACM, 2009.

[6] Sun, Pei-Chen, et al. "What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction." Computers & education 50.4 (2008): 1183-1202.

[7] Zhang, Dongsong, et al. "Can e-learning replace classroom learning?." Communications of the ACM 47.5 (2004): 75-79.

[8] Saito, Tami. "Fostering Collaboration via Google Apps." (2014).

[9] Ferreira, Jose Manuel Martins. "Flipped classrooms: From concept to reality using Google Apps." Remote Engineering and Virtual Instrumentation (REV), 2014 11th International Conference on. IEEE, 2014.

[10] Welsh, Elizabeth T., et al. "E-learning: emerging uses, empirical results and future directions." international Journal of Training and Development 7.4 (2003): 245-258.

[11] Govindasamy, Thavamalar. "Successful implementation of e-learning: Pedagogical considerations." The internet and higher education 4.3 (2001): 287-299.

[12] Tavangarian, Djamshid, et al. "Is e-Learning the Solution for Individual Learning?." Electronic Journal of E-learning 2.2 (2004): 273-280.

[13] Railean, Elena. "Google Apps for Education–a powerful solution for global scientific classrooms with learner centred environment." International Journal of Computer Science Research and Application 2.2 (2012): 19-27.

[14] Brown, Maury Elizabeth, and Daniel L. Hocutt. "Learning to use, useful for learning: a usability study of Google apps for education." Journal of Usability Studies 10.4 (2015): 160-181.

[15] Blau, Ina, and AvnerCaspi. "What type of collaboration helps? Psychological ownership, perceived learning and outcome quality of collaboration using Google Docs." Proceedings of the Chais conference on instructional technologies research.Vol. 12. 2009.

[16] Lindh, Maria, and Jan Nolin. "Information we collect: Surveillance and privacy in the implementation of Google Apps for Education." European Educational Research Journal 15.6 (2016): 644-663.

[17] Cahill, Jacqueline L. "University professors' perceptions about the impact of integrating Google applications on students' communication and collaboration skills." Journal of Research Initiatives 1.2 (2014): 7.

[18] Iftakhar, Shampa. "Google classroom: what works and how?." Journal of Education and Social Sciences 3 (2016): 12-18.