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Improving Attainment of Graduate Attributes using Google Classroom

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Abstract : Outcome Based Education (OBE) has become world wide standard in the current education system. OBE provides a clear and unambiguous framework for curriculum planning. It stresses on the end product- what graduate can do after completing course rather than on the educational process. Graduate Attributes can be defined as qualities, attitudes and dispositions that graduates should possess in full or part, when they have completed their course of study. OBE is measured by assessing the attainment of Graduate Attributes. This paper presents a case study of a course using Google Classroom and compared with two other courses being taught that do not use Google Classroom in terms of attainment of Graduate Attributes.

Keywords : Outcome Based Education, Graduate Attributes, Google Classroom

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1. Introduction

Recent shifts in education and employability standards have resulted in universities being placed under increasing pressure to produce employable graduates. Universities all over the world have embraced a new reform in educational system called as Outcome – Based Education. Outcome-Based Education is a performance-based approach clearly focusing and organizing everything in an educational system around, what is essential for all students to be able to do successfully at the end of their learning experiences [1].

The Indian accreditation agency National Board of Accreditation has also adopted OBE for colleges seeking accreditation now. A list of GA to be achieved at the end of the programare also specified [11] .

In OBE, Course Outcomes are defined for each course being taught. And these Course Outcomes are mapped to the Graduate Attributes. The Graduate Attributes are thus studied for assessment of the attainment.In this paper, the importance of Outcome Based Education is presented .Previously, a study was to conducted to determine the effects of Google Classroom in increasing knowledge of content and vocabulary[10]. However there is no study done so far to show that the Google Classroom can be used to improve the attainment levels of GAs. This paper addresses the question ”Can we improve the attainment of GraduateAttributes by incorporating a new technology –Google Cl\

Attributes by incorporating a new technology available - Google Classroom?"

The rest of the paper is organized as follows. Section 2 discusses about the importance of OBE and GAs. Section 3, introduces and discusses the usage of Google Classroom. Section 4, is about the current course being taught with the expected outcomes. Section 5presents the Survey on the usage of Google Classroom, the results of the survey, and it's analysis. Conclusion is presented in section 6.

2. Outcome Based Education (OBE) and Graduate

A. Course Outcomes and Graduate Attributes(GA)

In Outcome-Based Education, the emphasis is on the end product-what the graduate can do rather than on the educational process. Here, the educational outcomes are clearly and unambiguously specified. These define: the curriculum content and its organization, the courses offered, the teaching methods and strategies, the assessment process, the educational environment. OBE also provides a framework for curriculum evaluation. It encourages the teacher and the student to share responsibility for learning and it can guide student assessment andcourse evaluation. As part of the OBE, universities have attempted to design the generic outcomes of the educational experiences they provide, beyond the content knowledge that is taught. Similar to some aspects of a mission statement, universities have claimed that these are the core outcomes of higher education and that every graduate of every degree will possess these. However, contention exists regarding exactly what constitutes employability and which Graduate Attributes are required to foster employability in tertiary students.

Graduate attributes can be defined as qualities, attitudes and dispositions that graduates should possess in full or part, when they have completed their course of study. These attributes include but go beyond the disciplinary expertise or technical knowledge that has traditionally formed the core of most universitycourses[4]. They are qualities that also prepare graduates as agents of social good in an unknown future" (Bowden et al., 2000)

Outcomes are clear learning results that we want students to demonstrate at the end of significant learning experiences. They are not values, attitudes, or psychological states of mind. Instead, outcomes are what learners can actually do with what they know and have learned. They are the tangible application of what has been learned. This means that outcomes are actions and performances that embody and reflect learner competence in using content, information, ideas, and tools successfully. Having learners do important things with what they know is a major step beyond knowing itself [2].

B. List of Graduate Attributes

GA1Engineeringknowledge:

Engineering Graduateswill be able to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

GA2Problemanalysis:

Engineering Graduates will be able to Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

GA3 Design/development of solutions:

Engineering Graduates will be able to Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

GA4 Conduct investigations of complex problems:

Engineering Graduates will be able to Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

GA5 Modern tool usage:

Engineering Graduates will be able to Create, select and apply appropriatete chniques, resources and modern engineering and IT tool sincluding prediction and modeling to complex engineering activities with an under standing of the limitations.

GA6 The engineer and society:

Engineering Graduates will be able to Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

GA7 Environment and sustain ability:

Engineering Graduates will be able to under stand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustain able development.

GA8 Ethics:

Engineering Graduates will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

GA9 Individual and team work:

Engineering Graduates will be able to Function effectively as an individual, and as a member or leader in dive se teams, and in multi disciplinary settings.

GA10Communication:

Engineering Graduates will be able to Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective report sand design documentation, make effective presentations, and give and receive clear instructions.

GA11 Project management and finance:

Engineering Graduates will be able to demonstrate knowledge and under standing of the engineering and management principles and apply the set oone'sown work, as amember and leader in a team, to manage projects and in multi disciplinaryenvironments.

GA12Life-longlearning:

Engineering Graduates will be able to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

3. Google Classroom:Paperless Classrooms

Thousands of teachers are finding their way to Google Classroom, which is a blended teaching and learning platform developed by Google. It was introduced as a feature of G Suite for Education on May 6, 2014, followed by its public release on August 12, 2014 [3]. Regardless of the subject taught, Google Classroomis a high-end tool for teachers who wish to create a paperless classroom environment that allows the teacher to have instant access to student work, and manage every aspect of the classroom workflow digitally. In a glimpse, Google Classroom integrates Google Drive, Google Docs, Sheets and Slides, and Gmail together to help educational institutions go to a paperless system.[6] Google Calendar was later integrated to help with assignment due dates, field trips, and class speakers.[5] Students can be invited to classrooms through the institution's database, through a private code that can then be added in the student's user interface or automatically imported from a school domain.[7] Each class created with Google Classroom creates a separate folder in the respective user's Google Drive, where the student can submit work to be graded by the teacher.Google Classroom is available also as Mobile app in Android version 3.8.332.07 and IOS version 2.2017.33200[8].

Table 1. Course Outcomes for Data Structures through C++ with mapping to Bloom's Taxonomy Levels

	Course Outcomes
CO1	Students will be able to define basic static and dynamic data structures and relevant standard algorithms for them: stack, queue, dynamically linked lists, trees, graphs, heap, priority queue, hash tables, sorting algorithms, min-max algorithm***[Knowledge and Comprehension Level]***
CO	Students will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures***[Knowledge and Comprehension Level]***
CO3	Students will be able to use linear and non-linear data structures like stacks, queues , linked list etc. ***[Application Level]***
CO4	Students will be able to evaluate algorithms and data structures in terms of time and memory complexity of basic operations***[Comprehensionand Application Level]***
CO5	Student will be able to choose appropriate data structure as applied to specified problem definition.***[Analysis Level]***
CO6	Students will be able to formulate new solutions for programming problems or improve existing code using learned algorithms and data structures***[Synthesis Level]***

The correlation matrix of COs to GAs are given below (without using Google Classroom) in Table 2. In the mapping matrix in Table 2, it is evident that not all GAs arebeing addressed by the current COs.It is a fact that the more the number of GAs attained from a course, the better is the result.

The point of discussion is whether the number of graduate attributes being attained by a single course be improvedso that the attainment levels are better for the entire program.

A. Using the tool Google Classroom for course management

Basically, we can make students perform better by understanding where they fail. As faculty, we often observe that students fail to perform better, miss their deadlines and fail to write effective reports due to unavailability of all the required resources and effective communication system with the teacher. Constant failure in these areas makes the students to procrastinate.By incorporating Google Classroom, both the student and the faculty can have better control over the course in terms of managing the required resources, using the resources to complete the tasks and thus making the student perform better in the entire learning process.

To start with, the classroom needs to be set up. To do so,go to the URL www.classroom.google.com .Login with a valid gmailaccount.Click on the "+" in the top right to create your first class. Then click on "Create Class" .Click on "Create Class " . Add a class name and section . Once your class is created, students can start joining it. The classes will appear like cards. Now students can be invited to join Classroom.This is a good way to communicate with your class and give them up-to-date information. New announcements, assignments and course related materials can be uploaded anytime and anywhere with great ease. Course related files in any form files from your system or from Google Drive and otherwise,YouTube videos or other provide links can be attached. Assignments can be set a due date. In addition to this, assignments can be assigned to the complete class or as a group task or individually.Write the title of the assignment, a description of it and if necessary, attach required files for completing the assignment. In student accounts, it will put extra notifications on assignments in your class to remind students when something is due — or when it's late. In the same way, students can upload their completed assignments by clicking on the option "turn in" . Google classroom constantly notifies each time a student turns in an assignment.Click the title of the assignment to open it. Click on a student's name to show and now grades can be given. Classroom flags every assignment as "not done," "done," "late" or "done late". The classroom also has an option of changing the number of points an assignment is worth, find the "Points" section at the top of the page and change it. Once grading is don, the marks can be returned by clicking the blue "Return" button. Student will be notified of his/her marks.

It has been observed that the student's participation levels have improved in the course, students started sticking to deadlines, and the overall result was found to have improved after using Google Classroom.

A study has been taken up to determine whether there can be a better mapping of the Course Outcomes to the Graduate Attributes. The next section describes the experiment, results and analysis.

4. Survey Results: Improving the attainment of GAs

The experiment conducted included a survey. The students who participated in this course were given a questionnaire with 6 questions where each of those questions addressed one of the Graduate Attributes that were otherwise not being addressed through the regular course management. The questions and the corresponding GA mapping to that question are being presented in Table 3.The survey has been taken up by 89 students who participated in the course. Three of the courses taken up by the students have been considered, of which two of them are being taught in a regular manner without using Google Classrooms whereas one of the courses Data Structures through C++ is being taught using Google Classroom for the second year Engineering students. The students were sent an online form which they have filled up. The link was uploaded in Google Classrooms. The students logged in and have given their feedback.

Table 2. Mapping of Survey Questions to Gas

		GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA 10	GA 11	GA 12
Q1					X							
Q2					X							
Q3									X			
Q4										X		
Q5										X		
Q6												X

A total of 89 responses were collected in the response sheet.Thesurvey questionnaire contains the following questions:

Table 3. Survey Questionnaire

STUDENT SURVEY QUESTIONAIRE
Q1 : Are you able to access all the course resources like presentations, Lecture Notes, videos etc. at any place and time?
Q2 :Are you able to complete the given assignments/tasks on time?
Q3: Are you receiving clear instructions and important announcements about the course at any time and place?(Even though you or the subject faculty are not available in the campus)
Q4 :Whenever a group assignment is given, in which of the courses you were able to distribute and discuss the task among the group members and thus collectively completing the task?
Q5: In which of the subjects, you were able to comprehend and compose reports effectively?
Q6: In which of the subjects, you feel that you have upgraded your ability to participate in independent learning?

The results obtained from the feedback are presented in following graphs.

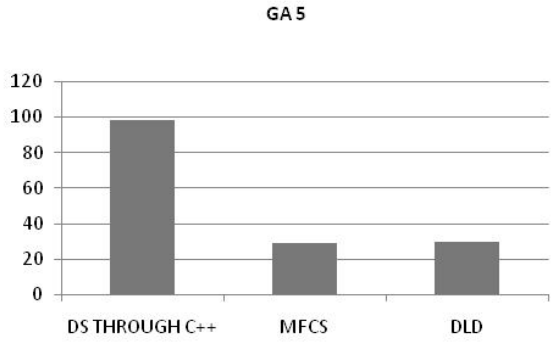

Fig 1. Mapping of Survey Question 1 to GA 5

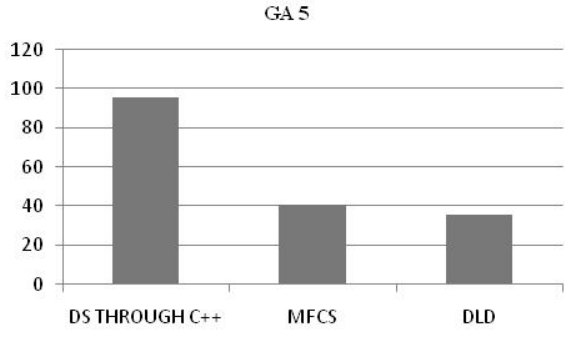

Fig2. Mapping of Survey Question 2 to GA 5

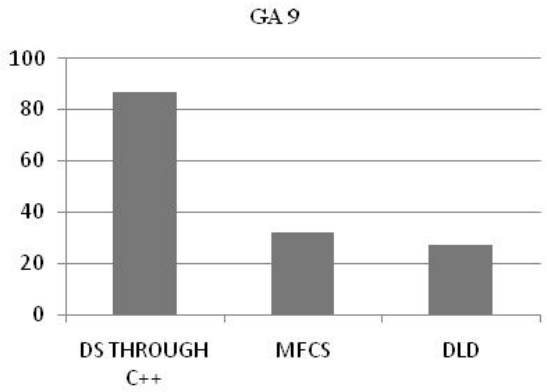

Fig.3 Mapping of Survey Question 3 to GA 9

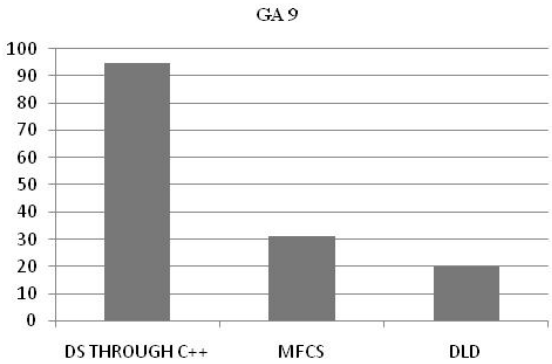

Fig.4 Mapping of Survey Question 4 to GA 10

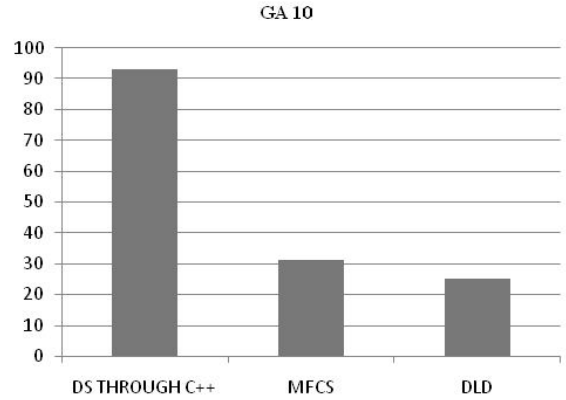

Fig.5 Mapping of Survey Question 5 to GA 10

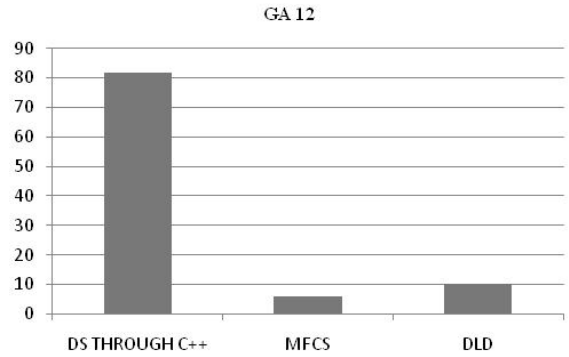

Fig.6 Mapping of Survey Question 6 to GA 12

In all the above graphs, it is evident that the course using Google Classroom has achieved higher percentages for each of the mapped GAs, as compared to the other two course which are not using it.

5. Conclusion

It is a proven fact that usage of ICT in teaching improved student attainment levels. A new technology for classroom management - Google Classroom is implemented and studied here.This paper presents case studies of a course being taught using Google Classroom for classroom management, and courses not using Google Classroom. Graduate Attributes attained are measured in these cases. The results show that the Graduate Attributes attainment levels have improved in the course that used Google Classroom when compared to other courses using traditional methods for classroom management.

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