

EDU0003

Instructional Media Using Google Apps for Education in Multi-Sections Engineering Course

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Abstract

Google Apps for Education are increasingly used in higher education. Instructors try to reach out to students and encourage them to learn by themselves via new technology. Instructional media using Google apps was developed for a statics course at Faculty of Engineering, Mahasarakham University. The statics course is taught by different instructors in multiple sections necessary to accommodate a large number of students. A course website was created and instructional media features were developed, including basic and extra class materials, slides, assignments, important information and other resources. The course website and its features were evaluated by students and instructors on a 1-5 rating scale in four categories: class materials, activities and other resources, course evaluation and website usability. Students and instructors gave similar and different points of view in the evaluation. Students and instructors agreed that “class materials” was the best category with average scores of 4.1 and 4.6. Students rated “website usability” lowest with an average score of 3.8 whereas instructors were least satisfied with “activities and other resources” with an average score of 4.0. Overall, the developed instructional media were useful and beneficial to both students and instructors. Suggestions for improvement were better design, providing solutions of assignments and past exams, providing a chat box and more links to additional resources.

Keywords: Google apps, instructional media, multi-sections course, engineering education

1. Introduction

Google started in 1998 as a search engine and expanded its ability to other products [1]. Google Apps for Education was launched in 2006 [2]; it requires no hardware or software other than a standard internet browser and is free. Mahasarakham University has been a partner with Google Apps for Education since 2013 [3]. With the internet, students easily learn and learn more outside the classrooms. Hence, instructors use Google apps to reach out to students.

Owayid and Uden, assessed the use of Google Apps services in higher education by both instructors and their students [4]. They found a significant difference in use between them. Instructors used the packages as the main communication among themselves but used it less between students. They suggested that instructors should encourage their students to use Drive for sharing files instead of traditional ways of file transfer [4].

Elena [5] discussed the advantages of Google apps for education with regard to a new learning strategy for a university community. In the study, Google apps for education were regarded as a very useful tool to support flexible and collaborative learning environments. Viriyavorakul and Phonak [6] reached a similar conclusion; they reported that the use of Google Apps for Education would enhance efficiency and effectiveness of teaching and learning processes and could support student self study.

Usability of Google Apps for Education was evaluated by Brown and Hocutt [7] who reported that it was a useful and user-friendly tool. However, a training session was needed to attain the most beneficial practice. There were many case studies that

employed Google Apps for Education and reported successful stories [8-10].

Statics is a fundamental course in the engineering program. It must be taken by all first year engineering students and is a prerequisite to many advanced engineering courses. Since hundreds of students register for this course each year, they cannot all fit in only one classroom. Then statics is considered to be a multi-sections course with different instructors.

Since different instructors were assigned to the same course, teaching styles and techniques can be very different. However, basic class materials, course evaluations and grading scales were the same for every section. In order to lessen the differences among sections, a course website and instructional media were created as a support tool. Additional class materials and other resources from every instructor were collected and uploaded to website. Students could use course website as an online instructor anytime and anywhere.

The objectives of this study were to develop an instructional media using Google Apps for Education and to evaluate its usability. The analysis used the viewpoints of both students and instructors. Suggestions and comments were also reported.

2. Methods

The statics course website and instructional media were developed using Google Apps for Education. They were available to students who registered for statics in the second semester of academic year 2016. There were 495 registered students divided into eight sections with eight different instructors. Students chose their sections based on their schedule and each

EDU0003

section could take up to 80 students. Instructors were assigned to each section based on their schedule as well.

2.1 Google Apps for Education

Google Apps for Education is a free set of communication and collaboration tools provided by Google Inc. The core services are Gmail, Calendar, Classroom, Contacts, Drive, Docs, Forms, Groups, Sheets, Sites, Slides, Talk/Hangouts and Vault. Those applications are available online or in the cloud.



Fig. 1 Google apps for education [11]

In this research, Gmail, Drive, Sites, Docs, Sheets, Slides and Forms were used to create the statics course website and instructional media. The lead author was an instructor and the website admin. Functions of the various tools are listed in Table. 1.

Table. 1 Google Apps for Education and their roles

Google apps	Details
Gmail	registered a university account to use the complete Google Apps for Education set
Drive	store all class materials and other resources for website
Sites	course website
Docs	view/edit document files
Sheets	view/edit excel files
Slides	view/edit slide files
Forms	online test and evaluation forms

2.2 Evaluations and feedbacks

Course website and instructional media feature evaluations were completed by both students and instructors. A 1 to 5 rating scale was used to assess quality and suitability in which 5 was the highest and 1 was the lowest. Four categories were evaluated: class materials, activities and other resources, course evaluation and website usability. Recommendations and comments were also recorded.

3. Results and Discussions

Course website and instructional media were created and used. Satisfaction evaluations from both students and instructors were collected and scored. Recommendations and comments were also discussed.

3.1 Course website and instructional media

The statics course website is <https://sites.google.com/a/msu.ac.th/statics/> and is

publicly available worldwide. Instructional media on website includes class materials, additional examples for classes, past examinations and video clips about the application of statics.



Fig.2 Statics course website

The appearance of website was kept simple and was designed to be easy to use. Instructional media was positioned on the left of the page while the center of the page was the place for posting up-to-date information and events. Information tabs for individual section were also provided. Admin would post information on each section tab when instructors made requests.

Class materials, additional examples for classes, past examinations, and video clips were stored in Drive. Online evaluation was created using Forms. Students and instructors could access website without requiring any usernames or passwords. Gmail or Google registration was not required either.

3.2 Evaluation results

Online evaluation was used to collect data from a link on the course website. The population consisted of 495 enrolled students and eight instructors in eight sections. Four categories were evaluated: class materials, activities and other resources, course evaluation, and website usability.

3.2.1 Students' results

Evaluation results are presented in Table. 2 - 5. Overall, the class materials category had the highest score 4.07 and website usability category had the lowest of 3.84.

Table. 2 Student evaluations: class materials category

Class materials	Average Score
Cover all course objectives	4.01
Correct and complete according to course description	4.11
Appropriate to knowledge and ability of students	4.01
Learning topics was organized according to in-class agenda	4.17
Provide complete class materials and PowerPoint presentations on website	4.06
Overall	4.07

EDU0003

Table. 2 showed that students satisfied with “Learning topics was organized according to in-class agenda” the most. Since there were eight sections, instructors had to follow the class agenda strictly to avoid differences among sections. Course description and course syllabus were also provided on the website. Every topic in this category scored over 4 or relatively high.

Table. 3 Student evaluations: activities and other resources category

Activities and other resources	Average Score
Provide example of exams and extra exercises	4.09
Suggest further resources elsewhere	3.91
Encourage self-learning	4.06
Provide video and multimedia that related to the class materials	3.72
Promote new technology into teaching techniques	4.05
Overall	3.97

In the activities and other resources category (Table. 3), students showed the highest satisfaction with “provide example of exams and extra exercises” while “provide video and multimedia that related to the class materials” had the least score. The purpose of providing video was to let students see practical applications of statics. After an extensive internet search, our searchers found that most available videos were class tutoring and solving example solutions. Most were in English which was also a barrier for Thai students. Thus, only a few videos were available at this time.

Table 4 Student evaluations: course evaluation category

Course evaluation	Average Score
Accordance and proper to class materials	3.96
Various evaluation methods	3.95
Cover all course objectives and class materials in exams	4.08
Explain course evaluation clearly	4.09
Clear and fair evaluation process	4.23
Overall	4.06

Table. 4 showed that students were most satisfied with the “Clear and fair evaluation process”. According to evaluation process, exam scores and other scores were available and accessible to students. With the help of the course website, instructors could spread information widely to students at one time. Students and instructors could see how other sections

performed. Previously, each section’s instructor would provide this information in-class.

Table. 5 Student evaluations: website usability category

Website usability	Average Score
Simple features and easy to use	4.02
Provide step-by-step instruction for website features	4.05
Enough basic function	3.88
Attractive website	3.67
Quick feedback from website admin	3.58
Overall	3.84

Website usability category satisfaction scores were relatively low compared to other categories (Table. 5). The lowest score was at “quick feedback from website admin”. There was no channel to contact admin on the website. Students were able to notify their section instructors about problems from using website then instructors would tell admin later. A feedback feature will be added to the website in the future.

3.2.2 Instructors’ results

Instructor evaluations are in Table. 6 - 9. Overall, class materials category had the highest score of 4.58 and activities and other resources category had the lowest score of 4.00.

Table. 6 Instructor evaluations: class materials category

Class materials	Average Score
Cover all course objectives	4.38
Correct and complete according to course description	4.75
Appropriate to knowledge and ability of students	4.50
Learning topics was organized according to in-class agenda	4.62
Provide complete class materials and PowerPoint presentations on website	4.62
Overall	4.58

There was one basic class material to be used in every section of the course. Instructors were asked to provide their additional class materials and their slides to be added to the course website. In this category (Table. 6), instructors were clearly satisfied with the most with “correct and complete according to course description”. Since it was their responsibility in providing class materials to students, the high score reflected that instructors were satisfied with their own performance.

EDU0003

Table. 7 Instructor evaluations: activities and other resources category

Activities and other resources	Average Score
Provide example of exams and extra exercises	4.63
Suggest further resources elsewhere	3.88
Encourage self-learning	4.13
Provide video and multimedia that related to the class materials	3.25
Promote new technology into teaching techniques	4.13
Overall	4.00

In the activities and other resources category (Table. 7), instructors were most satisfied with “provide example of exams and extra exercises”. On the other hand, the lowest score came from “provide video and multimedia that related to the class materials”. After instructors were advised of this, they have planned to add more videos.

Table. 8 Instructor evaluations: course evaluation category

Course evaluation	Average Score
Accordance and proper to class materials	4.13
Various evaluation methods	3.75
Cover all course objectives and class materials in exams	4.38
Explain course evaluation clearly	4.13
Clear and fair evaluation process	4.75
Overall	4.23

From Table 8, instructors were clearly satisfied with “clear and fair evaluation process” whereas “various evaluation methods” had a relatively low score. Since there were many students spread over many sections in the statics course, it was more difficult to manage various evaluation methods. The evaluation methods for the course were midterm and final examinations, homework, attendance and online tests. Examinations and grading scheme were the same for every section.

For website usability, Table. 9 shows that instructors were satisfied with “simple features and easy to use” and less satisfied with “attractive website”. Our technical support had limited experience in designing websites, therefore the website turned out to be very simple and straightforward. However, the conceptual design of the website was simple, easy to use and inclusive.

Table. 9 Instructor evaluations: website usability category

Website usability	Average Score
Simple features and easy to use	4.63
Provide step-by-step instruction for website features	4.50
Enough basic function	4.25
Attractive website	3.88
Quick feedback from website admin	4.00
Overall	4.25

3.3 Comparison of evaluation results

Evaluations from students and instructors are compared in Table. 10. Both students and instructors agreed that “class materials” was the best category. Course website and instructional media features contained all the class materials necessary for the whole course. They also helped students and instructors kept up with the class schedule via up-to-date information available on the website.

Table. 10 Evaluations between students and instructors

Category	Student	Instructor
Class materials	4.1 ^a	4.6 ^a
Activities and other resources	4.0	4.0 ^b
Course evaluation	4.1	4.2
Website usability	3.8 ^b	4.2

a = the highest, b = the lowest

On the other hand, students gave “website usability” the lowest score while instructors gave “activities and other resources” the lowest score. Students participating in this study could be considered as part of an “internet generation”. They were familiar with using the internet, websites and other social media. From their point of views, course website and instructional media lacked attractiveness. In contrast, instructors thought that activities and other resources in the course website were relatively inadequate.

3.4 Recommendations

Students and instructors offered similar recommendations and comments. They thought that the course website and instructional media were useful, easy to use, and comprehensive for the course. They suggested that solutions for homeworks, tests, and past examinations should be provided on the website. More class-related video and more links to additional resources were requested. Improvement of website design and appearance was also mentioned. A particular recommendation from students was that the website should have a chat box to allow direct contact with the website admin and also a web board allowing communication with students from different sections.

EDU0003**4. Conclusions**

A course website and instructional media were developed using Google Apps for Education and were used for Statics course in the Faculty of Engineering, Mahasarakham University. There were 495 registered students in eight sections and eight instructors. Four categories were evaluated: class materials, activities and other resources, course evaluation and website usability.

Evaluations showed that students and instructors had some common and some differences in opinions. Students scored the class materials category at 4.1 (on a 1 to 5 scale) but the website usability category only at 3.8. Instructor evaluations agreed that the class materials category was the best with score of 4.6 but they scored activities and other resources category lowest at 4.0. However, instructor evaluation scores suggested that usability and quality of course website and instructional media were acceptable and suitable.

Overall, students and instructors agreed that course website and instructional media were useful and easy to use. Instructional media features were adequate and comprehensive for both in-class learning and self-study. The major recommendations were providing problem solutions and improving the design of website.

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