



Blended Classrooms with a New Scope: University and High School In the Same Classroom

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Abstract

In an ever-changing world, it is only inevitable that all things must succumb to the changing tides. In contrary to the rest of the world education still focuses on standardization, which hinders students more than helping them^[4]. As technology developed, new ways of learning emerged that is capable of offering an alternative to the current system as a whole. Online learning platforms like Coursera and Edx provide an alternative for all to learn from experts from well-known universities. While it may be able to rival the system on its own in some regards, it is still a newly emerging method with many known problems^{[1][3]}. These courses require immense self-discipline and genuine desire to complete since the material can be challenging and the reward may not be as visible as a diploma after 4 years. On the other hand, students may not give their full attention due to the traditional course system not catering towards their interests^[2], dissuading them from cultivating interest in the subjects discussed within the classroom. The classroom, as we used to, is the place where operated by a teacher who is there to teach which learning is assumed to be a natural result of the teaching process. However, the blended and flipped classroom focuses on students' learning in and out of the classroom. Also with the deployment of e-learning environments, classroom turns to a place where students clarify their learning with the guidance of the teachers. In our case, an online engineering mechanics course is offered to 11th and 12th-grade students. Students meet at class for the review elongation of the online content and also for the discussion of missing content. In our experience based research, we analyzed the pilot implementation of this course with respect to teacher and student view

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Introduction

With the increased accessibility of the internet, not only daily life but also educational life has changed. That is, thanks to unlimited interconnection, online platforms created alternative ways to learn rather than waiting for a transfer of information by a teacher. As a result, for the education in the 21st century, not only applications of but also the philosophy of education is started to be discussed in detail.[1] The intention in teaching is always for the benefit of students, with the change in students' daily lives classical learning environment becomes less effective in learning since they can gather the information that they need from others and the web.[2] As a result, instructors both in high school and universities are compelled to shift their teaching to provide differentiation for students with special needs, to cope with time limitations while the available content gets more and more fruitful, provide for a larger and more diverse cross-section of the population, to cater for emerging patterns on educational involvement which facilitate lifelong learning and to include technology-based practices in the curriculum. [1][3]

Within this structure, the purpose of this paper is to investigate the potentials of blended learning on an exemplary elective high school course which covers two introductory mechanical engineering course which are presented online via an online learning platform. The paper starts with a brief definition of blended learning are, then a detailed description of the case. After the variables that affect the design of the subject is cleared, an analysis is made to reveal students' and teachers' perceptions of satisfaction and success on blended education.

Blended Education

With the differentiated nature of learning, definitions made in the field of education may vary and have shades both in definition and application. One of the first use of Blended education as a terminology states the convergence between the traditional and online instruction as "the single-greatest unrecognized trend in higher education.[4] The term hybrid learning is also used for blended learning. Amongst various definitions, Discroll(2002) defined blended learning as a

- combination any form of instructional technology with face-to-face instructor led-training

- getting together different Web-based technologies
- combination of different pedagogical strategies [5]

Discroll lead the current literature, Garrison and Kanuka(2004) limit the definition as the integration of classroom teaching with online experiences[1]. This limitation makes it easier to understand the scope of blended education. In 2019 when most students and teachers are surrounded by online experiences in all circumstances, blended education-for us- means the integration of online learning platforms into face-to-face learning in order to construct content knowledge, provide differentiation and learn using multiple modalities and finally vary assessment strategies.

Example Course: Introduction to Engineering Mechanics

Need for the Course

Regular science courses are in a modification process with respect to the needs of STEM education. However, the disconnection between engineering in higher education and pure science in high school(9 to 12th grades) creates a misconception for guiding students who are willing a career in engineering. That's why there is a need in school to related physics course with their future professions. Also, school structure is an important variable to create such a learning environment. 85% of students at subject school prefer overseas universities, especially the U.S. In this case, students needs curricular or extracurricular activities/courses which show their readiness for the higher education in a specified subject. With these and so many additional needs which are not discussed in here and also thanks to the technological infrastructure of the school setting, the subject school is suitable to create a technology-based learning environment.

Course Structure

The course is planned to be a combination of two online courses namely Introduction to Engineering Mechanics and Applications of Engineering Mechanics courses, provided by Georgia Institute of Technology (G-Tech) on Coursera Online Learning Platform(Coursera). These courses are available for all however, additional classroom discussion, which makes the course blended with respect to our definition, is added to the course structure. Thanks to the face-to-face aspect of the course, university-level online content becomes understandable for high school students. This face-to-face method isn't taken to the point of a lecture however, as it would mimic the traditional education techniques. The teacher instead takes the role of a mentor more than an instructor. The material from G-Tech is then went over through the lessons and discussed, turning the classroom into a forum of sorts.The completion of practice material isn't mandatory but encouraged for comprehension. The tests are usually assigned as homework to keep the core idea of students taking responsibility for their learning. The system is structured around the student taking all responsibility for their own learning, thus creating a system that is found in universities, online courses, and most importantly the real life after education.

Even the course structure is designed with a process of formative assessment, summative assessment is again made through online quizzes provided by Coursera. Weekly modules have a final quiz which covers the related weeks content with 3-6 questions. For the combination of two courses there are 10 quizzes in total. The course is presented as a science elective course for 11th and 12th-grade students. The class time is designed as 2x40 mins. Even though the online courses are 10 weeks in total, classroom discussion is the main operator for the timetable. That is if the discussion is not completed for the relevant part the content is rescheduled for the following weeks.

The idea based on the selection of course by the teacher turns to a key factor that shapes the face-to-face classroom discussion part. The students are also free to extend the discussion. Based on experience, a classical face-to-face lesson covers prerequisite knowledge that students need to comprehend the content, fundamental theories that are not included in university-level course and mathematical background like calculus-based applications and so on. These components are important for the selection process of the online content. Even the world of online education is fascinating especially in engineering education, exorbitant goals which are not possible for a high school student to achieve may result with complete failure for the group. That's why math and physics related prerequisites are carefully analyzed.



Analysis of Benefits

The study is not planned as a quantitative study but to guide the analysis procedure, a modified version of Hiltz's Students' Perceptions of Satisfaction and Success survey [7] is used for review.

The Course Pace, Objectives and Content

With the clarification in class course objectives are found to be clear, moreover overall course structure is found to be beneficial and appropriate for student's actual and chosen profession.

Taking a Blended Course

When the overall course is taken into account, the student researcher has clearly stated that the impact of taking a blended course is better than a classical course. Additionally, taking another course is planned and this course is suggested to others.

Accessibility of Resources

Course package on Coursera includes video lectures, online forum, textbook, solutions for the quizzes and homework sets. Even these resources seem like more than enough, active classes on Coursera may have different schedule school class. As a result of this disconnection, resources are assessed as satisfactory by the student researcher. On the contrary, availability of the course package, weekly feedback mechanism and existing discussions in forums is graded as highly effective by the teacher-researcher.

Interaction among Classmates and the instructor

As also discussed in course structure student-student interaction and student-teacher interaction is observed as higher than a traditional class. In the student perspective, it is stated that differentiated help is available during course time and also student dominance is higher than teacher's impact. However, since the teacher is not the owner of the course in the online platform, online feedback and interaction are not possible among the original lecturer and students. Which puts the class instructor in the role of explaining material at a more used to form by the students.

Online part satisfaction vs Overall satisfaction

When the online part of the class is taken into account as a standalone course, student feedback shows that it may be frustrating and not an epochal development. However, when the face-to-face and online parts of the class are taken into account together student satisfaction is apparently higher than the only-online part.

When the above difference is taken into account blended education is a better choice than stand-alone online learning. Also when traditional learning is compared with blended learning, student outcome shows that blended learning is a better choice for student achievement.

Conclusion

Blended learning method is a new innovation in the field of education that adopts cultural changes caused by technological advancements. The adoption of different methods of education in the blended model allows for greater flexibility and promotes a more effective mode of learning as the students can choose what course to attend and interact with their fellow classmates without the fear of being given low marks, focusing more on their learning. The combined method is perceived to be more effective than the two separate versions of the course, both by the student and the teacher. The method becomes most effective when the students attend the course voluntarily and choose topics that they have interest in. Responsibility, collaboration between classmates and the instructor is key in the success of the whole class.

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