How Delivery Modalities Affect the Students' Academic Achievement and Their Life Plans

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Abstract – This paper evaluates the effectiveness of an undergraduate course, Manufacturing Processes, which has been taught to mainly freshman and sophomore students in an Engineering Technology program. The class was taught with three formats: in-class, hybrid, and online. Surveys were conducted and results were analyzed. The criteria for evaluating the effectiveness of each class have been: academic achievement, study habits and time management, lifelong learning, developing interest towards the manufacturing concentration, positive influence on degree attainment and finally students' future careers. Compared to the traditional teaching method, most of the students in online and hybrid classes study in a way that facilitates lifelong learning. However, the interaction between the instructor and students in traditional sections influences the students so that they become more interested in their major and develop a positive attitude towards the related subject matter which increases retention and graduation rates.

Keywords: Online, Hybrid, Traditional, Freshman.

INTRODUCTION

There has been progressive growth in online education in American colleges and universities. Distance learning is now very common which not only accommodates nontraditional adults who work full time and have family responsibilities, but also other students who are used to new technologies and prefer to study in private and not to commute [1]. The relationship between the learning environments and learning outcomes has constantly been explored by researchers of education. Ramsden and Entwistle [2] examined this relationship. Many educators are strongly against online education while others are in favor of this type of instruction. The first group demands an education with a personal touch and highlights the dynamic nature of faculty-student interaction. This group of researchers claims that online classes are not suitable for those students who arrive at college (or junior college) unprepared to learn and unable to manage time and master basics like math and English. They are concerned that students in an online environment may feel isolated [3] or confused and frustrated [4] and that students' interest in the subject and learning effectiveness may be reduced [5]. A five-year study, issued in 2011, tracked 51,000 students enrolled in Washington state community and technical colleges [6]. The results of the study showed that students who took at least one on line course in the first fall term were more likely to withdraw entirely from their college career in the subsequent term than were those who took only face-to-face courses (32% versus 28% in Fall 2004 and 19% versus 16% in 2005). Based on these statistics they concluded that those who took more online courses were less likely to earn degrees or transfer to four-year colleges.

However, the second group of educators focuses on the learner-centered model and is in favor of online education. They argue that online interaction can be used to enhance learning, especially for students who tend to be reserved in the classroom setting. In her paper on online learning, Ni [7] evaluated the performance of her students based on the grades that they made and concluded that the performance of the students to be independent of the mode of instruction. However, she did not account for the fact that the examinations for online classes were not proctored. On the other hand, she has pointed out that persistence in an online environment may be more challenging but participation may be less intimidating. McLaren [8] has also worked on persistence and performance of online students and has concluded that the quality and quantity of student-student and student-instructor interaction may be increased in online classes.

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In the hybrid model, instructional technology using an environment such as Desire2Learn (D2L)® is blended with face-to-face student and instructor interaction [9]. Some people [1, 8 & 9] have stated that the hybrid or blended modality is the best type of online education because it also employs the interactivity that typically characterizes face-to-face instruction. They also focus on student-student interaction which has a motivational effect and has demonstrated effectiveness especially for adult learners [9].

This research explores the key issues of online and hybrid learning modalities and compares the major dimensions of their learning effectiveness with those of the traditional or in-class modality. This study focuses on the multi-section experience of one instructor in a manufacturing processes course in a Mechanical Engineering Technology program. This research evaluates the effect of the delivery modalities on students' academic achievement and their life plans. In the following pages, the author describes the research addressing the impact of various learning environments. Then the research setting and methodology are explained in detail. Finally, results and discussion are presented, and conclusions are made. Furthermore, critical issues are addressed and lessons that were learned are presented. Finally some suggestions are made for increasing the effectiveness of all classes regardless of the format.

PURPOSE OF RESEARCH AND METHODS

The Mechanical Engineering Technology program is an ABET accredited program established in 1970. In the four-year Bachelor's degree program, necessary theoretical concepts are emphasized as well as practical laboratory experience in various areas. The program gives the students a chance to graduate with a specialization or concentration in Manufacturing, Energy and Heat Power, Engineering Graphics, or Machine Design. Hence, in addition to common core and normal engineering courses, some specific courses are offered which are related to the concentrations that the students choose. One of the required courses for all MET students and students from other majors who are seeking the minor in Manufacturing Engineering Technology is Manufacturing Processes. This course has no prerequisite and is usually taken by freshman and sophomore students. It focuses on an introduction to engineering materials and also the main manufacturing processes for metals and polymers.

Outcomes of the course are: (1) Understand basic product design and manufacturability, (2) Describe basic physical and mechanical properties, behaviors, and failure modes and their relevance to manufacturing processes, (3) Describe atomic structure and the elements, bonding between atoms and molecules, crystalline and noncrystalline structures, (4) Describe heat treating methods for metals and their purposes, (5) Describe selected metal forming operations and calculate the associated force and energy requirements, (6) Describe molding and casting processes for metals, (7) Describe the selected shaping processes for polymers, (8) Describe manufacturing processes for powder metal alloys, and (9) Understand different machining operations and describe various machineries.

Starting in Spring 2007, the course has been offered every semester with the traditional format. In Fall 2008, the online format started to form, and since then there has always been an online section as well. Recently, in Fall 2013, the hybrid version was offered and the comparison between three modalities became possible. The in-class students have been provided with exactly the same materials as online and hybrid students which are placed on author's website as well as inside the D2L environment. Therefore, if an in-class student has to miss a class, they have all of the lecture materials and video clips available to them online. In online or hybrid modalities, discussions are added and in in-class format students have the chance to present their seminars. Grading policies for the three modalities are as follow:

- In-class: Attendance (5%), Online Quizzes (20%), Tests (40%), Seminar (20%), Final exam (15%)
- Online: Discussions/Research Projects (10%), Quizzes (30%), Tests (40%), Final exam (20%)
- Hybrid: Attendance (5%), Discussions (5%), Quizzes (20%), Tests (40%), Presentation (10%), Final exam (20%)

The course has evolved through years and has become more effective. Various components are as follow:

Assignments /Quizzes: Initially reading assignments were set for students and questions were asked in class. To make the activity fun, the students' names were placed in a jar and were drawn. Starting Fall 2012, homework quizzes which were initially designed for online students were placed in D2L to engage the in-class students even more. Each quiz has about 50 questions of true/false or multiple-choice.

Tests/ Final exam: There have been 5 tests on 14 chapters of the book and one final exam. Each test has between 30 and 50 multiple-choice and true/false questions. The final exam for in-class section is proctored and has 150 questions of the same types. Currently, all the tests and final exams are online for online and hybrid sections.

Seminar 1: A couple of power-point slides on casting processes, which are prepared by the author, are made available to students. First they are instructed on working in a group and then they are paired up to present the course materials for their classmates. This was to develop the students' interpersonal skills and teach them how to present themselves and talk in front of other people.

Seminar 2 (project): At the end of the semester, students should have a presentation on "how it's made". Students choose something that they use/see in normal life and prepare a power point presentation. The instructor clearly defines what the criteria are for a professional presentation. Students present their seminar, by making a Power-Point slide show, and support their presentations by including images, animations, and video clips. They also learn about plagiarism by explaining the process(s) in their own words and by including the references that they use. For online and hybrid sections, students upload their Power-Point files inside D2L.

Online threaded discussions: Students in online and hybrid classes are encouraged to participate in class discussions. In a typical online class, there are up to four discussion trends. In one of them, the students introduce themselves and write about their major, hobbies and future life plans and goals. In the second one, they ask any questions that they might have. In the third one, the Society of Manufacturing Engineers (SME) chapter tours and activities are announced and they share their thoughts and ideas on tours and what they have experienced and also about their interest in manufacturing. The author is the advisor to this chapter and manufacturing activities are arranged for students. The last one is set for their projects.

No matter what the format of a course is, ongoing development is necessary. Some changes were made to each section until it became optimized and produced the highest effectiveness and the author felt that the majority of students were grasping the materials. This evaluation was based on higher grades, more participation in class, more engagement in discussions, and also higher SIRs scores. Since Fall 2012, the author decided to use more technology to augment the face-to-face class. Twelve homework quizzes were added to the in-class section which increased the class engagement. Seminar one was omitted because of time limitation and more class discussions were used in the online section. Table 1 summarizes these changes. The hybrid class was taught in Fall 2013, and it had all the components of the online class plus a PowerPoint presentation or seminar.

Section	2007- 2008	2008- 2009	2009- 2010	2010- 2011	2011- 2012	2012- 2013
In-class	4 tests, one final exam and 2 seminars	In-class HW assignments added	Seminars reduced to 1	Manufacturing games added		12 HW assignments were added in VISTA
Online	4 tests, one final exam and some discussions	-	Projects added	More discussions were added	Proctored final exam changed to online	-

Table 1- New teaching elements were added to each modality or section with the aim of optimizing the course so students would perform better and achieve the outcomes.

Graduation rates are a major area of focus at author's institution. They have historically been low, but these rates have improved over the past years. Based on university's fact books, for first-time full-time (FTFT) freshmen, the six-year graduation rate for the 2005, 2006 and 2007 cohorts were 31.2%, 32.3% and 38.8%, respectively. Six-year graduation rates were higher for transfer students (e.g. 52.2 % for 2007). The 4-year graduation rate is currently 7% and 6-year graduation rate is 34%.

Retention rates, which are in fact an indicator of student satisfaction, are stronger and have been improving as shown in figure 1. For some state universities, as many as one in three first-year students does not make it back for sophomore year. Family problems, loneliness, academic struggles, and financial burden are some of the causes of low retention of freshman students [10]. At the author's institution, the average freshman retention rate for the past 3 years has been 75%. In 2012, the one-year retention rates were 74.63% for FTFT, and 77.92% for FT transfer. Part-time students were retained at lower rates. In 2012, the one-year retention average rate was 55% (53.16% FTPT, 60.29% PT transfer).

At author's institution, considering a 6-year graduation rate, only about 31% of first-time freshman entering the school of Engineering Technology and Management (ETM) in Fall 2006 had graduated with an ETM degree by Spring 2012. In general, these rates are even lower for females and for black or Hispanic students [10 & 11]. Figure 1 shows the retention rate data for Bachelor's degree FTFT freshman students. The retention rates shown in the graph are the average proportion of freshmen entering starting in Fall 2007 through Fall 2013 who returned to university the following Fall. The increasing trend shows that the retention is improving for the whole university.

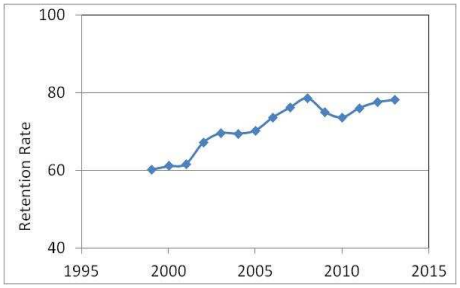

Figure 1 - One year university retention rates for first-time full-time freshmen from Fall 1997 to Fall 2013.

The aim of this study is to find the best instructional strategies to teach the manufacturing processes class with various delivery modalities of face-to-face, online and hybrid. It identifies essential design principles to consider in order to: (a) have high level of students' satisfaction and performance, (b) motivate students and engage them in class discussions to develop better academic achievement, (c) form good study habits and time management which might lead to better lifelong learning, (d) develop interest in the manufacturing concentration or track, (e) have positive influence on degree attainment and (f) impact the students' future careers.

RESULTS

Many surveys were conducted and the results were assessed for all the sections. Every semester, online students are asked to evaluate the outcomes of the class, instructor's performance and compare the course effectiveness with other courses. In Fall 2013, the students in hybrid class were given the same survey. The author also conducted many in-class surveys (Fall 2007, Spring 2009 and Fall 2012) which were even more detailed. In this work, the results of these surveys are presented one after another. Special instructional strategies were used to teach various sections of this course at the same time. Despite the similarity of course assessments in all sections, some components such as tests and presentations have not been comparable. Although all homework assignments are online for all classes, the tests are proctored for in-class sections. Also, only students in in-class sections have the chance to present their seminars in class and get trained on how to speak fluently and professionally in front of a large group of people. However, there are many other elements such as course outcomes, students' engagement and their interest in the subject matter, performance of students in subsequent classes, and in general the positive environment in which students can learn and grow can be compared and assessed.

It was noticed from the surveys and talking to students that the interaction between the instructor and students in traditional sections influences the students in a way that they become more interested in their major and develop a positive attitude toward the related subject matter (here manufacturing) which increases the retention and graduation rates. Table 2 shows the questions and the students' answers in Fall 2012 in-class sections. 47 students, mainly freshman and sophomore students, from two classes took the survey.

Question:	Answer (%) or Quotes from students:
How much did you know about the materials and processes before taking this class?	Nothing at all or Not much (45%), I knew a bit (9%), I knew something about some materials (11%), I knew something about some processes (4%), I knew about a couple of materials and processes discussed (26%), I knew about most of materials and processes discussed (5%).
What do you say about your knowledge of course materials after taking the class?	I learned just a little bit (0%), I learned some new stuff on materials and processes (4%), I learned a lot of new stuff on materials and processes (96%).
How much of the knowledge you gained in this class you think will be used in your future career?	Nothing (0%), A little of the materials learned will be used in future (0%), Some of the materials learned will be used in future (28%), A lot of materials learned will be used in future (72%).
Were you encouraged to do well in this class and do most of the assessments and study hard to succeed in them?	Yes (85%), I had on and off moments (15%), No (0%).
Has this course increased your feelings of competence and confidence?	Yes (54%), Somehow yes (34%), Somehow not (4%), Not at all (2%) Not sure (6%).

After taking this course, you decided to take your study more seriously.	True (62%), False (2%), Somehow true (32%), Somehow false (0%), Other (4%).
The instructor stimulated interest in the course./ Overall, this course has stimulated your interest in manufacturing.	Strongly agree (58%), Agree (34%), Undecided (8%), Disagree (1%), Strongly disagree (0%).
What was the most valuable part of the course(*):	Learning new stuff (85%), Organization of the course (30%), Encouraging environment in which I could grow (32%), Seminars through which I could learn how to express myself and learn more (43%), Class discussions (30%), The way the lectures were presented (53%), Manufacturing processes games (30%), Tests and homework assignments (34%), Tours and the professional seminar (53%), Other (2%).
What was the least favorite part of the course(*):	Homework assignments (23%), Tests (26%), Seminar 1 (23%), Seminar 2 (23%), Solving engineering problems (21%), NA (28%).
Were you trying to participate in class discussions and answer the questions asked by the instructor in class?	Yes, all the time (38%), Sometimes (60%), Not at all (2%).
Did the instructor link course content to actual situations in the field and brought examples based on her own experience?	Yes (94%), Somehow yes (6%), somehow no (0%), No (0%).
What was different about this course in terms of the methods of teaching used and the assessments components, etc? Mention some teaching methods which were valuable to you. If you enjoyed this course, explain why.	"Learning about the students themselves and how they are.", "Encouraging discussion.", "Question and answers were a big help as it kept the class involved and may have answered questions we did not know about. Also the games were a good teaching method.", "The simplification of lessons. Online and in-class assignments optimized student performance.", "Some of the teaching methods that I found valuable was your enthusiasm for the course content. Also, the part game at the end of the semester further challenge me to find anything in my house and try to name the process of how it was made. Finally, the seminars definitely increased my knowledge in a certain category that I was specifically interested in."
What skills did you learn from this course?	"The study time required for classes and the amount of effort you have to put into the class.", "I improved by skills in public speaking and teaching. I learned how to speak comfortably amongst professionals in their working environments.", "I learned how to walk around campus looking for bits of information and finding events of interest related to my studies.", "I learned more about time management and to always check for due dates."
If the instructor demonstrated high expectations for student performance, how did you notice this?	"The instructor told us that she believes we could do better than what we were doing and pushed us to get better grades.", "By showing the highest grades, average and lowest grades on the board after every test and constantly encouraging us to do better than we did before.", "Verbally; constantly telling us to try and wanting us to succeed as engineers.", "The instructor was very encouraging and would make comments on tests for me to better when I needed to."
If your major is not MET, did you consider changing your major to MET and why? (Consider the effect of this course only)	"I am doing a degree in EET and would like a minor in MET if at all possible as both degrees are better than just one degree.", "Yes, I am switching from ME to MET.", "I am switching to MET and I am actually looking into a manufacturing concentration since I have taken this course.", "This course has not caused me to reconsider my choice in major in fact it has helped me to feel more confident in my choice to be MET."

Table 2- The result of a survey that two traditional classes took in Fall 2012. (*) People may select more than one checkbox, so percentages may add up to more than 100%.

Figure 2 shows the summary of students' evaluation of in-class manufacturing processes class in six years. The scores have mostly improved or have stayed almost steady. This is a freshman level course and the focus has been on student effort and involvement, which has been increased semester after semester (Please see Figure 2). By adding the online homework assignments to this section and also encouraging the students to take part in class discussion, and manufacturing games, the students' grades improved as well (Figure 3). Grade distribution has been found using the following equation:

$$GD = \left(4n_A + 3n_B + 2n_C + n_D\right) / \left(n_A + n_B + n_C + n_D + n_F\right), \quad (1)$$

with n_A being the number of A grades in class, n_B number of B grades, n_C number of C grades, n_D number of D grades and n_F number of F grades. Additionally, it was noted that the number of withdrawals decreased from a maximum 5 in one of the early semesters to maximum 2 every now and then in the past five years.

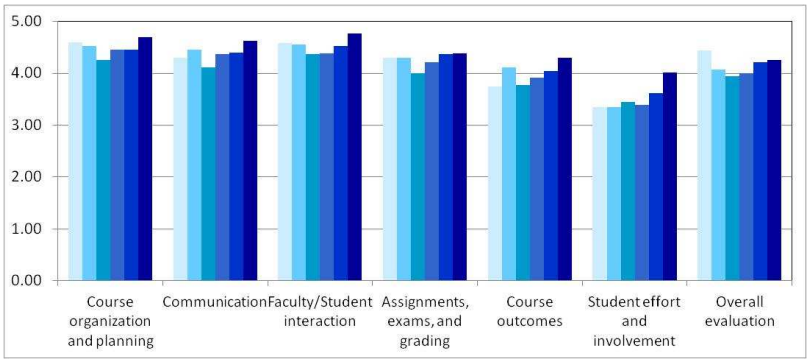

Figure 2- Students course evaluation (SIR results) for in-class manufacturing processes for the past 6 years of teaching sequentially by year from left to right. Each bar represents the average for one year.

The results of extensive evaluation of various sections show that there are no differences between pass rates and attrition rates in online sections versus face-to-face sections of the same course (Figure 3), or, perhaps more importantly, in student success rates in subsequent courses which have the manufacturing processes course as a prerequisite. This also shows how technologies can bridge the instructional gap that faculty and students face.

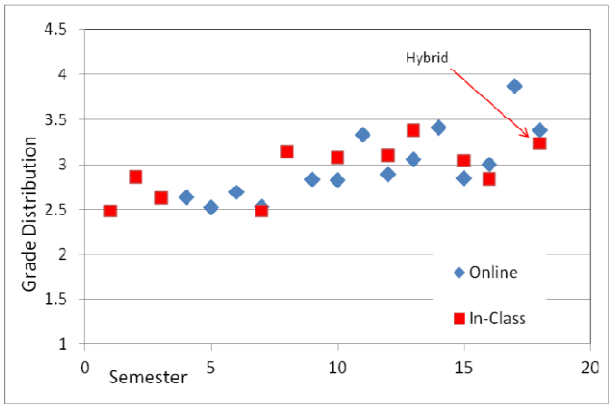

Figure 3- Grade distribution for online, in-class and hybrid sections of manufacturing processes class in terms of the semsetrs offering the sections. The hybrid class was offered only in Fall 2013. Optimizing the course assessments and increasing the student engagement have had direct effect on increasing the class grades.

At the end of each semester, online students take a survey and evaluate their instructor and the course structure. They attest to whether the course follows the outlines set in the syllabus and whether they became interested in the subject matter. The results of the surveys from Fall 2008, and also the survey in Fall 2013 hybrid class, illustrates that most of the students in these sections train themselves to study at their own pace, manage their time and interact between classmates and the instructor even more, which is expected to facilitate lifelong learning. In general, there are no significant differences in learning outcomes in all sections.

The results of the survey show improved achievement for students in hybrid class relative to those taking the online class while both groups perform relatively well and learn the course materials. This is mainly because of the engineering problems which are solved in class. Some of the students mentioned in their surveys that these classes

are a great alternative to online classes, but not a substitute for an actual face-to-face class. Most of them also think that meeting face-to-face for 75 min per week is not enough. Besides, students mentioned that not being able to present their seminars to the class is a disadvantage. The one area of online delivery modality in relation to academic credibility that needs much attention is testing via proctored examinations.

Success in online learning depends on the amount of interaction between instructors and students and also between students. The manufacturing processes students are encouraged to participate in a lot of class discussions and immediate feedback is given for every single student's post. Writing consistently with frequent feedback and being able to see the students' own thoughts written out helps students to steadily improve and become more interested in the subject matter. The discussion board has allowed them to interact with their classmates, even more compared to the in-class section, and to talk about future plans and goals. Students respond to their classmates' posts which allow peer-to-peer teaching to take place as well.

However, as noted by other educators as well, it is noticed that some of the least prepared students do enroll in online classes as well and they usually have a lot of problems remembering the homework or test deadlines and submitting their discussions/projects on time. After several missed assessments, some of these students gradually disappear before or shortly after midterms. The challenge is to keep them engaged and persuade them to consider their education more seriously. Self motivation and teaching them how to manage their time are two important issues which need to be addressed by instructors teaching online or hybrid course.

DISCUSSION AND SUGGESTIONS

This work shows that we can constantly determine- through surveys, observations, interviews and analyses of student performance and course design- what leads to a better and more effective learning outcome, regardless of class format. In addition to interactive and attractive course materials, frequent homework quizzes, tests and discussion, one may consider the following methods to increase the students' satisfaction and performance, leading to better academic achievement. It is noticed that these methods have produced a better learning experience and have also increased the students' interest in the manufacturing concentration or track. In addition, these might indirectly have positive influence on degree attainment.

Get to know your students and make the learning fun:

Fun activities increase the students' engagement and involvement. Nowadays students would like to learn through entertaining education. Competition adds to the excitement and pushes students to do even more. In this course, some class games and activities have been considered to make the class a friendly environment in which students can talk to their classmates and work on assignments and learn more. When students notice that an instructor knows their names, they feel valued. A student who feels valued will feel more comfortable to actively participate in class discussions. Learning the names of students may be very difficult in a class of 35 or above, but mentioning the names of even few students in class, gives this impression to all students that their instructor wants to get close to them and cares for their progress. On the first day of class, the students in manufacturing processes class are asked to mention their names, and talk about their hobbies and future interests. This ice breaking session has a huge influence on students. Besides, a manufacturing game is played at the end of the semester, when students are familiar with most of materials and processes. A box full of everyday items is brought to class and students are asked to guess the processes involved in making the part. Students enjoy the game and learn a lot.

Integrate learning into life:

Most students in in-class sections gained a great amount of knowledge for the topics on which they presented their seminars. Online students mainly chose the subjects for their project discussions based on their own interests and they specifically mentioned what they planned to do in future. Overall, many students expressed pride in their newfound expertise. They expressed that they would continue to look for new processes and learn more and more about materials and processes and everyday items that they use.

Use technology and be up-to-date:

Students can learn just as effectively online as in a traditional classroom provided that suitable tools are used. Interactive lecture materials such as colorful PowerPoint slides full of images and video clips, and even music will attract the students towards the subject matter and produce a passionate environment in which students can learn and grow. Even the in-class section needs some online components because students need to review the materials at their own pace. Nowadays, the Internet is full of educational materials which are more attractive for 21st-century students

who are constantly watching video clips, vines, humorous memes, etc, on popular Internet websites. Educators should not overlook this fact.

Encourage the students:

Classroom activities can be used to stimulate student interaction with course material. Students come to college lacking confidence as well as competence. These students need engagement with their classmates and teachers to feel comfortable and to succeed. Many instructors do not get to know their students even in a traditional class let alone the online ones. Therefore, students get nothing from the online environment except estrangement from the instructor. The teacher's encouragement and support however has a huge role on education and learning process of students. They need to have role models to get motivated to study harder and succeed.

Consider hands-on projects:

Students benefit from an interactive or dynamic classroom in which they can learn more and flourish. There is a proverb which says "Tell me, I'll forget. Show me, I'll remember. Involve me, I'll understand." Students do learn more through hands-on projects. In the manufacturing processes class, some students use their knowledge on materials and processes to make fun things. For example one student made a dirt-surfer using his knowledge on various sheet-metal working processes that he gained in class (Figure 4). Another student recreated the armored suit worn by Master Chief, the lead character in Microsoft Xbox's Halo® franchise. He made the armored suit out of fiberglass resin and assorted fillers (like Bondo®) through the slush casting taught in class (Figure 4). The multiple tests the students performed reinforced the skills taught in class, including those that measured the toughness, hardness and other mechanical properties of the material.

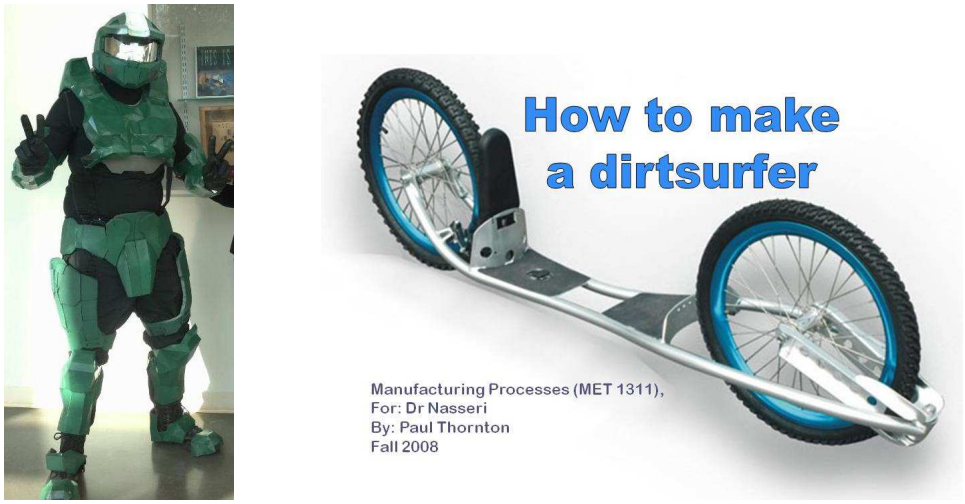

Figure 4: Left- The Halo armor project for the Manufacturing Processes class which is now used for university open- houses. Right- The dirt-surfer project which was built and presented in class.

CONCLUSION

The author of this article has taught a freshman/sophomore level course (manufacturing processes) from Spring 2007 with three different delivery modalities of traditional, online and hybrid. There are about 20 assessment components for this course and even the face-to-face class has some online assessments. Overall the author has the following points to make:

The classes taught in the first couple of years of campus life are important in regard to retention and progression. A warm, friendly and engaging environment encourages the students to stay in college, study and thrive. Lack of face-to-face accountability in online courses may contribute to lower graduation and retention rates. On the other hand, upper-level classes are not as dependent on student maturity and a sense of community to help ensure retention and progression, however, the instructor interaction may result in better future life choices for students.

The author believes that courses which are delivered completely online and lack the components of engagement and encouragement may be appropriate for highly skilled, highly motivated people, but they are not suitable for struggling students who make up a significant portion of college enrollment who need more guidance and close contact with instructors to succeed. Besides, teaching online courses is not appropriate for all faculty members as

well. An online course should be highly engaging and instructors should spend even more time interacting with students and answering their questions and pushing them to be active in class discussions, otherwise it will not be effective. It is believed that higher grades for online classes should not be considered as an element for comparison because online classes are not proctored on campus.

On the other hand, using completely traditional teaching methods, *e.g.* when the instructor lectures and the students listen and take notes, are not efficient for the 21st- century-students who are deeply attached to the current social media. Instead of ignoring the type of social presence that they are drawn to, the instructors should use more technology and make their classes more fun and attractive. If designed professionally, the class can influence the students in a way that they will become more interested in the subject matter. For this research, more than 85% of students became interested in manufacturing after taking the class. The tactics in online or hybrid classes may lead to form good habits of self-studying and time management and develop interest towards the manufacturing concentration or track as well.

Considering some restrictions for accepting struggling students into online classes may be appropriate. In other words, before allowing them to take online courses, they need to demonstrate adequate success in traditional classes.

Furthermore, students taking hybrid classes, those that blended online instruction with a face-to-face component, may perform better as long as enough time is allocated for interaction between the instructors and their students and some examinations are proctored on campus. One may not ignore the fact that online and hybrid courses are time-consuming for instructors, especially for those who are teaching the same course with other delivery modalities.

In conclusion, the author suggests that poorly designed courses, no matter what the delivery mode is, can seriously shortchange the most vulnerable students. To address the current students' attitude, even the traditional method of teaching should integrate more technology and hands-on activities to attract more students. The interactive lecture materials, students' engagement and encouragement are key factors in academic achievement, which will result in increasing retention and graduation rates and in providing a brighter future for our students.

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