

Comparing Course Delivery Methods, What do Students Prefer and What Works

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Abstract

In the past eleven years we have developed several papers for ASCUE about hybrid classes. The initial paper we shared our experience developing a hybrid course and followed with comparisons of student opinions about face-to-face, hybrid, and online classes and finally a paper reviewing components that we were using in hybrid and online classes. It has been eight years since we last addressed the topic, in that time, we have gone from using no online classes and limited use of hybrid courses to relying on their availability in order to deliver our BS program in Computer and Information Technology (CIT) to three sites in Purdue Polytechnic statewide locations. In this paper we would like to take a look at where we have come in the last eleven years. We also would like to compare the methods of instruction: face-to-face, hybrid, and online, is one method more successful than others, how do students feel about the methods of instruction? We know the students are unique and those different types of course delivery may appeal to different people. With that in mind, we will look into the students who prefer which environment and why. Finally, if you are teaching a hybrid or online class what can be done in the classroom to be successful.

Introduction

At Purdue Polytechnic Columbus we use a variety of delivery methods for our classes. In the past eleven years we have gone from offering all of our classes in a face-to-face delivery to offering face-to-face, hybrid and online. In the most recent semester, one half of our class offerings were either hybrid or online. In this paper we will discuss why we have increased the use of hybrid and online classes. We will compare the methods of instruction: face-to-face, hybrid, and online, to determine if one method is more successful than others. We will compare student preferences about the different methods of instruction. We know the students are unique and those different types of course delivery may appeal to different people. With that in mind, we will look into the students who prefer which environment and why.

Hybrid and Online Defined

First let us explain what we mean by hybrid and online classes. We will use a definition from the University of Wisconsin Milwaukee for a hybrid class that states that in hybrid classes much of the course learning is moved online which in turn makes it possible to reduce the time spent in the classroom (Swanson and Casner, 2008). Another popular term for a hybrid course is a blended course or mixed-mode course. At Purdue we have offered several variations of hybrid delivery. We have, in the past had students complete labs at home and come in for lectures and in class exercises. The most popular type we use today is to have lectures recorded and available for students to listen to before a scheduled meeting and in the class meeting have in-class exercises based on lecture along with lab activities (for lab classes). This is popularly termed a flipped classroom today. In this situation we completely eliminate the face-to-face scheduled lecture. In other cases we may meet every few weeks as a group for class activities and meet individually either live or virtually in between.

In an online class, the face-to-face component is eliminated or is virtually eliminated (some institutions have varying definitions for online classes where face-to-face time is only used with testing for example) and in a hybrid class, the face-to-face component is merely reduced and still a significant part of the learning environment. With online courses they may be offered either synchronous or asynchronous. Synchronous learning is when classes have a set schedule and time frame, students and instructors are online at the same time in order to participate in the class. Asynchronous classes let students complete their work on their own time. Students are given a time frame, usually a one-week window during which they need to connect to the class and listen to lectures, take exams and quizzes and complete assignments. For our online classes at Purdue we have used the asynchronous method and in some cases added synchronous office hours using WebEx (a conferencing tool used by Purdue University).

Hybrid and Online Benefits

There are many potential benefits of online and hybrid courses including, but not limited to, reach new markets, less time for students to commute, students can complete degrees sooner, ability to accommodate additional students without need for increasing number of classrooms, various ways to interact and to engage students and increase student learning. All of these are benefits but probably the biggest potential benefit is the ability to offer our BS degree in Computer and Information Technology (CIT) at three sites with a smaller number of faculty and less use of adjunct faculty. The number of students in CIT has fluctuated in the last 20 years at the statewide sites but generally, the trend has been for less students enrolled in our program. There are a number of potential reasons including increased competition, moving away from offering an AS degree, more emphasis in recruiting traditional students, our main campus in West Lafayette increasing its' capacity just to name a few. With the decrease in students, we have had a decrease in the number of full-time faculty at our statewide sites. As an example, in the early 2000s, we had four full time faculty in Columbus, now we have two full time faculty to offer our program in Columbus. During this same time period Anderson has gone from two to one full time faculty member. The use of hybrid and especially online has allowed us to offer the BS program without relying strictly on adjuncts.

The Research

As hybrid and online classes have begun to gain popularity over the years, more and more people have begun to do research on which method of instruction receives the best results and the highest satisfaction from both teachers and students alike. Results are particularly important for institutions who wish to know whether implementing more or less online and hybrid classes would be a benefit to them, both in the rate of satisfaction of students but also in their performance scores to ensure that they are performing as well as they should be. Unsurprisingly, the answer as to which method of delivery is a lot more complicated than a simple one model is obviously better.

Soffer and Nachmias (2017) found that online courses had higher satisfaction rates and higher performance rates than their face-to-face equivalent. This is good support that online classes are just as good, if not better than face-to-face classes. However, Jokhan, Chand and Nusair (2018) found that face-to-face students had a better performance than their online counterparts, which is in direct contradiction of the previously mentioned study. These two extremes aren't the only type of data being found either, Nemetz, Eager and Limpaphayom (2017) found no difference in face-to-face results and satisfaction compared to those in an online course. Grandzol (2004) found no difference in teaching quality in hybrid and face-to-face classes, Friday et al. found no differences between face-to-face and online students' performance scores, Priluck (2004) and Oblender (2002) both found no difference in performance between face-to-face and hybrid classes. Because of so much research either finding contradictory data or completely neutral data, it can only be assumed that there are more factors at play here than purely course delivery method. These possible factors will be discussed later.

Hybrid and Online History in Columbus

At Purdue Polytechnic in Columbus we started using hybrid courses around eleven years ago. At that time we had a popular service course CIT 107 that introduced the basics of computer technology and Microsoft Office to Purdue and IUPUC students (our partner university that offer our non-CIT courses for our students). Based on course evaluations and surveys of students and faculty these classes were a success. Over the next several years we decided to offer several of our CIT courses in a hybrid format including CNIT 489 Advanced Topics in Database Technology, CNIT 487 Database Administration, CNIT 392 Enterprise Data Management and CNIT 372 Database Programming. The format we chose was different for each class to accommodate the individual goals and needs of the class. One issue that hybrid did not solve was an increasing push by Purdue and our statewide program to offer more online classes that would allow faculty at statewide facilities to teach in specialty areas with a larger pool of students (all 3 statewide sites and in some cases students from the main campus in West Lafayette) to draw. (Swanson, 2011)

Around 2013-2014 school year the faculty were asked to look at classes that could be potentially be put online. As a group the statewide faculty informally agreed to avoid putting classes early in the curriculum online or hybrid (freshman courses and most sophomore courses) and focus on junior and senior level classes. Several reasons for this that came up at the time of the discussions. First, retention was a factor, in freshman and sophomore year we wanted the students on campus to get more involved on campus and build relationships with faculty and staff. Another reason is we felt that it would be easier for upper-level students to have the discipline to succeed in hybrid and online

classes. Finally, by offering upper level classes online, faculty could more easily specialize in their areas of expertise.

It should also be noted that our partner in Columbus, IUPUC has over the same time increased the use of online and hybrid offerings. This is in a variety of subjects and for freshman to senior level classes. Our Purdue students can take many of their non-CIT classes from IUPUC so most students are exposed to online and hybrid format not only in Purdue's curriculum but also in the IUPUC curriculum. In fact, in the course listing for the fall 2019 there are well over a hundred course offerings that are listed.

Face-to-face, Hybrid. And Online Preferences at Purdue Polytechnic

Since our first offering of hybrid classes in 2008 we have been surveying the students taking the classes about their preferences for the CIT courses that they are enrolled in. The format of the survey has changed slightly over each iteration but we have been able to gain a good comparison and glean meaningful information from the results. The original class we converted was CIT 107 as mentioned previously; this class is an introductory service course that we offered for non-CIT majors from Purdue and IUPUC. The class was mainly freshman and sophomore students and the majority of the students were Business majors. As we moved to the survey from 2011, it included the CIT 107 course that at that point we were offering in the traditional face-to-face and hybrid format. We also offered several upper level CIT courses in a hybrid format. At this time IUPUC started offering more of the hybrid and online classes as well so students were seeing the hybrid and online classes on a more regular basis. The 2018 survey included only CIT majors taking courses that were offered either online or hybrid and the students included sophomores, juniors and seniors with a majority of the students upperclassmen.

Here are some of our interesting findings over the years. One thing to note is in the data from 2008 and 2011 the students were all from the Columbus campus. In the last survey the online classes included students from Columbus, Kokomo and Anderson campuses.

2008 Survey Preferred Course Delivery format

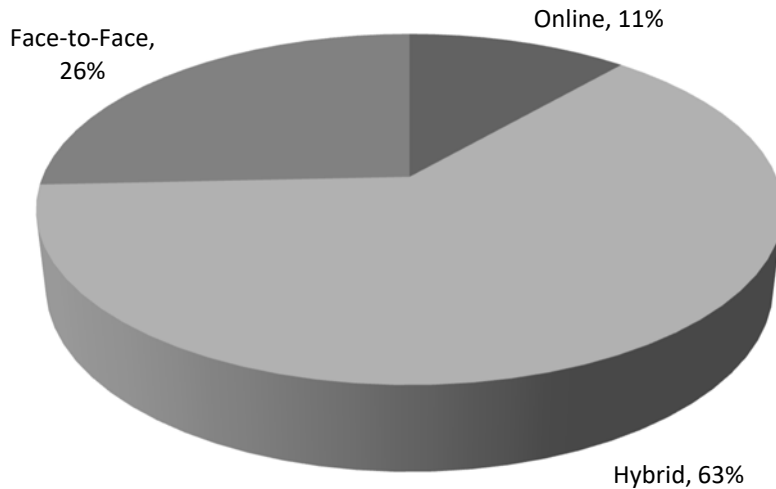


Table 1

Looking at the first survey in Table 1 which consisted of 35 students surveyed, the students had a strong preference for hybrid courses. This data includes students in CIT 107 hybrid version and CIT 107 in the traditional face-to-face version. When broken down by individual classes the students enrolled in the hybrid section favored it by an even larger margin with 86% of the students preferring a hybrid format compared to 48% in the face-to-face class. Students in the hybrid class listed Blackboard, email, online gradebook and discussion forums as the most useful tools in the hybrid class.

In the survey three years later in 2011 in Table 2 which consisted of 38 students, there is still a strong preference for hybrid, traditional face-to-face preference dropped slightly and online preference increased slightly. The 2011 survey included upper level CIT courses taught in hybrid format, and again the CIT 107 with one section taught as hybrid and another section that was delivered face-to-face format. Delving into the data in more depth the students in the face-to-face class preferred the hybrid format more than the students enrolled in the hybrid section (82% to 58%) and the CIT 107 non-majors preferred the hybrid class more than CIT majors in upper level classes (70% to 57%). The favorite tools listed by the students in the hybrid class were Blackboard, PowerPoint slides and email. Hybrid students main reason for choosing the class was because it best fits their schedule and they preferred it over online and traditional and it meant less driving with only meeting one day a week.

2011 Survey Preferred Course Delivery format

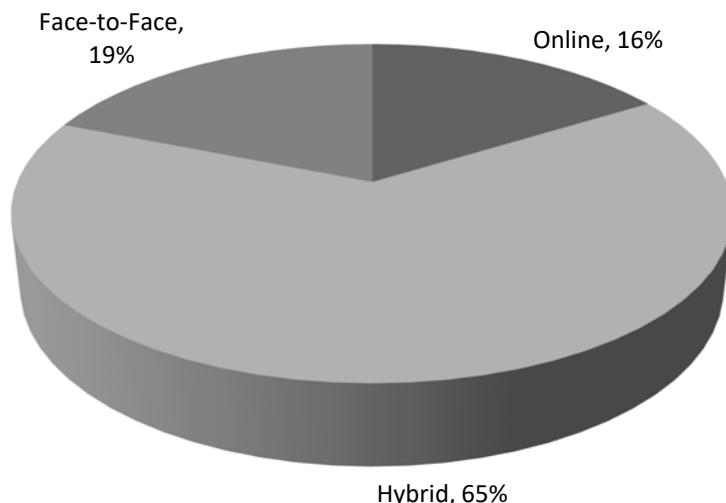


Table 2

The most recent survey in 2018 consisting of 25 students included only CIT majors in 200, 300 and 400 level online and hybrid classes. By the time of this survey we no longer offered the CIT 107 class at the Columbus campus. In the latest survey the online preference stayed about the same compared to 2011 however, the preference for hybrid format dropped with increased preference of the traditional face-to-face format. One possible reason is this is the first survey where online CIT classes with labs was included which may indicate a higher preference for face-to-face in lab classes. Students in the classes found pdf of lectures, online discussions and weekly announcements as the more useful tools in the online and hybrid classes.

Over all of these surveys we have looked at the data from different points such as junior/senior CIT majors vs. freshman/sophomore non-majors, students enrolled in the different formats: face-to-face, hybrid and online and we don't have any clear cut conclusions. Over this ten year period, the hybrid course has been the favorite although the percentage dropped in the last survey. A possible reason is that the hybrid has the components of the face-to-face and online and appeals to fans of both. Another survey we conducted on students in 2016 and 2017 where we have students rank the three formats consistently had hybrid as the second choice in over 90% of the student surveys. Again if students preferred online the hybrid had online components and if the student liked the face-to-face hybrid with many face-to-face components was a good second choice.

2018 Survey Preferred Course Delivery format

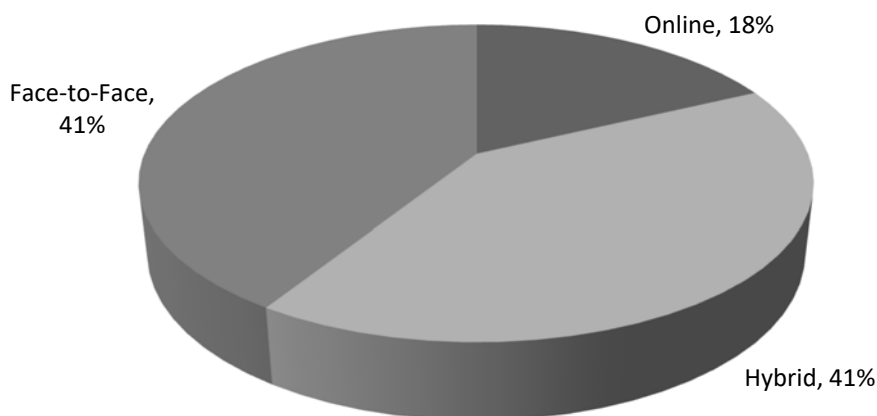


Table 3

Performance and Satisfaction

As we discussed earlier, there are many instances of equal performance scores and satisfaction rates between face-to-face, hybrid and online courses. Those studies that found difference in a student's preference or ability within a class were found supporting both ends of the spectrum as well, meaning that there isn't a lot of consistent data backing up any one model. The research has shown that there is a high level of variability when it comes to the success of the different classes. So as a future teacher or student, what are the factors that lead to a successful course, regardless of class type?

Starting with the student, it has been found that students with a higher GPA are more likely to have a higher performance score, regardless of the method of instruction (Burns, Duncan, Sweeney, North and Ellegood, 2013). Another study also found equally good performance scores among the students in both course types, where researchers speculated the GPA requirement to take the course may have had some effect on the overall success (Nemetz, Eager and Limpaphayom, 2017). Although one can't control their students GPA's, it is important to acknowledge that the past predicts future and that this may be something that could affect a course regardless of the model being used. Another important thing is the students' investment in the course. One study found that students who were more invested in the face-to-face setting did much better versus the less interested online students (Jokhan, Chand and Nusair, 2018). Although teachers can't force a student to put in more effort if they are unwilling, creating activities and assignments that encourage your students to become invested in the topic may be a good place to start.

There are certain things that teachers can do to hopefully make their face-to-face, hybrid or online course more effective. As previously mentioned, providing assignments that make the students become more invested in the information can be an important step. However, one of the biggest things a teacher can do to help improve the success and satisfaction rate, is to match the course model with the specific class. Each model has their strengths and weaknesses when it comes to instruction method, which makes certain models more effective with different types of classes (Estelami, 2012).

Classes that require more immediate feedback or in depth directions or analysis will probably be better off with a face-to-face class. Online classes are better for classes that require less direction and more personal reflection or memorization. Since the hybrid is a combination between the two, it shares both strengths and weaknesses from both course models and thus is good for a mixture of those class types.

The overall point here is that there is no right way to organize and plan a class. Knowing this information and using it accordingly can be helpful, but overall with the variety of students and topics, each model has a good chance of success or a good chance of mediocrity. As such, each professor knows their material and students better than we do, and encourage everyone to do what they see fit for their specific courses.

Discussion of Implementation

Although we previously mentioned that we are not in any position to tell professors what kind of model they should be using for their classes, we do recognize that the process of deciding a method of instruction can be difficult and confusing. Because of this we will be using examples of classes currently being taught at Purdue Polytechnic in all three formats and why they were chosen and work well in their given format.

The first class is CNIT 272, Database Fundamentals, which is taught in the face-to-face model. This course works well in this format because it revolves around many in class exercises assigned as individual and group assignments. These exercises lead to class discussion and are given immediate feedback from the professor. There is also a large team project that requires collaboration through multiple students across two separate classes (CNIT 255, Introduction to Object Programming). Students are given in class time to work together and receive instruction and feedback from the professor. Students also are required to complete labs using the SQL programming language. The fact that this class depends on team work, discussions and immediate feedback from the professor means that it is a great example of a face-to-face class.

The next course is CNIT 280, Systems Analysis and Design Methods, which is taught as a hybrid. This class works really well because it utilizes the strengths of both the online and face-to-face course. The class meetings during the week are used to facilitate discussions and group work as they are set to analyze and solve problems and receive feedback from the professor as they have their discussions. The online portion is typically used to listen to lectures, do assignments and quizzes regarding lecture and reading assignments, all at the students' own pace. The assignments and lectures in the online portion work well because that information can be easily done in an online setting and does not take away any of the class time needed to go towards more detailed topics in class. This class is a great example of the two competing components that can work well together to create a hybrid. Also, Purdue Polytechnic at the statewide locations have a large number of commuter students, which means that hybrid classes are used to cut down on the amount of time traveling a student needs to do for classes.

Finally, we will be looking at CNIT 487, Database Administration, an online class. This class works well in the purely online format because it requires a lot of memorization and online assignments on the part of the students. Their assignments also use tutorials to walk them through certain concepts

and enhance their learning process. The professor also posts videos, lectures and demos to help aid the student in their studies which is extremely helpful. While assignments have due dates, the students are allowed to work ahead at the pace that works best for them. This class works well in the online model because it does not require much discussion, immediate feedback, or working in groups and more often emphasis is placed on the memorization and online assignments and videos. It is important to note that Purdue Polytechnic has 3 statewide locations offering the CIT program in Indiana, online classes allow professors to focus more in their areas of expertise.

This is not a definitive answer as to whether or not you should choose a certain model for a certain type of class, however this could be used as a guideline for those instructors who are unsure as to which model their specific course would work best as. The factors mentioned in previous sections are also important to take into consideration, but these class assignments and goals of the course mentioned work well with the chosen format they are currently in. But as stated before, professors know their materials and students better than we do and should use their own discretion when making these decisions.

Conclusions

Looking at the research and our surveys there does not appear to be a silver bullet for the best way to deliver classes or for that matter which classes are the most popular with the students. The research done by others was not consistent in results and tends to prove what we have believed all along, it is highly variable. The best method will change from class to class, student to student. In our surveys the hybrid course has scored consistently well over the last ten years in the surveys and in head to head comparisons. Again, as stated it could be related to the fact that it has major components of the face-to-face and online classes. With the in-class portion of a hybrid class the students can get the immediate feedback and the opportunity for in depth directions or analysis that was mentioned as a strength of the face-to-face class. The online component of a hybrid can be developed to have more personal reflection, less direction, cover more memorization, all advantages of the online class according to the research. With the addition of more lab classes being converted to online and hybrid format there appears to be a trend of increased popularity with the traditional face-to-face classes in the latest survey. We speculate this could be the result students want the immediate feedback in the typical programming labs and have additional opportunities in the face-to-face format. Although this paper was not focused on particular tools used in the classroom, our surveys indicate items that provide timely feedback such as labs, discussions and non-graded assignments that have feedback were very popular with students along with items that disseminated information such as weekly announcements, instructional videos and lecture pdfs. These tools have changed over the last 10 years. We plan to continue to add and tweak the tools we incorporate into the hybrid and online classes to meet the needs of each student. Just like the tools used we plan to keep learning and keep moving forward, honing in on what is most successful and improving each course delivery method.

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