Understanding Student Preferences in Online Education

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Abstract--**Higher education is at a crossroads. Universities face a combination of increased costs, increased competition, changing enrollments, and the introduction of new disruptive technologies with the potential to threaten their core product offerings. In response to these challenges, universities across the country are moving rapidly toward offering more online courses and programs. But in doing so, they are faced with questions with no clear answers: How should university courses (online and face-to-face courses) be designed? What do prospective and current students value about university level courses today and in the future? Are there factors that if included in the design of courses will increase student selection and retention in these courses? This paper presents results from a survey of over 390 respondents that addresses student characteristics and student preferences for different educational delivery options. The purpose of this study was to gain deeper insight by identifying factors that students value in university level courses so as to inform course and curriculum design choices. In the competitive environments faced by universities today, this research can be highly valuable to universities interested in improving their courses leading to increased enrollments.**

I. INTRODUCTION

The enterprise of higher education is experiencing dramatic changes and restructuring. Universities today encounter a combination of increased costs, increased competition, declining enrollments, and the introduction of new disruptive technologies that have the potential to threaten their core product offerings-- traditional face-to-face classes.

A number of entrants into the higher educational space are creating offerings that not only have the potential to interest students but also have the ability to scale to simultaneously accommodate large numbers of students at minimal marginal cost. Many leading universities have begun to offer MOOCs, which has almost become a noun for massively open online classes, at the undergraduate level free of charge to the public. Consortia such as Class2Go, Coursera, Edx, Iversity, OERu, Udacity, and others, have sprung up which are partnerships of universities and in some cases venture capital firms, to develop and offer these courses. A number of well-regarded universities are also offering free courses including Stanford, MIT, Harvard, Yale, Carnegie Mellon, Berkeley, and others. Some MOOCs are moving toward offering credit [1]. Moreover, text book publishers including Pearson [2], McGraw Hill [3], Wiley [4] and others are offering more and more materials online. At present there are over 1,000 online degree programs being offered within the U.S. at both the graduate and undergraduate levels [5].

With the increased offerings, competition among universities is becoming fierce and the pressure to both attract more students and bring down tuition costs has never been higher [6]. Responding to this pressure, universities across the United States and abroad are scrambling to develop their online offerings. Their hope and belief is that by doing this, the universities will be able to:

- Attract significantly more students. Many of these students they believe will come from out of state or international populations.
- Substantially increase revenues (as a result of this increased enrollment).
- Significantly reduce operating costs. Online course offerings will be significantly cheaper in the medium to long term than offering face-to-face courses after initial IT investments and development of online course content.
- Keep quality the same if not potentially improve it.
- Reduce costs to students as far as possible

Clearly, the online movement is making tremendous impacts to the financial, organizational, and customer levels of the higher education enterprise [7]. At some universities these impacts are driving dramatic changes to their business models, the composition of their academic labor force and their programs and course offerings [8]. There are multiple layers to this transformation of higher education and multiple stakeholder groups, all of which merit research and exploration. A critical examination of the fundamental assumptions driving the transformation and their implications can facilitate intelligent strategic decisions and investments to move toward a better future for universities [9] [10].

These accelerating developments are creating an urgent need to decipher how universities should respond to the disruptive impact of online education. Given the diversity of today's students, the numerous fields of study, the varied skill sets they need to develop and their different educational levels (i.e. undergraduate, masters, and Ph.D.), it is unlikely that a one size fits all response such as "converting all classes to online" will be successful. Given the diversity of students and educational needs, the approach pursued here is to address the disruptive technology of online education by understanding what customers (i.e. students) value about their education and to see what course designs best deliver that value [11].

Specifically in this paper we seek to examine questions pertaining to: "What do customers (in this case prospective and current students) value about university level courses?",

"Are there preference differences between demographic groups?" and "What if any implications do these preferences and the associated demographic differences have for university course design and in particular online course design?"

Section 2 of this paper discusses the need for and value in intentional design of university courses to incorporate factors that drive student selection in the face of disruptive technologies. Section 3 gives an overview of a recent survey that was conducted to assess factors that drive student selection and the demographics associated with the sample. Section 4 presents the results including factors that drive student selection, their relative importance, and how preference for online courses changes based on specific demographic factors. Section 5 presents conclusions and implications for future work.

II. DESIGNING UNIVERSITY COURSES IN RESPONSE TO DISRUPTIVE TECHNOLOGIES

Changing needs, interests and habits imply the need to change course design. The disruption caused by the online education movement has brought into question many assumptions that universities have taken for granted for many years about the best way to educate students [12]. Without question the past decade has experienced rapid technology advances that have dramatically changed what is possible to offer students both inside and outside of the classroom [13].

Moreover, new technologies have changed the behaviors of students such that the current generation of students as well as future generations of students have a higher tolerance for and interest in digital technologies as a way to both receive information and as a way to interact socially [14] [15]. This macro trend clearly implies the need for changes to how courses are designed and delivered. It implies future requirements for universities to include a larger presence of digital technologies integrated into their course portfolio, and specific course offerings whether or not the primary delivery mode for the class is face-to-face or online [16].

Given this evolving reality, some important questions of interest to universities are: how best to achieve this integration of digital technologies into the curriculum? What is the best balance of face-to-face (F2F) courses and online courses (OL)? How should the balance among the course offerings change for diverse student audiences in different fields of study who are enrolled in varied programs and with different ages with uneven levels of computer skills? When designing a specific course, what features are most important and compelling to students? Which course features increase student interest and success? What course features affect student selection of the course offering?

III. DATA COLLECTION

To gain insight into these questions, we conducted an exploratory survey focusing on what students value about the delivery of their university level courses. To create the survey we collected information from focus groups of undergraduate business students who identified key factors they believed influenced their selection between online and face-to-face courses. Based on their responses, we created a detailed survey of prospective student preferences toward university courses. Questions included topics relating to course content, quality of materials, course delivery modes and social factors. This section discusses some of the demographic characteristics of the survey respondents.

The data were collected as a convenience sample of undergraduate business students. In addition, students also distributed the survey via Facebook and other social media sites to which that they had access. The data analyzed here are those obtained from this sampling procedure. The data set was rich and diverse in the sense that there was good representation across a number of important demographic dimensions including: field of study, age, gender, employment status, income level, household income, college budgets, and others. In terms of its limitations, there was not much diversity with respect to ethnicity of the respondents, and data were collected from one geographic region. We received a total of 395 complete responses.

To provide more specifics, gender was well balanced with 58.5% female respondents and 41.5% male. As illustrated in Fig. 1, the fields of study (i.e. major) are diverse. The top three majors selected by respondents are Business, Liberal Arts, and Health Care, at 35.1%, 14.7% and 10.7% respectively. Moreover, as shown in Fig. 2, there was a great diversity of education levels of respondents with current undergraduate students (30.1%) and college student grads (24.1%) being the largest proportions.

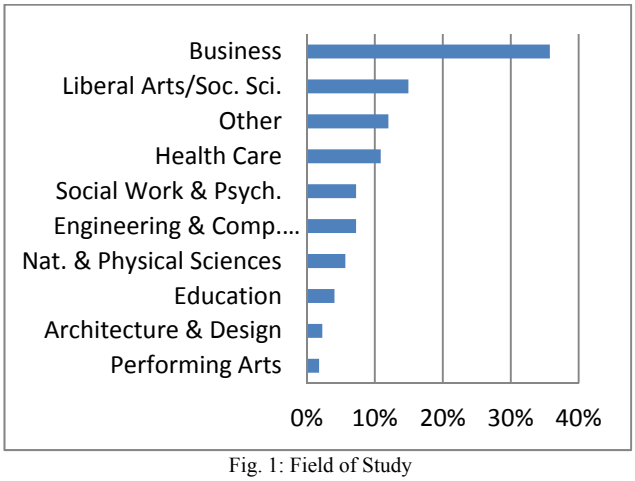

Fig. 1: Field of Study

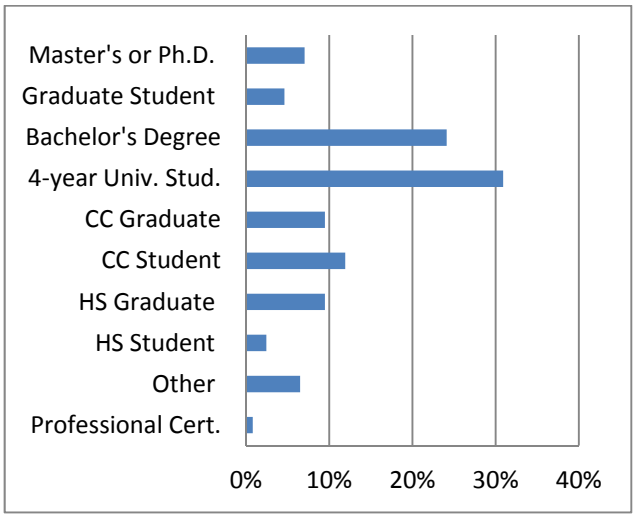

Fig. 2: Education Level

In terms of enrollment status, 43.8% of the respondents were enrolled full time in university courses, 12.4% were enrolled part-time and 43.8% were not currently enrolled but planned to be in the future. We saw this diversity to be a strength as it included respondents who may be prospective students or who might help their children choose the kind of university courses they would take. Most respondents (over 82%) did have experience with higher education (Fig. 2), and over 70% had experience with online or hybrid courses. The age of respondents (Fig. 3) are varied, with the majority (73.2%) below the age of 35.

In terms of employment status (Fig. 4), we observed that 47.2% of the respondents were employed full-time, 24.0% were employed part time, and 25.5% were not employed. Household income was well distributed with 40.2% being low income (making between $0 and $32,999), 36.4% were middle income (making between $33,000 and $75,999) and 23.5% were high income (making over $76,000). Fig. 5 shows the annual budget that people were willing to allocate for college tuition and fees. Fig. 6 shows one-way commute times to campus with 75.3% commuting 30 minutes or less and 97.9% commuting less than 60 minutes.

Fig. 3: Age Range

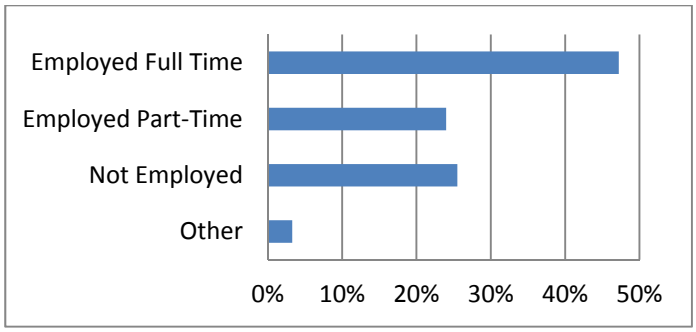

Fig. 4: Employment Status

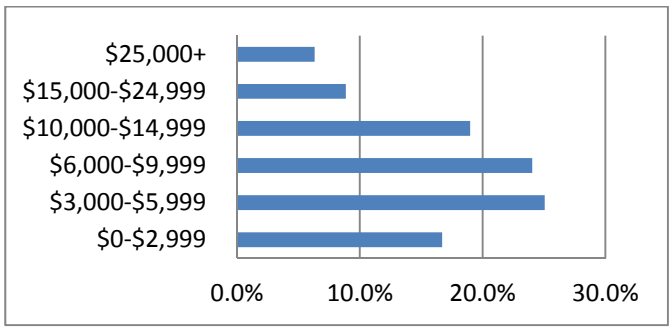

Fig. 5: Annual College Tuition Budget

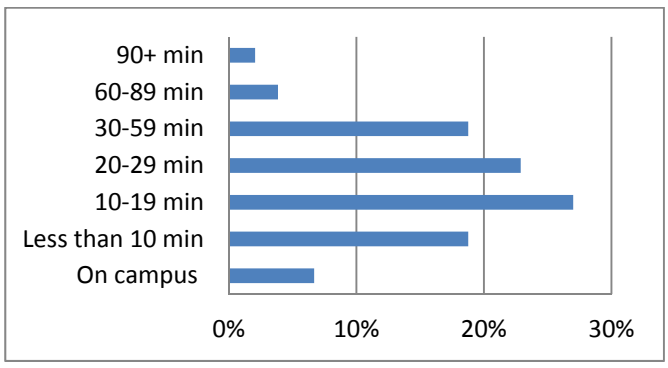

Fig. 6: One-way Commute Time to Campus

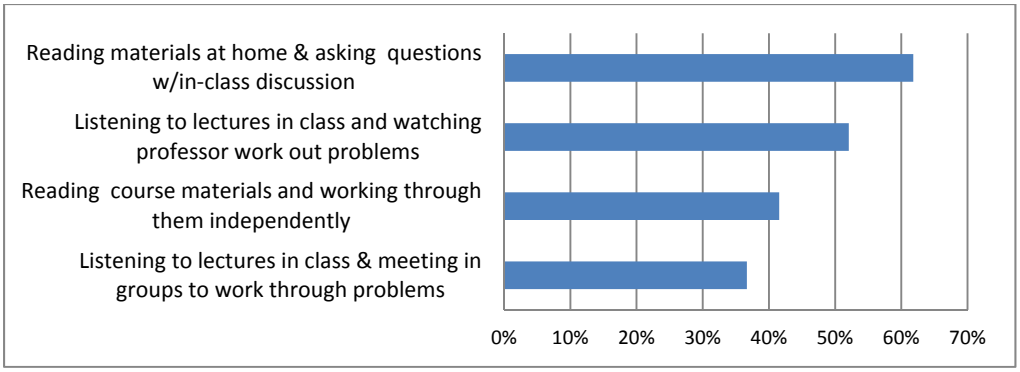

Fig. 7: Learning Style Preferences

IV. DATA ANALYSIS

This section is divided into two parts. The first part looks at student preferences or value drivers related to university level education. A number of the issues relate specifically to online education, the technologies deployed and the quality of materials used. These factors have implications for the kinds of features that should be considered when initially designing or redesigning university level courses. The second part of this section explores how student preferences for online education vary by demographic characteristics including age, major, level of education, work status, among others. These factors also have implications for university course design when addressing specific groups.

A. Exploring What Students Value

In this subsection we present survey data for a variety of factors that respondents valued with respect to university courses. These factors are considered by respondents when making decisions about selecting courses.

Fig. 7 shows preferred methods for learning new information in terms of the percentage of respondents who preferred each method. Respondents could select multiple options for this question. . We see that while students liked working independently (42%), most preferred a combination of in-person interactive and independent work (62%). Moreover, there were positive feelings about course options that have large face-to-face components (52%). Working in groups seemed to be the least preferred (37%).

Table 1 presents results for 14 factors that were rated by respondents as being important when they consider selecting a course. The factors were originally identified through focus groups and then presented to a wider set of respondents via the survey. The following factors were selected to provide useful guidance about possible design features to include in university course offerings. By understanding what prospective students value, decisions can be made regarding how much to invest in particular course features and estimate the likely payback for the investment.

Seven value driver categories were identified: Course Transferability, Teaching Quality, IT Platform Quality, Experience Quality, Prestige, Socialization, and Flexibility. The factors were ranked on a scale of 1 to 5, with 5 being considered "Very Important" and 1 being "Not Important at All". Table 1 shows the mean and standard deviation for each factor. Table entries are listed in Table 1 in descending order of importance.

Although as a group the factors and categories that were identified were not unexpected, some of the relative rankings were so. As shown in table 1, the most important factor was that students want whatever online course they take to count toward their degree and program requirements. While learning for learning's sake has some value, students overwhelmingly want their course work to contribute toward a tangible degree. This is a significant issue inhibiting the widespread acceptance of MOOCs by students. However, if this issue can be resolved, it has the potential to dramatically shift the appeal of MOOCs.

The second most important factor addresses the question of the expertise and knowledge of the professor running the course head on. Students do not want graduate students, administrators, or other lower skilled individuals running their classes. They want knowledgeable and experienced teachers. Who runs the course matters, and likely contributes to the justification for the payment of substantial tuition rates.

Two value drivers tied for third place (i.e. the means for these two value drivers were not statistically different). The first dealt with the quality of online materials. Students who take online courses are very concerned about the quality of online materials, and it is very important to them that these materials (including video production quality of the lectures, online exercises, and the online platform) be professionally well done. This result was not surprising and was very clear. Also, in third place, was a surprising value driver. Students want an enjoyable educational experience. While this was more important to younger students than older students, it still rated highly across all age ranges. Initial interviews of students indicate that this value driver relates to the variety and quality of educational activities that students engage in during a course. It may also be possible that this value driver refers to the amount of in-person social interaction available as part of the university experience. Exploring this factor further is part of our planned future work.

TABLE 1 – VALUE DRIVER RANKINGS FOR ONLINE COURSES

Category	Rank	Value Driver	Mean	Standard Deviation
Transferability	1	Importance that the online course is transferable to a degree program at an accredited university	4.626	0.764
Teaching Quality	2	Importance that your teacher be an expert in the subject they're teaching	4.515	0.765
IT Platform Quality	3*	Importance that online course content appears to be professionally done (well-edited videos, etc.)	4.210	0.933
Experience Quality	3*	Importance that your college learning experience be enjoyable	4.202	0.968
Reputation Quality	4*	Importance that the online course is highly regarded and considered as rigorous as a traditional face-to-face course	4.040	1.104
Teaching Quality	4*	Importance that your teacher uses the latest methods and techniques to make classes as engaging, effective, and informative as possible	4.005	1.053
IT Platform Quality	5	Importance that internet-based interactions for the course are easy-to-use for someone with basic computer skills	3.917	1.105
Socialization	6	Importance that you are able to interact with your teachers and fellow students frequently	3.604	1.110
IT Platform Quality	7	Importance that your online courses use the latest technology to improve communication/engagement between students/teacher	3.515	1.192
Flexibility	8	Importance that learning/assignments/interactions for class can be done at any time you want to do them	3.467	1.119
Flexibility	9	Importance that course tutoring/coaching be available at any time you want it	3.278	1.224
Socialization	9	Importance that you are able to socialize with other college-students and your professors in-person	3.278	1.333
Reputation Quality	10	Importance of the prestige of the University	3.121	1.093
Flexibility	11	Importance that you don't have to show up for class	2.992	1.301

* While the means for these 3rd and 4th place value drivers were different, the difference was not statistically significant

In fourth place were two value drivers that were also not statistically differentiated. The first deals with reputation quality of the student's program. Although the prestige of the university was ranked 10th among the value drivers, the perception that online classes are as rigorous and of as high a quality as face-to-face courses is very important for students to consider taking these courses. We found that again Teaching Quality was an important factor when selecting courses. Students want their professors to employ the best practices available to keep classes engaging, informative and effective. This again potentially speaks to the need to have professional educators in the classroom rather than lower skilled individuals who may not have the time to devote to perfecting their teaching.

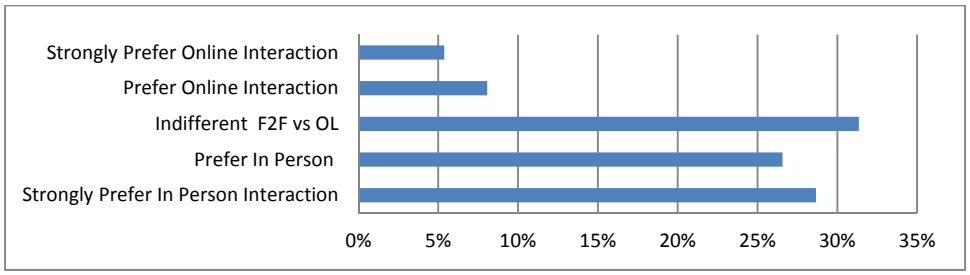

Fig. 8: Preference for Online vs In-person Interaction

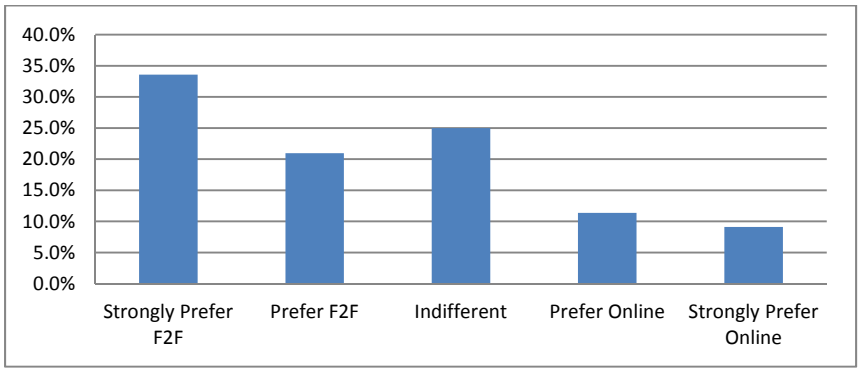

Fig. 9: Delivery Mode Preference

Fifth and Seventh places dealt with IT Platform Quality. Students want their online platform to be easy to use and for the latest communication technologies to be deployed in their courses.

Sixth and Ninth places deal with Socialization. It is important to students that they can reach out and interact with their instructors and other students when they need to, which may be very frequently. Most students enjoy this socialization to be done in person. In addition to being asked how important it was to students that their interactions be done in person, they were also asked whether they preferred interacting in person or online. Fig. 8 shows the results.

Eighth, ninth and eleventh places go to Flexibility related value drivers. It was surprising to see that these value drivers were rated relatively so low. Flexibility has often been promoted as being one of the primary reasons online education has the potential to gain a larger share of the higher education market. These results indicate that while flexibility relating to being able to do work and get help any time the student wishes, coupled with not needing to attend class on a fixed schedule, is desired by students, other factors related to quality, reputation and socialization are more important.

Overall, we find that Teaching Quality and IT Platform Quality are the top two categories. Reputation Quality is in the middle with Flexibility and Socialization lower rated overall. These results were interesting in that the primary driver that has been promoted for online has been the Flexibility it offers. The downside to online education is the isolation and lack of socialization. This may imply that quality related factors may be bigger determinants of success for online education (and face-to-face education) than previously understood.

B. Preference for Online Education Based on Demographic Characteristics

In this section we discuss survey results that speak specifically to the preference of respondents toward online vs face-to-face education. We then look at different demographic groups and to potentially detect any changes in the patterns of their preferences. Fig. 9 shows the overall preference of respondents for face-to-face vs online courses, such that 55% of respondents preferred or strongly preferred face-to-face courses. Although 20% preferred or strongly preferred online courses, 25% of survey respondents were indifferent. These results are of interest in that they show that although there is substantial interest in online courses, face-to-face remains the dominant preferred delivery mode for students today. This is also supported by other results presented in this paper in the previous section. At the same time, the large percentage of respondents who are indifferent to taking face-to-face courses vs online courses is very large (25%). Thus the opportunity to attract these students to either type of course is possible.

TABLE 2 – PREFERENCE PATTERNS FOR ONLINE COURSES BY DEMOGRAPHIC GROUP

Demographic Group	**Nature of Pattern Detected**	**Correlation**	**P-Value**
Gender	Slight positive, statistically significant relationship where women seem to prefer online courses more than men (Fig. 10)	0.120	0.018
Age	Slight positive relationship as age increases, preference for online increases (Fig. 11).	0.084	0.094
Employment Status	No relationship. The number of hours worked per week does not appear to make a difference in a person's preference for online education (Fig. 12)	0.034	0.528
Education Level	No relationship. Education level does not appear to affect preference for online education. Chi Square analysis also shows no relationship (p=0.8258)	-0.018	0.715
Enrollment Status	Slight, non-statistically significant relationship where respondents who are more fully enrolled appear to have a greater interest in face-to-face classes.	-0.078	0.123
Field of Study	Different fields of study have different levels of preference for online education (Fig. 13)	NA	NA
Commuting Time	Positive, statistically significant relationship from a t-test of the mean difference in which respondents with commuting times above 30 minutes appear to have an increased preference for online education (Fig. 14)	NA	0.001
Household Income	No Relationship. Household income does not appear to have any correlation with preference for online.	-0.009	0.856
Education Budget	Statistically significant relationship, as education budget increases, interest in online courses decreases (Fig. 15)	-0.143	0.004

We investigated specific demographic subgroups to see if any salient preference patterns emerged for online vs face-to-face courses. These patterns could identify potential market segment categories for specific course offerings or targeted marketing communications. We explored respondent preferences for online courses based on gender, age, employment status, field of study, education level, commuting time, and so forth. Table 2 lists the different factors considered and whether a significant preference pattern was found. Figures 10 through 15 present the interesting patterns visually.

The following figures illustrate the relationships between items on the survey with bubble plots, in which the diameter of each point, or bubble, is proportional to the corresponding joint frequency of the two relevant values of the respective variables. Fig. 10 shows the bubble plot of the Gender variable compared to Delivery Mode Preference. The hypothesis test of zero correlation renders a *p*-value of 0.018, thus rejecting the hypothesis of no relation between the two factors at a significance level of 95%. Thus a correlation between Gender and Delivery Mode Preference is detected suggesting that women have a preference for online classes more than men. In looking closely at the data, it was observed that over 75% of the respondents who preferred or strongly preferred online education were women. For the number of men and women taking the survey, 26.1% of women preferred or strongly preferred online classes compared to only 12.3% of men.

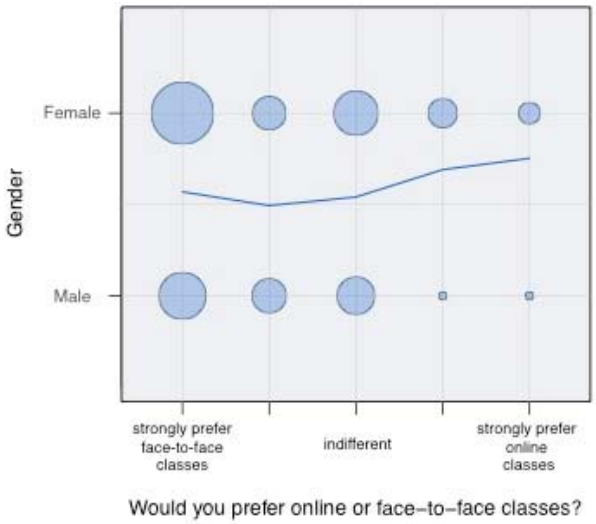

Fig. 10: Gender vs Delivery Mode Preference

In Fig. 11, we see a slight positive trend that as students increase in age, they have a greater preference toward online education. However, this relationship did not attain statistical significance, yielding only a *p*-value of less than 0.10. Although it was expected that this relationship would be stronger, the slight relationship may be due to the fact that there are competing influences. Younger students have a greater familiarity and comfort with new technologies, and older students may have other life commitments that reduce their ability to be present for face-to-face courses. The net result is that these influences offset each other and hence there is only a slight difference based on age. However, as can be seen from Fig. 12, the other life commitments that do affect preference, may not be related to employment status.

As can be seen from Fig. 12 and the statistical results in Table 2, Employment Status did not appear to change respondent preference for online education. This was surprising as it has been believed that one's job status would be one of the main life commitments that would increase a prospective student's difficulty with attending regularly scheduled face-to-face classes and increasing their preference for classes online.

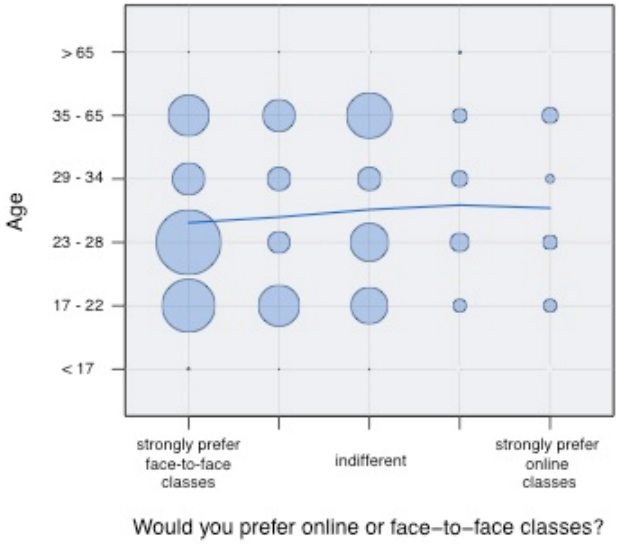

Fig. 11: Age vs Delivery Mode Preference

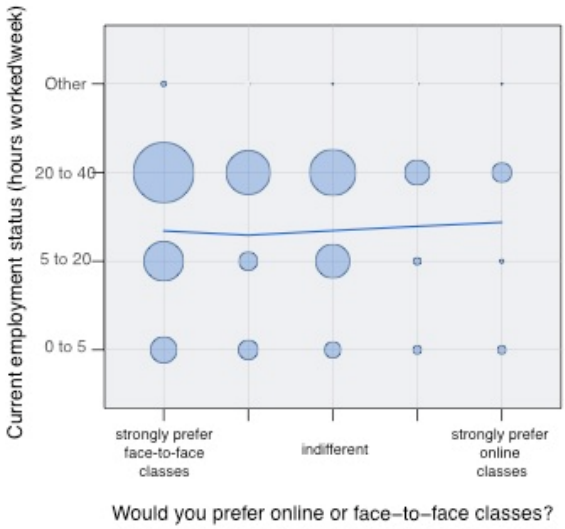

Fig 12: Employment Status vs Delivery Mode Preference

There was no *p*-value for differences of the means of the Field of Study variable when compared to Delivery Mode Preference because of the lack of independence of the data. Respondents were able to select one or more categories as their field of study. As such, the distributions for each field of study were not independent; there is no single variable for a major field of study. To address this dependence, we examined the distribution for each Field of Study separately, and then calculated the means as weighted averages across the five levels of Delivery Mode Preference. Fig. 13 is the result that shows that different fields of study appear to have different preferences toward delivery mode. Social Work and Psychology, Architecture, and Business were the top three fields of study that most preferred online education. Political Science and Urban Planning, Natural and Physical Sciences, Education, and Engineering and Computer Science were the top four fields of study that preferred face to face.

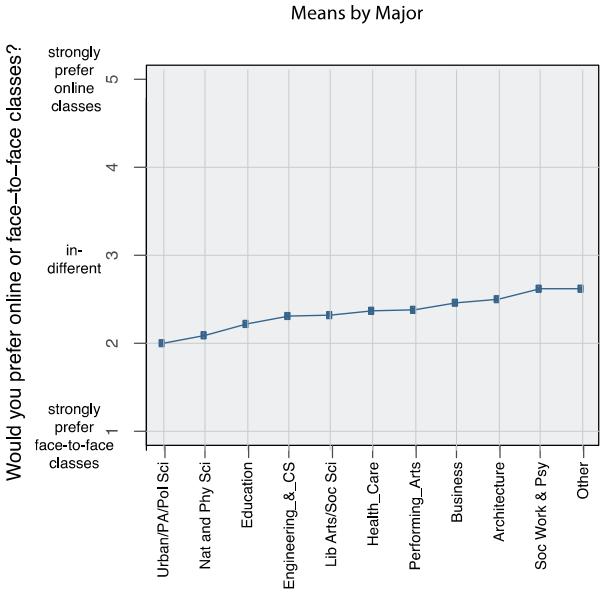

Fig. 13: Field of Study vs Education Mode Delivery

Fig. 14 shows a slight but statistically significant increasing preference for online education as the commuting time increases. We see a discontinuous increase as commuting time increases above 30 minutes. The significant relationship, p-value < 0.01, shown in Table 2 is based on a t-test of the two groups, close and far, operationalized by less than or greater than 30 minutes from campus. Based on this, we conclude that those who are far from campus, on average, prefer an on-line class, which seems logical.

Fig. 15 shows a statistically significant but inverse relationship. As the amount of money available to spend on the college education decreases there is a tendency to prefer online classes. The effect appears to bottom out at $6 to $10 thousand dollars per year. This might be an indication of limits for prices for online courses. Alternatively, it could be hypothesized that students with a lower educational budget might be more prone to have the perception that online classes will be less expensive than face to face ones. We plan to explore this result further in future work.

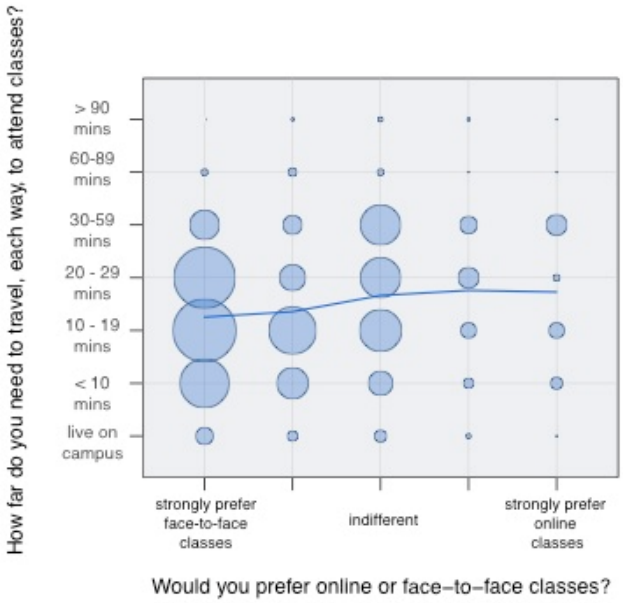

Fig. 14: Commute Time vs Delivery Mode Preference

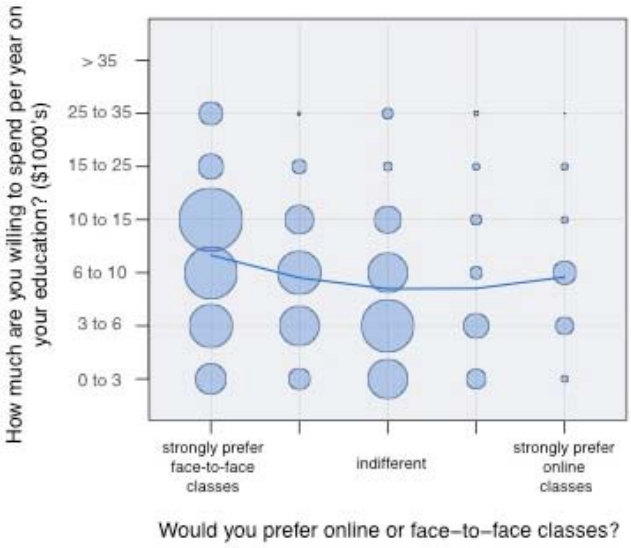

Fig. 15: Educational Budget vs Delivery Mode Preference

V. CONCLUSIONS AND FUTURE WORK

Higher Education is at a crossroads. Universities are facing a drastically altered business environment compared to the one they faced as recently as a decade ago including: substantial reductions in state support, increased costs, increased competition, and changing enrollment patterns coupled with the introduction of new and potentially disruptive digital technologies . These factors are driving dramatic changes at some universities to business models with an increased focus on cost containment and revenue

generation in terms of the composition of the academic labor force as well as program and course offerings.

Digital technologies specifically are having a tremendous impact on not only the delivery of university education but also the content of classes. While there are many stakeholder groups and factors to consider, university administrators are left wondering how can or should universities respond to these drastic changes? Incorporating digital technologies into university curriculums is part of the answer, but to what extent should this be accomplished? How should university courses be redesigned to accommodate these technologies – should classes move completely online or remain predominantly face to face experiences?

This paper focuses on identifying factors that drive student choice in selecting between online and face-to-face courses. By identifying the factors that drive student choice for courses, universities can be strategic as to how they invest their scarce resources available for course design. This paper also identifies demographic group patterns that may be useful in targeting certain audiences for online content.

Specifically, this paper presents results from a detailed survey of over 390 participants. Survey respondents were diverse across many dimensions including age, education level, household income, field of study, gender, and employment status. At the same time, this study does have limitations in terms of not being ethnically or geographically diverse.

Some of the findings from the analysis include:

- Overall, respondents prefer face-to-face education over online education. Over 55% said that they prefer or strongly prefer face-to-face courses. In contrast, 20% said that they prefer or strongly prefer online while 25% were indifferent to face-to-face or online. It is clear that other design factors could drive the indifferent group to prefer one style of delivery versus the other.
- Women tend to prefer online education more than men. We found that 26.3% of the women surveyed compared to 12.3% of the men preferred or strongly preferred online education compared to face to face.
- Social Work and Psychology, Architecture, and Business were the top three fields of study that most preferred online education. Political Science and Urban Planning, Natural and Physical Sciences, Education, and Engineering and Computer Science were the top four fields of study that preferred face-to-face.
- The key factors that are important in students making their decision about choosing face-to-face vs online education are:
  - The ability for the course to count toward a degree
  - The professor being an expert in the subject they're teaching
  - The online content (including video) be professionally done
  - The educational experience is enjoyable
  - The online course is highly regarded and considered as rigorous as a traditional face-to-face course

Flexibility factors (such as when courses are offered and when students do their work) were rated to be less important than expected. Socialization factors (including the frequency of interaction with students and professors and the desire for face-to-face interactions) were also rated to be less important than expected.

Other findings of interest were:

- Employment status did not appear to have an effect on people's preference for online education
- People with commute times greater than 30 minutes each way seemed to have an increased preference for online than those with commute times less than 30 minutes
- While household income seemed to have no effect on preference for online courses, there appeared to be an increased preference for face-to-face courses for people with greater financial resources available for college.

Overall, universities need to invest in integrating digital technologies into the curriculum – both face-to-face and online classes. Students make selection decisions about face-to-face and online classes based on key factors. Given the large percentage of those who are indifferent to face-to-face versus online education, strategic design of courses by including factors that students care about when selecting their courses has the potential to dramatically improve market share, increase enrollments and increase revenue. In the competitive environments faced by universities today, we see this research as being highly valuable to help universities target their limited resources to improve their courses to attract more students and revenue.

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