Online Learning and Student Satisfaction: Academic Standing, Ethnicity and their Influence on Facilitated Learning, Engagement, and Information Fluency

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Abstract

A study by Mullen and Tallent-Runnels (2006) found significance in the differences between online and traditional students' reports of instructors' academic support, instructors' demands, and students' satisfaction. They also recognized the limitation to their study was their demographic data. In another study, Dziuban et al. identified multiple student satisfaction groupings into dimensions that structure studies in online learning. In the present study, differences between academic standing and ethnicity were added to broaden the Mullen & Tallent-Runnels (2006) demographic deficiencies and used several student satisfaction dimensions identified by Dziuban et al. (2007). The differences between academic standing and the studied dimensions were found to be statistically significant: the largest effect was Facilitated Learning and academic standing, which accounted for nearly 15% of the student scores' variance; Engagement and Information Fluency had variance effects of, respectively, 4.5%, and 5.1%. However, error accounts for the majority of total variance in all the tests, which implies other variables' influence.

Online Learning and Student Satisfaction: Academic Standing, Ethnicity and their Influence on Facilitated Learning, Engagement, and Information Fluency

In colleges and universities across the country, online courses continue to enhance their presence in the schedules of undergraduate and graduate students; indeed, online learning seems to be taking colleges and universities by storm. Nationally, the current growth rate of college courses being put online is estimated to be around 33% per year (Tallent-Runnels et al., 2006). According to Allen and Seaman (2007), in the fall of 2006, nearly 3.5 million students took at least one online course, representing nearly twenty percent of all US higher education students. At the University of Central Florida (UCF), the numbers are even more telling: registrations for courses that were delivered through web only (W type classes) increased by an annual average of 67% over the last three years; registrations for courses that were mixed-mode (M type classes), where students in a particular class spend some of the time in a face-to-face classroom, as well as convene online increased by an annual average of 54% over the same last three years; by contrast traditional, face-to-face course registrations increased by an annual average of 26% over the same last three years (Center for Distributed Learning, University of Central Florida, 2007).

Reasons for this strong rate of growth include increased student access to course offerings, especially to non-traditional learners, and an opportunity for institutions to lower costs (Allen & Seaman, 2007). Distance education, of which online courses constitute one format, is a “delivery system of teaching and learning, when the teacher and student experience separation by physical distance and time, using alternative media resources” (Dabaj & Isman, 2004). As the transition to a greater emphasis on online learning continues into the future, the issue of student satisfaction arises, including questions of difference in satisfaction and engagement between Caucasian and Non-Caucasian students and between groups of students based on academic standing.

Purpose of the Study

The purpose of the study was to explore whether demographic variables such as academic standing and ethnicity influence particular dimensions of student satisfaction resulting from their experiences with online learning programs. Student satisfaction plays an increasingly important role in the evaluation of instructors, their courses, and the overall quality of educational programs. There are many variables that comprise student satisfaction, and until recently, those variables were perceived in many different ways by as many people as perceived the variables. Differences in those perceptions made it nearly impossible to group the variables into dimensions that could be used to study educational programs and thereafter make improvements to the same. This study sought to determine how much a role demographics influences student satisfaction along three dimensions, as defined forward, of Facilitated Learning, Engagement, and Information Fluency.

Research Questions

The research questions that guide this study follow. The particular student satisfaction dimensions that are mentioned below, Facilitated Learning, Engagement, and Information Fluency, are defined in the following section on Operational Definitions.

(H1): Is there a difference in Facilitated Learning scores between academic standing groups?

(H2): Is there a difference in Facilitated Learning scores between ethnic grouping of non-Caucasian and Caucasian?

(H3): Is there an interaction effect between academic standing and ethnicity regarding Facilitated Learning scores?

(H4): Is there a difference in Engagement scores between academic standing groups?

(H5): Is there is no difference in Engagement scores between ethnic grouping of non-Caucasian and Caucasian?

(H6): Is there an interaction effect between academic standing and ethnicity regarding Engagement scores?

(H7): Is there a difference in Information Fluency scores between academic standing groups?

(H8): Is there a difference in Information Fluency scores between ethnic grouping of Non-Caucasian and Caucasian.

(H9): Is there an interaction effect between academic standing and ethnicity regarding Information Fluency scores?

Operational Definitions

This study was based on specific groupings of collected student survey responses as explained forward in the methods section. Operational definitions of the key elements to this study are necessary to ensure clarity of the report, which in turn should improve study reliability, as well as to invoke external data validity.

Student satisfaction: as one of the metaphorical pillars in the Sloan-C consortium's definition of an effective educational environment, student satisfaction regarding their course experiences can be the basis to evaluate the complex relationship between instructors, their course designs and delivery styles, and the students' perceptions on their learning experience. Dziuban et al. summarized this relationship concisely, as well as identified the rationale for studying student satisfaction:

> Satisfied students are engaged, motivated, responsive, contribute to an effective learning climate, and tend to achieve at higher levels. Dissatisfied or ambivalent students contribute to more negative environments where instructors encounter many more difficulties creating opportunities for effective learning (p. 4).

Facilitated Learning: this was one of the groupings identified by Dziuban et al. In their study, Dziuban et al. correlated the following (paraphrased from particular survey questions) to comprise the student satisfaction dimension of Facilitated Learning:

- Online classes allow me to work where I want
- Online classes are easier to schedule
- Online courses help me control my life
- Online classes free me from large classes
- Overall, I am satisfied with online courses
- Online classes allow me to work when I want
- Online classes make my life more flexible
- Online classes make life more convenient

Engagement: this was another of the groupings identified by Dziuban et al. As with Facilitated Learning, Engagement comprised the following:

- Learn more in online classes than small class
- More likely to ask questions online

- More opportunities to collaborate online
- Learn more online than in large classes
- Amount of interaction better with faculty online
- Amount of interaction better with students online

Information Fluency: this was another of Dziuban et al.'s groupings, and the dimension comprised the following:

- Online experience increased ability to use information
- Overall, I am satisfied with my classroom courses
- Online experience increased ability to evaluate information

Academic standing: in the Dziuban et al. study, the demographic data of academic standing had the following possible values: Freshman, Sophomore, Junior, Senior, Graduate, and Other. As the reader can see, there was no age implied in this grouping, only the level of academic experience.

Ethnicity: in the Dziuban et al. study, the demographic data of ethnicity had the following possible values: African American, Asian American, Caucasian, Hispanic, Native American, and Other.

Literature Review

Online learning, through courses delivered completely online or through hybrid models of learning that combine face-to-face learning with an online component, constitute a part of many college students' experiences today (Allen & Seaman, 2007). As a result, perceptions of online courses may impact overall student satisfaction in a significant manner. In addition, students often already have online learning experiences, and accompanying perceptions, of varying quality and duration. Watson and Ryan, in their 2007 report titled "Keeping Pace with K-12 Online Learning," argue that although high school and even middle school students are more likely than ever to bring previous online learning experience into their college classrooms, students' experiences vary widely in quality of instruction and degree of online activity. In this same report, authors Watson and Ryan (2007) confirm that

> Taking an online course requires that the student understand how to get online, communicate, and collaborate via email and discussion boards, and access information via the internet – all skills that are tremendously important throughout most professional careers. Students interacting in these classes will not only gain the course content skills being taught, but will also learn about their online classmates, gaining online collaboration and global citizenship skills. (p. 11)

Students' perceptions of online courses offer a crucial window into student success in this environment and serve as a vital focus of study.

Communication is a specific, direct form of interaction between participants in an online course and constitutes the major focus in this context. As previously noted, many online students bring previous experiences with online courses while others come with little or no experience. Hara and Kling (2001), in their study of students' reactions to an online graduate course, found that "frustration, anxiety, and confusion, seem pervasive" (p. 68). According to their qualitative case study, Hara and Kling (2001) identified technical problems and issues related to online communications to be the most significant drivers of these reactions. Indeed, Hara and Kling (2001) indicate:

> Students reported confusion, anxiety, and frustration due to the perceived

> lack of prompt or clear feedback from the instructor, and from ambiguous instructions on the Web site and in email messages from the instructor. The instructor did not appreciate the duration or extent of the students' distress, believing that she had effectively eliminated their anxieties and frustrations earlier in the term. (p. 68)

Similarly, Belcheir and Cucek (2001), in their survey of student perceptions of online courses, report that quality of online communications and degree of interaction with classmates and instructor contributed to the most significant barrier to course completion – course content and delivery method. Frustration and anxiety may be the most intense reaction to these barriers, but they are by no means the only ones. Boredom, "lack of enthusiasm for learning in absence of feedback from instructor and students" (Belchair & Cucek, 2001, p. 12), and the perception of working in slow motion also arose in relation to these challenges.

Clearly, interaction in online courses, along with high quality communications, ranks highly with online learners in higher education. Young (2006), in her study "Student Views of Online Teaching," reported that students, in open-ended comments, confirmed that consistent and timely communication lead to positive perceptions of the course as well as greater success. In addition, discussions were well designed and facilitated. Young (2006) explains:

> Once the course begins, an effective teacher must give considerable attention to facilitating the course. The instructor is fully absorbed with communication, including e-mail, threaded discussions, and chats, and must work hard to meet the varied needs and demands of students. (p. 74)

Indeed, visibility is the key – even more so than in a traditional classroom (Young, 2006). Howland and Moore (2002), support this idea; instructor feedback greatly impacts students' perception of the value of their work. "One strategy to keep students engaged in an online learning course could be periodic correspondence from the instructor in order to keep students and connected" (Howland & Moore, 2002, p. 192).

In addition to a deeper understanding of the importance of online interactions and communications, online instructional design must continue to take interaction into account. As indicated by Northrup (2002), students who are more mature in age desire on online experience that reflects the kind of experience in a traditional, face-to-face learning environment. Indeed, as Howland and Moore (2002) confirm, there is no one-size-fits-all approach to online interactions; some students need more interaction while others need less.

Method

The researchers began with the results of the study by Dziuban et al. (2007), "Student Involvement in Online Learning," which was underwritten by the A. P. Sloan Foundation. Their study included a 74 item survey delivered to 1325 college students from University of Central Florida and the University at Albany, State University of New York in 2007. The focus of that study was to identify the factors underlying students' motivation for engaging in asynchronous learning networks (ALNs) and to identify the underlying elements for why students chose to engage in online environments and what elements motivated their satisfaction. With the Dziuban et al. results and a copy of the collected data, the researchers in this paper elected to seek general answers to implied questions posed by Mullen & Tallent-Runnels (2006) in their study report, "Student

Outcomes and Perceptions of Instructors' Demands and Support in Online and Traditional Classrooms." Mullen & Tallent-Runnels (2006) gathered data on 194 graduate students to study perceptions of differences in instructors' demands and support and student' motivation, self-regulation, satisfaction, and perceptions of learning in traditional and online courses. They found that differences between online and traditional students' reports of instructors' academic support, instructors' demands, and students' satisfaction were significant with medium effect sizes. Furthermore, the results are important because they provide information about students' perceptions of the differences in environments created by instructors that relate to students' affective outcomes.

There are interesting parallels between the studies by Dziuban et al. and Mullen & Tallent-Runnels. Student perceptions of the differences in the environments will likely influence their choices in taking courses online, and their affective outcomes will be mirrored by the level of satisfaction they achieve by the end of the course. At the conclusion of their report, Mullen & Tallent-Runnels (2006) support the connection between affective outcomes and satisfaction, as they put it: "The correlation between affective support and satisfaction, however, was much higher for online students than for traditional students" (p. 264). The Tallent-Runnels et al. (2006) report focused on studying the relationship between support and/or demands and outcomes that will differ between students taking traditional courses versus taking online courses. They identify the need for future research to increase the generalizability of the results since their sample included only graduate students who were older, predominately Caucasian, and from a large university in the southwest. Further, they clarify that future research should examine students' perceptions of task difficulty as part of the demands instructors make on students, as this would better inform an understanding of how students are motivated to engage in self-directed learning.

Another gauge on students' perceptions of task difficulty can be found in their level of satisfaction along dimensions identified in the study by Dziuban et al (2007). In the present study, the researchers chose to include the student satisfaction dimensions of (1) Facilitated Learning, (2) Engagement, and (3) Information Fluency as an initial test of the concept that these dimensions will prove more important than the demographic data requested by the Mullen & Tallent-Runnels that would permit the level of generalization they seek.

The researchers had to study and prepare the data to conduct these analyses. The data was already stored in an SPSS file, but the correlation between items in the survey and the variable names needed to be made. The first task the researchers completed was to map the variable names to the survey questions, and then identify which of the variables required recoding. The original surveys posed questions that used a five point Likert scale, where the value one (1) was assigned to a student response of "Strongly Disagree" and the value five (5) was assigned to a student response of "Strongly Agree." Since the dimensions of student satisfaction are a collection of survey questions, the researchers created new variables from the existing data. In this way the survey question items that belonged to the grouping dimensions identified by Dziuban et al. (2007) were combined into single variables by adding together the values for each survey respondent that belonged to the identified grouping dimensions of Facilitated Learning, Engagement, and Information Fluency. Thus, three new variables were created. The minimum and maximum value for each dimension of student satisfaction is directly proportional to the number of survey questions that make up the dimension. For Facilitated Learning, there were eight survey questions, which left the minimum and maximum value any respondent could have was eight and forty. For Engagement, there were six questions, which left the minimum and maximum value any respondent could have was six and thirty. Finally, for Information Fluency, there were three questions, so the minimum and maximum for any respondent was three and fifteen.

Next, the researchers conducted frequency counts on key demographic data points to determine whether there was sufficient spread of data over the demographic groupings. For example, the results of the frequency counts on the age grouping yielded that nearly all the respondents were in the first two tiers of the variable potential values. The age demographic was therefore dropped as it did not have sufficient representation across all ages. The results of a frequency counts on the academic standing variable yielded that there were few respondents in the original variable grouping of “graduate” or “other.” Therefore, the academic standing variable was recalculated to leave freshman, sophomore, and junior the same, but that seniors would have graduates and other added to it, and this level was renamed to “Senior and above.” Finally, the frequency count on ethnicity groupings yielded that the spread of the non-Caucasian groups would yield no meaning because of the many small respondents belonging to them. Therefore, the researchers decided that the Caucasian grouping would be left as-is, but all the other non-Caucasian groups would be added to a new ethnicity variable that holds only two groupings: Caucasian and non-Caucasian. Finally, the original data file was complete with 1325 respondents recorded across 40 variables. The research team took a random sampling of 400 cases from the 1325 and saved the data into a new file for study. All data preparation and analysis was conducted in SPSS (v. 16) on a MS Windows PC. No further data preparation was conducted.

To conduct the analyses, the researchers had interval data in the form of three variables that collect students' satisfaction scores in the dimensions of Facilitated Learning, Engagement, and Information Fluency. Further, the researchers had ordinal data in the form of academic standing (i.e., freshman, sophomore, junior, senior and above) and ethnicity (i.e., Caucasian and non-Caucasian). The statistical test selected was the two-way factorial ANOVA. This test permits the researchers to explore both the demographic data variables, as well as possible interactions between them on the students' satisfaction scores. In summary, the researchers ran the two-way factorial ANOVA with academic standing and ethnicity as fixed factors, and Facilitated Learning, Engagement, and Information Fluency as the respective dependent variables in three separate runs of the data.

Results

The first set of analyses looked for demographic effects on the students' satisfaction dimension of Facilitated Learning. The null hypotheses were the following:

> Null 1 (H_0:1): There is no difference in Facilitated Learning scores between academic standing groups.
>
> Null 2 (H_0:2): There is no difference in Facilitated Learning scores between ethnic grouping of non-Caucasian and Caucasian.
>
> Null 3 (H_0:3): There is no interaction effect.

In table 1, the means for Caucasians tended to be higher than for Non-Caucasians at all grade levels with the exception of the Sophomore year ($M_{Caucasian}$=32.88, M_{non-}

$_{\text{Caucasian}}$=34.20), and the variance of the means tended to decline as students progressed in their academic career. For a maximum possible value of 40, these means lie in the 80th percentile: an indication of a strong agreement on the importance of this dimension of satisfaction.

Table 1

Descriptive Statistics-Students' Satisfaction - Facilitated Learning with Academic Standing & Ethnicity

Dependent Variable: Facilitated Learning

Academic Standing	Ethnicity	Mean	Std. Deviation	N
Freshman	Non-Caucasian	30.10	6.15	21
	Caucasian	31.44	5.48	55
	Total	31.07	5.66	76
Sophomore	Non-Caucasian	34.20	5.47	15
	Caucasian	32.88	5.64	34
	Total	33.29	5.57	49
Junior	Non-Caucasian	35.75	3.23	40
	Caucasian	35.80	4.90	83
	Total	35.78	4.41	123
Senior or above	Non-Caucasian	35.48	4.32	50
	Caucasian	35.84	3.51	92
	Total	35.71	3.80	142
Total	Non-Caucasian	34.52	4.91	126
	Caucasian	34.53	5.03	264
	Total	34.52	4.99	390

In table 2, there was a statistically significant effect of academic standing, denoted below as “dD1,” ($F_{3,382}$=19.03, p<.001). Academic standing accounted for 13% of the variance in the Facilitated Learning score. There was no statistically significant effect of ethnicity, denoted below as “dD5,” ($F_{1,382}$=.04, p>.05). Ethnicity accounted for no appreciable variance in the Facilitated Learning score. Further, there was no statistically significant interaction effect, denoted below as “dD1*dD5,” ($F_{3,382}$=.7, p>.05). Interaction accounted for no appreciable variance in the Facilitated Learning score.

These results indicated that we can safely reject the Null 1 hypothesis, but we fail to reject both Null 2 and Null 3 hypotheses. While academic standing does have an effect on students' scoring in the Facilitated Learning dimension (14.8%), it accounts for little of the total variance. There is no statistically significant effect from ethnicity or from an interaction effect on students' scoring in Facilitated Learning.

Table 2

Tests of Between-Subjects Effects - Facilitated Learning with Academic Standing and Ethnicity

Dependent Variable: Facilitated Learning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1427.97[a]	7	204.00	9.440	0.000	0.148
Intercept	320714.59	1	320714.59	14847.680	0.000	0.975
dD1	1233.44	3	411.15	19.030	0.000	0.130
dD5	0.79	1	0.79	0.040	0.849	0.000
dD1 * dD5	45.14	3	15.05	0.700	0.555	0.005
Error	8251.32	382	21.60			
Total	474498.00	390				
Corrected Total	9679.29	389				

a. R Squared = .148 (Adjusted R Squared = .132)

In table 3, the researchers found significance between freshmen to juniors and seniors or above, as well as sophomores to juniors and seniors or above. However, there were found no significance between freshmen and sophomores.

Table 3 Academic Standing

Multiple Comparisons: Facilitated Learning - Scheffe

(I) Academic Standing	(J) Academic Standing	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Freshman	Sophomore	-2.22	0.85	0.079	-4.606	0.166
	Junior	-4.71*	0.68	0.000	-6.615	-2.815
	Senior or above	-4.65*	0.66	0.000	-6.496	-2.795
Sophomore	Freshman	2.22	0.85	0.079	-0.166	4.606
	Junior	-2.49*	0.78	0.018	-4.694	-0.295
	Senior or above	-2.43*	0.77	0.020	-4.583	-0.268
Junior	Freshman	4.71*	0.68	0.000	2.815	6.615
	Sophomore	2.49*	0.78	0.018	0.295	4.694
	Senior or above	0.07	0.57	1.000	-1.535	1.673
Senior or above	Freshman	4.65*	0.66	0.000	2.795	6.496
	Sophomore	2.43*	0.77	0.020	0.268	4.583
	Junior	-0.07	0.57	1.000	-1.673	1.535

Based on observed means.

The error term is Mean Square(Error) = 21.505.

*. The mean difference is significant at the .05 level.

The second set of analyses looked for demographic effects on the students' satisfaction dimension of Engagement. The null hypotheses were the following:

Null 4 (H_0:4): There is no difference in Engagement scores between academic standing groups.

Null 5 (H_0:5): There is no difference in Engagement scores between ethnic grouping of non-Caucasian and Caucasian.

Null 6 (H_0:6): There is no interaction effect.

In table 4, the means for Caucasians tended to be lower than that of Non-Caucasians, except for the standing senior and above ($M_{Caucasian}$=19.89, $M_{non\text{-}Caucasian}$=19.68), and the variance of the means tended to jump around as students' progressed in their academic career. The largest shift in standard deviation occurs in Non-Caucasians from the freshman to the sophomore year ($SD_{Non\text{-}Caucasian, Freshman}$=3.85, $SD_{Non\text{-}Caucasian, Sophomore}$=5.95), with a change of 35.3%. This would indicate that the surveyed freshman are more uniform in their perception of how Engagement is important to them than is the case for their sophomore counter-parts. For a maximum possible value of 30, these mean scores fall into the 65th percentile and were not as strong as was found with the Facilitated Learning scores.

Table 4

Descriptive Statistics of Students' Satisfaction - Engagement with Academic Standing and Ethnicity

Dependent Variable: Engagement

Academic Standing	**Ethnicity**	**Mean**	**Std. Deviation**	**N**
Freshman	Non-Caucasian	17.90	3.85	21
	Caucasian	17.50	4.45	54
	Total	17.61	4.27	75
Sophomore	Non-Caucasian	18.33	5.95	15
	Caucasian	18.30	4.54	33
	Total	18.31	4.96	48

Junior	Non-Caucasian	20.79	4.39	39
	Caucasian	19.43	5.17	79
	Total	19.88	4.95	118
Senior or above	Non-Caucasian	19.68	4.75	50
	Caucasian	19.89	4.43	85
	Total	19.81	4.54	135
Total	Non-Caucasian	19.57	4.73	125
	Caucasian	19.02	4.76	251
	Total	19.20	4.75	376

In table 5, there was a statistically significant effect of academic standing, denoted below as “dD1,” ($F_{3,368}$=4.45, p<.01). Academic standing accounted for 3.5% of the variance in the Engagement score. There was no statistically significant effect of ethnicity, denoted below as “dD5,” ($F_{1,368}$=.49, p>.05). Ethnicity accounted for no appreciable variance in the Engagement score. Further, there was no statistically significant interaction effect, denoted below as “dD1*dD5,” ($F_{3,368}$=.57, p>.05). Interaction accounted for no appreciable variance in the Engagement score.

These results indicated that we can safely reject the Null 4 hypothesis, but we fail to reject both Null 5 and Null 6 hypotheses. While academic standing does have an effect on students’ scoring in the Engagement dimension (4.5%), it accounts for very little of the total variance. There is no statistically significant effect from ethnicity or from an interaction effect on students’ scoring in Engagement.

Table 5

Tests of Between-Subjects Effects - Engagement with Academic Standing and Ethnicity

Dependent Variable: Engagement

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	384.97[a]	7	55.00	2.506	0.016	0.045
Intercept	98878.14	1	98878.14	4505.443	0.000	0.924
dD1	292.73	3	97.58	4.446	0.004	0.035
dD5	10.78	1	10.78	0.491	0.484	0.001
dD1 * dD5	37.52	3	12.51	0.570	0.635	0.005
Error	8076.27	368	21.95			

Total	147139.00	376
Corrected Total	8461.23	375

a. R Squared = .045 (Adjusted R Squared = .027)

In table 6, the researchers found significance between freshmen to juniors and seniors or above. However, there was no significance found between sophomores and any of the other groups.

Table 6 Academic Standing

Multiple Comparisons: Engagement - Scheffe

(I) Academic Standing	(J) Academic Standing	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	**Upper Bound**
Freshman	Sophomore	-0.86	0.86	0.804	-3.273	1.561
	Junior	-2.27*	0.69	0.014	-4.211	-0.325
	Senior or above	-2.20*	0.67	0.015	-4.096	-0.307
Sophomore	Freshman	0.86	0.86	0.804	-1.561	3.273
	Junior	-1.41	0.80	0.371	-3.648	0.824
	Senior or above	-1.35	0.78	0.398	-3.540	0.849
Junior	Freshman	2.27*	0.69	0.014	0.325	4.211
	Sophomore	1.41	0.80	0.371	-0.824	3.648
	Senior or above	0.07	0.59	1.000	-1.591	1.725
Senior or above	Freshman	2.20*	0.67	0.015	0.307	4.096
	Sophomore	1.35	0.78	0.398	-0.849	3.540
	Junior	-0.07	0.59	1.000	-1.725	1.591

Based on observed means.

The error term is Mean Square(Error) = 21.948.

*. The mean difference is significant at the .05 level.

The third set of analyses looked for demographic effects on the students' satisfaction dimension of Information Fluency. The null hypotheses were the following:

Null 7 (H_0:7): There is no difference in Information Fluency scores between academic standing groups.

Null 8 (H_0:8): There is no difference in Information Fluency scores between ethnic grouping of Non-Caucasian and Caucasian.

Null 9 (H_0:9): There is no interaction effect.

In table 7, the means for Caucasians tended to be marginally higher than that of non-Caucasians for freshmen and sophomores. Non-Caucasians' scores tended to be marginally higher than for Caucasians in the junior and senior and above years. The greatest difference would seem to be the scores Non-Caucasian juniors had as compared with their Caucasian counter-parts ($M_{non\text{-}Caucasian}$=12.03, $M_{Caucasian}$=11.56): a difference of nearly 4%. For a maximum possible value of 15, these means lie in the 77th percentile: a reasonable indication of agreement on the importance of this dimension of satisfaction.

Table 7

Descriptive Statistics of Students' Satisfaction - Information Fluency with Academic Standing and Ethnicity

Dependent Variable: Information Fluency

Academic Standing	Ethnicity	Mean	Std. Deviation	N
Freshman	Non-Caucasian	10.76	1.79	21
	Caucasian	10.98	1.74	55
	Total	10.92	1.74	76
Sophomore	Non-Caucasian	10.88	1.58	17
	Caucasian	11.18	1.75	34
	Total	11.08	1.68	51
Junior	Non-Caucasian	12.03	1.67	40
	Caucasian	11.56	1.81	84
	Total	11.71	1.77	124
Senior or above	Non-Caucasian	11.86	1.41	49
	Caucasian	11.75	1.71	92
	Total	11.79	1.61	141
Total	Non-Caucasian	11.60	1.65	127
	Caucasian	11.46	1.77	265
	Total	11.50	1.73	392

In table 8, there was a statistically significant effect of academic standing, denoted below as "dD1," ($F_{3,384}$=6.32, p<.01). Academic standing accounted for 4.7% of the variance in the Information Fluency score. There was no statistically significant effect of ethnicity, denoted below as "dD5," ($F_{1,384}$=.005, p>.05). Ethnicity accounted for no appreciable variance in the Information Fluency score. Further, there was no statistically significant interaction effect, denoted below as "dD1*dD5," ($F_{3,384}$=.8, p>.05). Interaction accounted for no appreciable variance in the Information Fluency score.

These results indicated that we can safely reject the Null 7 hypothesis, but we fail to reject both Null 8 and Null 9 hypotheses. While academic standing does have an effect on students' scoring in the Information Fluency dimension (5.1%), it accounts for very little of the total variance. There is no statistically significant effect from ethnicity or from an interaction effect on students' scoring in Information Fluency.

Table 8

Tests of Between-Subjects Effects - Information Fluency with academic standing & ethnicity

Dependent Variable: Information Fluency

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	59.57[a]	7	8.51	2.948	0.005	0.051
Intercept	37260.36	1	37260.36	12908.391	0.000	0.971
dD1	54.72	3	18.24	6.319	0.000	0.047
dD5	0.02	1	0.02	0.005	0.942	0.000
dD1 * dD5	6.93	3	2.31	0.800	0.494	0.006
Error	1108.42	384	2.89			
Total	53033.00	392				
Corrected Total	1168.00	391				

a. R Squared = .051 (Adjusted R Squared = .034)

In table 9, the researchers found significance between freshmen to juniors and seniors or above. However, there was no significance found between sophomores and any of the other groups.

Table 9 Academic Standing

Multiple Comparisons: Information Fluency - Scheffe

(I) Academic Standing	(J) Academic Standing	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Freshman	Sophomore	-0.19	0.31	0.939	-1.052	0.663
	Junior	-0.79*	0.25	0.018	-1.483	-0.095
	Senior or above	-0.87*	0.24	0.005	-1.544	-0.188
Sophomore	Freshman	0.19	0.31	0.939	-0.663	1.052
	Junior	-0.59	0.28	0.215	-1.381	0.193
	Senior or above	-0.67	0.28	0.116	-1.445	0.101
Junior	Freshman	0.79*	0.25	0.018	0.095	1.483
	Sophomore	0.59	0.28	0.215	-0.193	1.381
	Senior or above	-0.08	0.21	0.987	-0.664	0.509
Senior or above	Freshman	0.87*	0.24	0.005	0.188	1.544
	Sophomore	0.67	0.28	0.116	-0.101	1.445
	Junior	0.08	0.21	0.987	-0.509	0.664

Based on observed means.
The error term is Mean Square(Error) = 2.879.
*. The mean difference is significant at the .05 level.

Discussion and Conclusion

The results of this study focused on the differences that demographics, such as academic standing and ethnicity, might have on the student satisfaction dimensions of Facilitated Learning, Engagement, and Information Fluency. The three null hypotheses that covered the differences between academic standing and Facilitated Learning, Engagement, and Information Fluency were found to be statistically significant (the largest variance accounted for was Facilitated Learning and academic standing, which was nearly 15%; the other two were, respectively, 4.5%, and 5.1%), but they account for little of the variation in the scores on the studied dimensions of student satisfaction. There was no significance found between ethnicity and any of the student satisfaction dimensions, and neither was there significance with interactions between academic standing and ethnicity.

In this study, the researchers found that the error values account for almost all of the effect. This fact implies something else is at work: the demographics have little to do with what influences the scores in these groupings. These researchers can imagine that once a student is at college, the influences on the scores might be interactions between the score groupings, like Facilitated Learning interacting with Engagement, which in turn might be interacting with Information Fluency. Or, there may be other demographic factors at work, including ones that were not collected in the survey, such as degree major, GPA, or other indicators of academic history.

The intent of this study was to determine what effects that the demographics of academic standing and ethnicity have on the dimensions of student satisfaction. With error accounting for most of the variance, these researchers recommend a follow on project to look at the interactions between the groupings as suggested above. However, this study demonstrates that the demographics of academic standing and ethnicity have little to no influence on student satisfaction dimensions of Facilitated Learning, Engagement, and Information Fluency for their (i.e., the students') online learning experiences.

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