WHICH STUDENTS ARE AT HIGHEST RISK ONLINE?
Online course outcomes and subsequent college attrition

Claire Wladis, Borough of Manhattan Community College/City University of New York and the City University of New York Graduate Center

Alyse C. Hachey, Borough of Manhattan Community College/City University of New York

Katherine M. Conway, Borough of Manhattan Community College/City University of New York

Key Takeaways:

Students with children and native-born students were both significantly less likely to successfully complete an online course than would be expected based on face-to-face performance.

Students who enrolled in online courses were less likely to persist in college, but online course outcomes had no direct effect on college persistence. Thus, students didn't drop out of college because of poorer outcomes in the online environment.

Online learning has been widely adopted in higher education; increased online enrollments are expected to continue (Allen & Seaman, 2010; 2016; Jaggars & Xu, 2010; Pontes, Hasit, Pontes, Lewis, & Siefring, 2010). However, a major concern are online course dropout rates, which range from 20-40% (e.g. Pierrakeas, Xenos, Panagiotakopoulos, & Vergidis, 2004); and which have been reported in some studies to be 7-20 percentage points higher than those for face-to-face courses (Hachey, Wladis & Conway, 2013). Online courses may provide increased access to college (Johnson & Mejia, 2014), but if they also have higher attrition (as has been widely documented), then there is the potential that online course enrollment might also hinder degree completion. Currently, there is little research on the effects of online course enrollment on college persistence and completion, and available results are mixed (see e.g. Shea & Bidjerano, 2014; Xu & Jaggars, 2011).

There are significant differences in the background characteristics of students taking online versus face-to face courses (Lack, 2013). Research shows that online learners are more likely to be: female, older, married, active military or to have other responsibilities such as work full time and/or have children. Further, they are more likely to have other "non-traditional" characteristics, such as delayed college enrollment; no high school diploma; part-time enrollment; and financial independence (e.g. Shea & Bidjerano, 2014; Wladis, Hachey, & Conway, 2015). Additionally, the research reports that online students tend to have higher academic preparation, to be white, native English speakers and they are more likely to have applied for or received financial aid (Jaggars & Xu, 2010; Xu & Jaggars, 2011).

Thus, the characteristics that drive students to enroll in online courses are likely also correlated to course dropout (Jaggars & Bailey, 2010; Smith, 2016; Wladis, Hachey & Conway, 2015c). Therefore, examining

student characteristics may help to predict which students are at highest risk online; however, past research on the impact of student characteristics is conflicting (Jones, 2010). To accurately analyze whether a specific characteristic puts a student at greater risk in the online environment, it is essential to assess the *interaction* between that characteristic and course medium, while at the same time controlling for self-selection into online courses. This interaction measures the extent to which groups of students do worse online than would be expected given their face-to-face performance. For example, students with lower GPAs will be at higher risk of dropout and failure in both online and face-to-face courses; however, it is unclear whether the online environment increases the gap between students with low and high GPAs; if it does, this would be a significant interaction between the online medium and student GPA.

Two noteworthy studies have looked at the interaction between student characteristics and course medium. Xu and Jaggars (2013) report that Black students and students with lower G.P.A.'s did worse online than would be expected based on their face-to-face performance, and that women and older students did better than would be expected online. Wladis, Conway & Hachey (2015) found that older students did significantly better online and women did significantly worse online (but no worse than men), than would be expected based on their comparable face-to-face course outcomes. Additionally, they report no significant interaction between the online medium and race/ethnicity, suggesting that online courses do not increase (or decrease) the outcome gap by race/ehtnicity. However, while they did control for some self-selection factors, both studies relied solely on institutional research data, and therefore, excluded important life and affective characteristics which may be important

predictors of differential online versus face-to-face performance.

Methods

Drawn from the 19 two- and four-year colleges in the City University of New York (CUNY) system, this study used a sample of 9,663 students with 37,442 course records. Students were invited to participate in an online survey if they were enrolled in an online course section, or a face-to-face section of one of those courses, offered during the fall 2014 semester at one of the CUNY colleges. Course medium was dichotomized to face-to-face (33% or less online) or fully online (80% or more) based on Sloan Consortium definitions (Allen & Seaman, 2010). Hybrid students (34-79% online content) were grouped with face-to-face students since prior research suggests that students who take hybrid courses are substantially similar in both characteristics and outcome to students who take face-to-face courses (Xu & Jaggars, 2011).

Two measures of student outcomes were explored: successful course completion (i.e. whether the student successfully completed a course with a C- or higher), and college persistence (i.e. whether the student re-enrolled in college in the subsequent spring semester). Based on the literature, covariates included: whether the student had a child (and age of youngest child); gender; race/ethnicity; age; work hours; income; parental education; developmental course placement; marital/cohabitation status; immigration generational status; native speaker status; college level (two-year, four-year, or graduate); G.P.A; and number of credits/classes taken that semester. Additionally, the survey included validated scales measuring: motivation to complete the course; course enjoyment/engagement; academic integration (i.e. interaction with faculty/students outside class); self-directed learning skills; time management skills;

preference for autonomy; and grit (i.e. perseverance and passion for long-term goals).

Results

The most consistent pattern observed was that native-born students (particularly those with two native-born parents) were at greater risk than foreign-born students online. Figure 1 illustrates this pattern by showing predicted probabilities of successful course completion for a theoretical set of students who have the same values for all other variables in the model but differ only by course medium and immigrant generational status.
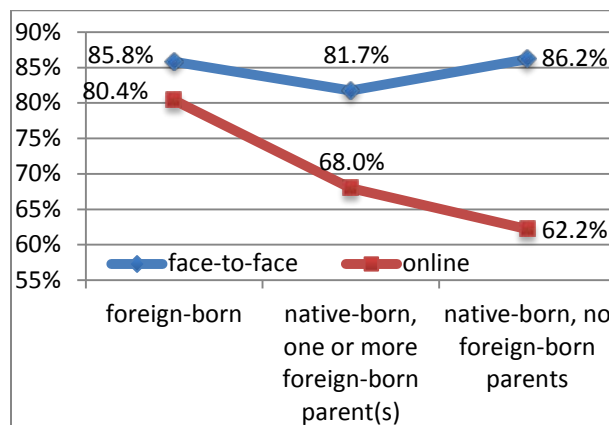

Figure 1. Predicted probabilities of successful course completion by immigrant generational status (using full model, reference groups)

Additionally, having a child under 6 years of age was a significant predictor of lower rates of successful course completion when comparing the same course taken by matched groups of student parents. The pattern was similar, although not significant, when comparing outcomes in online-versus-face-to-face classes taken by the same student. Repeating the analysis examining whether the student had a dependent child of any age, as opposed to a child under six years, produced similar results.

Figure 2 demonstrates this trend by showing predicted probabilities of successful course completion for a theoretical set of students who have the same values for all other variables in the model but differ only by course medium and parental status.
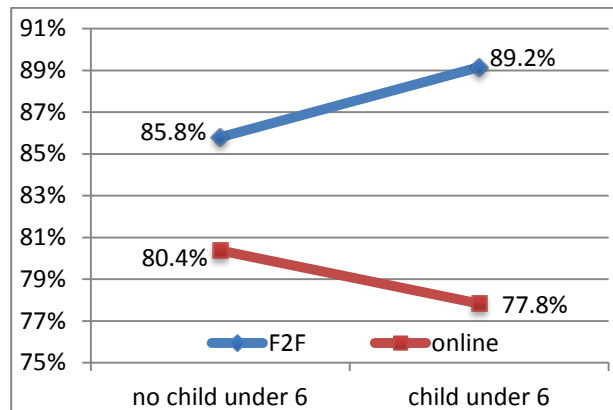

Figure 2. Predicted probabilities of successful course completion by parental status (using full model, reference groups)

No other factors (e.g. ethnicity, GPA) were significant predictors of differential online-versus face-to-face performance. So, for example, some ethnic minority groups and students with lower GPAs were both less likely to successfully complete the course in either medium, but this gap was not significantly increased in the online environment.

Discussion

In this study, we observed a pattern in which foreign-born and native-born students had similar face-to-face outcomes, but in which foreign-born students had significantly better online outcomes than comparable native-born students. One possible explanation for this pattern is that some research has shown that certain immigrant groups may not actively participate in face-to-face classroom discussions because of cultural norms, but that online discussions yielded more opportunity for interaction and participation among immigrant students (e.g. Campbell, 2007; Yildiz & Bichelmeyer, 2003).

At CUNY, where this research was conducted, roughly 40% of students are foreign-born; thus, results may differ in

institutional contexts where foreign-born students make up a much smaller proportion of the population.

In the patterns observed with student parents in this study, students with children had lower successful course completion rates online than face-to-face, whereas students without children did not. The reason for this pattern may be that student parents are more likely to enroll in online courses when they have greater time constraints, and then these same students are less likely to successfully complete a course; this is supported by research that reports that time poverty mediates parenthood and college outcomes (Wladis, Hachey & Conway, n.d.). Because this pattern was only significant when comparing the same course taken by different students (and not when comparing different online versus face-to-face courses taken by the same student), this suggests that these trends may be caused by student parents with more complicated lives enrolling in online courses at higher rates, even when they otherwise seem to be comparable to student parents enrolled in face-to-face sections of the same class.

This strongly suggests that without support for student parents (e.g. childcare, adequate financial aid to reduce work hours), the flexibility that online courses provide may not be enough to compensate for the time demands of parenthood.

We also examined whether the college persistence of online students is directly related to the outcomes of their online courses. Students were significantly less likely to persist in college as measured by re-enrollment at the university in the subsequent semester after taking an online course. However, results show that there is no significant indirect effect, indicating that online students are not more likely to drop out of college immediately after, or due to, the outcomes of their online course. Rather,

findings indicate that other student characteristics beyond online course outcome may be significant in predicting both online course enrollment and college persistence.

Implications

This study strongly suggests that colleges wanting to target interventions to vulnerable students in the online environment may want to focus on supporting native-born students in contexts where foreign-born students are heavily represented and on supporting student parents enrolled in online courses (e.g. by providing better access to childcare or to financial aid that would allow them to pay for childcare).

While these are the students found by this study to be most at-risk in the online environment relative to their face-to-face performance, these groups do not necessarily have the poorest absolute online outcomes. For example, in this study, household income was strongly correlated with course and college outcomes, both for online and face-to-face mediums. Thus, lower-income students likely still need significant support, regardless of instructional modality. So, beyond targeting student groups that are at-risk specifically in the online environment, colleges aiming to improve retention should continue to support online student groups that have historically been identified as vulnerable in the face-to-face environment.

Furthermore, online course outcomes were found to have no direct effect on college persistence. Thus, taking online courses likely does not lead directly to lower rates in college persistence on average. This suggests that policies which add barriers or limit access to online courses may have little impact in addressing concerns about potential college dropouts. Instead, there seem to be characteristics that lead students to both enroll in online college and

drop out of college at higher rates. Further empirical research is needed to identify these characteristics so that targeted support can be provided.

Acknowledgments

References

Allen, I. E., & Seaman, J. (2010). *Class differences: Online education in the United States, 2010.* (No. ED529952).Sloan Consortium. Retrieved from http://sloanconsortium.org/publications/survey/class_differences

Allen, E. & Seaman. J. (2016). Online report card: Tracking online education in the United States. Retrieved from: http://onlinelearningsurvey.com/reports/onlinereportcard.pdf

Angiello, R. S. (2002). *Enrollment and success of Hispanic students in online courses.* (No. ED 469 358). Washington, D.C.: U.S. Department of Education, Office of Educational Research and Improvement Educational Resources Information Center (ERIC).

Aragon, S. R., & Johnson, E. S. (2008). Factors influencing completion and noncompletion of community college online courses. *American Journal of Distance Education, 22*(3), 146-158. doi:10.1080/08923640802239962

Atkins, S. (2013,). Ambient Insight Whitepaper: The 2012 boom in learning technology investment. *USnews.Com*

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovsk, E., Wade, A., Wozney, L., . . . Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379-439. doi:10.3102/00346543074003379

Bernard, R. M., Brauer, A., Abrami, P. C., & Surkes, M. (2004). The development of a questionnaire for predicting online learning achievement. *Distance Education, 25*(1), 31-47. Retrieved from http://eric.ed.gov/?id=EJ680546

Bowen, W. G., Chingos, M. M., Lack, K. A., & Nygren, T. I. (2012). Interactive learning at public universities: Evidence from randomized trials. *Journal of Policy Analysis and Management, 33*(1), 94-111. doi:10.1002/pam.21728

Campbell, N. (2007). Bringing ESL Students Out Of Their Shells: Enhancing Participation Through Online Discussion. *Business Communication Quarterly, 70*(1), 37-43.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087-1101.

DuGoff, E. H., Schuler, M., & Stuart, E. A. (2014). Generalizing observational study results: applying propensity score methods to complex surveys. *Health Services Research, 49*(1), 284-303.

Hachey, A. C., Wladis, C. W., & Conway, K. M. (2012). Is the second time the charm? Investigating trends in online re-enrollment, retention and success. *Journal of Educators Online, 9*(1) Retrieved from http://www.thejeo.com/Archives/Volume9Number1/V9N1.htm#VOLUME_9,_NUMBER_1,_JANUARY_2012

Hachey, A., Wladis, C., & Conway, K. (2013). Balancing retention and access in online courses: Is it worth the cost? *Journal of College Student Retention: Research, Theory and Practice, 15*(1), 9-36.

Hair, J. F. J., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis* (5th ed.). Upper Saddle River, New Jersey: Prentice Hall.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Jaggars, A. and Bailey, T. (2010). Effectiveness of fully online courses for college students: A response to a Department of Education meta-analysis , Community College Research Center, Teachers College Columbia University.

Jaggers, S., & Xu, D. (2010). *Online learning in the Virginia community college system.* Retrieved from Commuity College Research Center, Teachers College, Columbia University.

Jaggars, S. S. (2011). *Online learning: Does it help low-income and underprepared students?* (No. CCRC Working Paper 26).Community College Research Center, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/online-learning-help-students.pdf

Jones, E. H. (2010). *Exploring common characteristics among community college students: Comparing online and traditional student success* (Ph.D.).

Kohler, U., Karlson, K. B., & Holm, A. (2011). Comparing Coefficients of Nested Nonlinear Probability Models. *Stata Journal, 11*(3), 420-38.

Lack, K.A. (2013). Current status of research on online learning in postsecondary education. Retrieved from: http://www.sr.ithaka.org/wp-content/uploads/2015/08/ithaka-sr-online-learning-postsecondary-education-may2012.pdf.

Macan, T. H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. . *Journal of Educational Psychology, 82*(4), 760-768.

Nora, A., & Snyder, B. P. (2009). Technology and higher education: The impact of e-learning approaches on student academic achievement, perceptions and persistence. *Journal of College Student Retention: Research, Theory & Practice, 10*(1), 3-19. doi:10.2190/CS.10.1.b

Patterson, B., & McFadden, C. (2009). Attrition in online and campus degree programs. *Online Journal of Distance Learning Administration, 12*(2) Retrieved from http://www.westga.edu/~distance/ojdla/summer122/patterson112.html;

Pierrakeas, C., Xenos, M., Panagiotakopoulos, C., & Vergidis, D. (2004). A comparative study of dropout rates and causes for two different distance education courses. . *The International Review of Research in Open and Distance Learning, 5*(2)

Pintrich, P. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40. doi:10.1037/0022-0663.82.1.33

Pontes, M.C.F., Hasit, C., Pontis, N.M.H, Lewis, P.A., Siefring, K.T. (2010). Variables related to undergraduate students preference for distance education courses. *Online Journal of Distance Learning Administration, 13*(2).

Shea, P., & Bidjerano, T. (2014). *Does online learning impede degree completion? A national study of community college students.. Computers & Education, 75*, 103-111.

Smith, N.D. (2016). Examining the effects of college courses on student outcomes using a joint nearest neighbor matching procedure on a state-wide university system. North Carolina State University. Retrieved from https://aefpweb.org/sites/default/files/webform/41/NicholeDSmith_ExaminingOnline.pdf

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2009). *Beginning postsecondary students longitudinal study.* (). Washington, D.C.: U.S. Department of Education. Retrieved from http://nces.ed.gov/surveys/bps/

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Valliéres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement, 52*, 1003-1017.

Waschull, S. B. (2005). Predicting success in online psychology courses: Self-discipline and motivation. *Teaching of Psychology, 32*(3), 190-192. doi:10.1207/s15328023top3203_11

Welsh, J. B. (2007). *Identifying factors that predict student success in a community college online distance learning course.*(Ed.D.). (AAT 3300982).

Wladis, C., Hachey, A.C. & Conway, K.M. (n.d.) No time for college? An investigation of Time Poverty and parenthood.

Wladis, C., & Samuels, J. (2016). Do online readiness surveys do what they claim? Validity, reliability, and subsequent student enrollment decisions. *Computers & Education, 98*, 39-56. doi:10.1016/j.compedu.2016.03.001

Wladis, C., Conway, K. M., & Hachey, A. C. (2015). The Online STEM Classroom—Who Succeeds? An Exploration of the Impact of Ethnicity, Gender, and Non-traditional

Student Characteristics in the Community College Context. *Community College Review,* doi:10.1177/0091552115571729

Wladis, C., Hachey, A. C., & Conway, K. M. (2015). The Representation of Minority, Female, and Non-Traditional STEM Majors in the Online Environment at Community Colleges: A Nationally Representative Study. *Community College Review, 43*(1), 89-114. doi:10.1177/0091552114555904

Xu, D., & Jaggars, S. S. (2011). The effectiveness of distance education across Virginia's community colleges: Evidence from introductory college-level math and English courses. *Educational Evaluation and Policy Analysis, 33*(3), 360-377. doi:10.3102/0162373711413814

Xu, D., & Jaggars, S. S. (2013). *Adaptability to online learning: Differences across types of students and academic subject areas.* (No. CCRC Working Paper No. 54).Community College Research Center, Columbia University. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/adaptability-to-online-learning.pdf

Yildiz, S., & Bichelmeyer, B. A. (2003). Exploring Electronic Forum Participation and Interaction by EFL Speakers in Two Web-based Graduate-level Courses. *Distance Education, 24*(2), 175-193.