Online or Face-to-Face? The Modality of a Learning Strategies Course and Impacts on Grades, GPA, Retention, and Persistence for Developmental Students

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Abstract

   As some research indicates that developmental students are more at risk in online learning (Jaggers & Xu, 2010; Xu & Jaggers, 2013), it is important to provide additional supports for students enrolled online. One of the ways to support developmental students is in providing learning strategies or college success coursework. At the institution of study, a one-credit hour learning strategies course is available to students online and in person and is provided at no cost to developmental students transitioning to credit-bearing coursework. Therefore, a concern is whether the students in the online course are disadvantaged by the modality, particularly during the pandemic when choice was limited. This research indicates that students who take the learning strategies course face-to-face do have better grades overall, but do not have a significantly higher GPA or persistence and retention rate. Outcomes are essentially the same for students before and during the pandemic. Overall, outcomes suggest that students are not materially harmed by taking the learning strategies course online with the caveat that grades may be higher in face-to-face coursework.

Keywords: Correlational research, developmental education, learning strategies, online learning, academic outcomes, pandemic

According to the National Center for Education Statistics, 36% of undergraduate students took at least one distance education course in 2019 (National Center for Education Statistics, 2023). During 2020, students in distance education rose to 75%. Though meta-analyses of online education defend the equivalence of online and face-to-face outcomes, during the pandemic online learning was introduced to a population that was unfamiliar with it and, in some cases, unprepared for it. This is particularly important for developmental students who are likely to have a deficit in study strategies and nonacademic skills which can be exacerbated online (Jaggars & Bickerstaff, 2018; Jenkins et al., 2009; Karp et al., 2017).

Though online learning has developed strong foundations over the past two decades, the average student and teacher were not prepared to make the switch to online learning that COVID-19 made necessary. K-12 schools were subject to a national experiment in how to take a platform that has, for the most part, not existed online, to one that was either supplemented by online material, hybrid in delivery mode, or entirely online. Colleges, though more prepared for this transition, still had to require instructors who were untrained into an online environment they were unprepared to manage. Distance education course enrollment increased by a dramatic 93% by the end of 2020 as compared to the fall 2019, and overall enrollment dropped as well, particularly at community colleges (Lederman, 2021). Fifty-nine percent of colleges included in Lederman's report also indicated that they plan to sustain their distance education offerings post-pandemic (Lederman, 2021). However, Means and Neisler (2020) found in a national survey of college students that students' satisfaction in spring 2020 sharply declined from 51% satisfaction before their course went online to 19% after. Students cited motivation as the primary issue with the shift, with 79% of students indicating this was a problem (Means & Neisler, 2020). Other issues they cited were the loss of the presence of the instructor and peers, hands on learning experiences, and discussion. However, students did feel the expectations were still clear, they knew where to get help and they felt their instructors knew them (Means & Neisler, 2020). In a government sponsored survey, Mukhtar and colleagues determined that the advantages of e-learning were in the flexibility, accessibility, and student-centered learning environment, specifically self-directed and asynchronous learning (Mukhtar et al., 2020). In addition to the disadvantages noted by Means and Neilser (2020), lack of feedback from students, attention span, and cheating were also cited as issues (Mukhtar et al., 2020). The pandemic allowed researchers the unprecedented ability to evaluate the impacts of online education without selection bias as many students who would not have ordinarily chosen to study online became online students. As such, the future of online education will be shaped by the lessons that we learn from these years.

Literature Review

Online Education Effectiveness

When considering online education as a whole, the consensus is that online education is effective when controlling for other factors. Those other factors are particularly important to consider for developmental education students. Since the topic has far reaching impacts, there have been a number of large-scale analyses conducted to determine whether online education offers similar outcomes to face-to-face instruction. For the most part, these conclude that online education is as effective or even more effective than face-to-face education (Bowen et al., 2014; Cavanaugh & Jacquemin, 2015; Hachey, 2020; Means et al., 2010; Means et al, 2013; Shachar & Neumann, 2010). It would seem this is the end of the discussion, but many other studies have found that other characteristics such as course

design, demographics, and academic preparedness play a role and that online education may not be equally useful for all.

Asynchronous Online Courses, Synchronous Online Courses, and Compared Face-to-face Courses

The delivery format of instruction is a factor in student success, retention, persistence, and graduation. Therefore, it is relevant to examine differences between asynchronous online, synchronous online, and face-to-face (F2F) educational outcomes. Most of the data indicates that online learning and face-to-face learning can have similar outcomes when controlling for mediating variables (Carol & Burke, 2010; Cavanaugh & Jacquemin, 2015; Ebner & Gegenfurtner, 2019; Means et al., 2010; Nguyen, 2015; Somenarain et al., 2010). Asynchronous and synchronous online models can also demonstrate similar knowledge outcomes and positive instructor perceptions as well if course design is effective and motivation is present (Presley et al., 2023).

On the other hand, Xu and Jaggars (2011) found online and face-to-face modalities for introductory math and English indicated a negative correlation between online modality and both retention and course performance. In follow up research, Xu and Jaggars (2012) also observed persistence and achievement were negatively correlated in the online format as well. Their research is specifically targeted at community college students which makes their work particularly relevant to the students in this study. They also note that "time management and independent learning skills" might be "critical to success," (Xu & Jaggars, 2012, p. 55). With the majority of research pointing to no major impact or harm from online coursework, it is practical to continue to provide online courses in order to meet the needs of particular students, but it is also important to stay alert for possible negative outcomes as well.

Online Education and Developmental Learners

If online education can be effective, then the question becomes: *Who does this methodology have a propensity to fail?* In the community college setting, the research of Xu and Jaggars finds that young, Black, male students who were not academically proficient previously are specifically less successful in online environments (Xu & Jaggars, 2013). Though research on developmental learners specifically is virtually non-existent (Rutschow & Schneider, 2012), Petrides and Nodine (2005) remark that student readiness, face-to-face interactions, access, and diverse student needs are all factors that should be evaluated before recommending online coursework to developmental learners. Like Xu and Jaggars (2013), they note that soft skills such as time management, literacy, and independent learning are all necessary to online learning and are not skills which developmental learners typically have mastered. This emphasis on soft skills is similar to other research that emphasizes self-regulation, self-efficacy, motivation, and self-empowerment (Jantz, 2010; Martin et al., 2014; Wadsworth et al., 2007) Wadsworth and colleagues (2007) also found that concentration, information processing, and self-test skills impacted final grade outcomes. Research by Weems (2002) and Carpenter (2004) find that academic results are somewhat similar in developmental online courses, but that dropout rates are higher online.

Petride and Nodine (2005) and Castillo (2013) indicate that differing populations can lead to different outcomes, as adult, nontraditional students have differing needs than those of the younger, more academically at-risk students, though both end up in developmental education. For older students, the flexibility of online education may be essential. However, Castillo generally argues that there is a larger risk in offering this type of course online, citing a partnership between San Jose State University and an online education provider that offered

introductory level classes and was ultimately named a failed experiment due to low pass rates (Castillo, 2013). Though this research is not centered on developmental education courses, since the population this study focuses on are developmental education students, it is relevant to note that online and face-to-face courses could have different outcomes.

Online Classrooms: Best Practices

There is a breadth of information about best practices in the online classroom ranging from course design to technology implementation; one best practice is that course design must be deliberate (Fish &Wickersham, 2009; Maddix et al., 2012,). Often teachers simply upload PowerPoints or handouts from their in-person classes which is ineffective. Research shows that students find online videos as the preferred method of distance education if traditional courses are not possible (Downing, 2020). Another best practice is faculty support and collaboration (Fish & Wickersham, 2009). Given the amount of work and expertise that is required in building effective online courses, faculty collaboration could go a long way in curating meaningful content. Providing student support in terms of technology use, time management, and study strategies is cited as another best practice (Fish & Wickersham, 2009). Students with greater academic preparation historically do better than those with subpar preparation (Jaggars & Xu, 2010). Therefore, many recommend providing this type of academic support and preparation for students to ensure equitable access. One of the ways to do this is in providing learning strategies courses that help students adjust to college academic expectations, college life, and college study strategies (Linder et al., 2018). Another form of providing student support is creating social presence and facilitating in the online environment (Fish & Wickersham, 2009; Downing, 2020; Maddix et al., 2012). Social presence is a student's sense that a professor is real, tangible, and available to them. Finally, reflection on and analysis of the effectiveness of the course and its outcomes are essential. Self-evaluation is crucial for growth and improvement and, as such, is a best practice in online education too. Therefore, since there can be a wide array of methods in online instruction, outcomes can be difficult to classify when the modality can fluctuate so widely.

Social Presence in the Online Classroom

A key issue of online learning is the social presence of the instructor. Though this is defined in a variety of ways, most definitions include students' perceptions of the instructor as "real" and accessible. However, some studies extrapolate teacher presence and social presence, defining teacher presence as the instructor interactions with students and content and social presence as including the community of the course (Garrison et al., 2001). These are not separate metrics as Shea and colleagues (2019) indicate in their research, but rather strong teacher presence is correlated with stronger community whether in facilitation or instructional design. A meta-analysis of studies on social presence indicates positive correlations between social presence and satisfaction and social presence and perceived learning (Kimbark et al, 2017). This is consistent with other findings (Gunawardena & Zittle, 1997). In a study of Chinese university students during the COVID-19 pandemic, the authors found that interaction, course satisfaction, and academic self-efficacy were related (She et al., 2021). Additionally, self-efficacy was related to engagement and that engagement correlated with satisfaction.

Teacher facilitation, instructional design and organization were also correlated with students' positive sense of learning communities (Shea et al., 2019). Recent research has also indicated that teaching presence can have an impact on learning outcomes directly (Martin et al., 2022). Whether it is simply perception of the course or in actual learning outcomes, social or teacher presence should not be discounted. If a belief that a teacher is available and

engaged can lead to stronger satisfaction, this satisfaction can lead to stronger learning outcomes overall (Oja, 2011). However, a student's perceptions of social presence can still fall short of being statistically significant to learning outcomes (Hostetter & Busch, 2006). For the purpose of online course design, it is important to note that social presence matters in some tangible ways and even if learning outcomes are not clearly measurable, there are enough other positive outcomes to support robust teacher facilitation, building strong learning communities and careful course design.

Learning Strategies Coursework Online

Students may need a particular sort of readiness in order to succeed online (Petrides & Nodine, 2005; Xu & Jaggers, 2013), and developmental education research suggests that these nonacademic skills contribute to developmental students' readiness (Jaggars & Bickerstaff, 2018; Jenkins et al., 2009; Karp et al., 2017). One of the methods colleges have been employing to provide these skills are college success or learning strategies courses. Research has demonstrated the positive academic impacts of these courses to be higher persistence rates, increased credential attainment, and higher GPA and grades for students who have taken these learning strategies or success courses (Fowler & Boylan, 2010; Kimbark et al., 2017; Tuckman & Kennedy, 2011; Zeidenburg et al., 2007). If learning strategies coursework skills are necessary in bridging achievement gaps both overall and online, then it would be important to see if modality impacts academic outcomes in these courses. However, there is very little research on learning strategies courses and course modality, and what there is does not measure academic outcomes (Abts, 2012). This is problematic since the research on online education is still mixed. Most meta-analyses note that online education has essentially equitable impacts, especially when controlling for other variables. However, the research on developmental learners and online modalities is sparse. The little there is reports negative impacts, and the research on learning strategies courses with regard to modality is even more untapped. It is important then to evaluate if this coursework's efficacy is impacted by the way it is delivered.

Framework

The overarching framework for this study is one proposed by Kolenovic, Linderman, and Karp (2013). They propose three constructs to increase graduation rates: academic momentum, support services, and college belonging. Though academic momentum is important for the acceleration of developmental education programs, it is not as relevant for the purposes of this study. As such, the support services and college belonging components of this framework will be the primary focus as they are the mission of the learning strategies coursework and are of particular importance.

Support services are critical for students to obtain degrees. In Kolenovic and colleagues' (2013) research over the Accelerated Study in Associate Programs (ASAP) in the CUNY community college system, advising was a significant predictor of graduation. Though only 28% of the sample had completed developmental coursework prior to beginning ASAP, the significance of advising support might even be more crucial for this population. In fact, ASAP has additional requirements in their Start program for developmental students, including a learning strategies course (The City University of New York, 2017). According to O'Gara and colleagues (2017), these learning strategies courses are an integral part of these support services. Not only did these courses help them obtain study skills, but they also

learned about the services the college offered and developed relationships (O'Gara et al., 2009).

Not only are support services integral but so are the relationships formed Tinto (1975; 2006) and Astin (1997, 1999), and Bean and Eaton's (2001) research on belonging dovetail here to support the concept that relationships are essential for increasing persistence. Astin (1999) claims that time is the most valuable resource a college student has and as such, when students invest more time on campus than off, they are more likely to be committed to the process of obtaining a degree. Similarly, Bean and Eaton (2001) found that students who spent time internally interacting with faculty, staff, and peers were more persistent than students who spent time invested externally with family, non-college friends, and external employers. Tinto (1975) equates this to the process of cost-benefit analysis, where students weigh the benefits of their goal attainment with the literal cost of college, and the social cost of withdrawing from their current communities. When those communities are found within the institution granting their degree, there is less social cost to attending college. Bean and Eaton (2001) also found that the explicit instruction of study skills, time management, and resource utilization increased students' coping skills which can impact persistence and retention when students are faced with unexpected challenges.

The research of Tinto (1975, 2006), Astin (1997, 1999) and Bean and Eaton (2001) falls primarily before the rise of robust and almost ubiquitous online course offerings, which begs the question: *How do colleges engage students who never step foot on campus?* To indicate that no online students will be engaged would be inaccurate, so research on social presence is key to filling this gap. Social presence or teacher presence seek to measure the ways in which online students engage with their online peers and instructors. In a world of increasing social engagement online, we cannot discount the ability of online communities to give a sense of belonging. Social presence research indicates that students can and do connect and engage in online classrooms, and this connection can drive some real-world outcomes in terms of engagement, perceptions, and achievement (Garrison et al., 2001; Gunawardena & Zittle, 1997; Kimbark et al., 2017; Martin et al., 2022; She et al., 2021; Shea et al., 2019). As such, it is important to consider the design and facilitation of online coursework as a way to bridge the physical barrier of college attendance and contribute to this momentum.

Learning strategies courses provide both academic and social support for students, ultimately giving students more potential for increased GPA which can lead to increased persistence and then ultimately, higher graduation rates (Pascarella & Terenzini, 2005). Research on learning strategies and college success courses specifically for developmental students indicate that students have greater credit acquisition and persistence, creating greater academic momentum. Therefore, learnings strategies courses should be considered as a means to increase these rates and as such, it is responsible to evaluate whether the modality in which they are offered will produce similar outcomes.

Methodology

Participants

Participants were developmental education students who have taken the learning strategies course from fall 2018-spring 2022 either synchronously online or asynchronously online. During this time frame, the course was offered to developmental students for free as a means of encouraging students who were more at risk to obtain support. As such, there is likely a more representative sample than other semesters. Data was obtained from archives

held by the institution. Developmental students are those who are required to take a developmental English, reading, or math course before enrolling in the general education course or students in the English for Academic Purposes sequence. For the Spring 2020 semester, students who completed the course before the college shut down in March were also included, but those who took the course after the shutdown in the spring of 2020 were removed from the sample (N=10). These students were required to take the course online regardless of preference and were therefore removed as they had the potential to skew the sample.

From Fall 2018 to Spring 2022, there were 354 students overall: 200 taking the course face-to-face and 154 taking the course online or hybrid. Before the pandemic, 59 students took the course online and 142 face-to-face. During the pandemic, 95 students took the course online and 58 face-to-face. I collected race, gender, age, Pell grant status, full/part time, and degree-seeking demographics and included those in the multiple regression analysis, in addition to whether or not the student was currently enrolled in developmental education, previously enrolled, or never enrolled. Outcomes for students from 2018-2019 were collected and compared by course modality as well as outcomes from 2020-2022. Outcomes included are grade in the course, GPA during and following semester, retention, and persistence. The course was offered both online and in person even during the pandemic.

Table 1

Summary Statistics: Modality

Variable	*N*	Mean	Standard Deviation	min	max
Face-to-face Modality	354	56%	.4964624	0	1
Scholarship Recipient	354	38%	.4849902	0	1
Degree Seeking	354	90%	.3063667	0	1
Received Pell Grant	354	35%	.4777336	0	1
Term Full Time Status	354	58%	.494403	0	1
Black	354	10%	.2950703	0	1
American Native	354	.3%	.0531494	0	1
Asian	354	4%	.1951706	0	1
White	354	49%	.5005079	0	1
Hispanic	354	16%	.3680668	0	1
Pacific	354	.6%	.0750581	0	1

International	354	8%	.2658072	0	1
Not Reported	354	5%	.2080316	0	1
Two or More Races	354	9%	.2830695	0	1
Female	354	67%	.5067998	0	3
Grade	328	2.865854	1.422942	0	4
GPA Prior Sem.	273	2.846117	.8638365	0	4
GPA Following Sem.	298	2.829564	.8456819	0	4
Retain	354	84%	.3654375	0	1
Retain/Transfer/ Graduate	354	88%	.3238269	0	1

Note: All binary variables express their mean in terms of percentage. For GPA and Grade, the mean indicates the GPA on a 4-point scale or the grade with 4 indicating an A, 3 a B, and so on.

Procedure

Multiple regression analysis for 201819 was performed on grades, GPA during and after, retention and persistence disaggregating by course modality. I ran separate analyses on Fall 2020 to Spring 2022 semesters. As noted above, I eliminated 10 students who took the learning strategies course from March 2020–May 2020 as they were unable to choose their modality. I included race, gender, age, Pell grant status, full/part time, and degree seeking as control variables and disaggregated results by developmental and non-developmental students.

Results

I ran four multiple regression analyses with *y* being grades, GPA, retention and persistence and *b1* whether the student was face-to-face in their learning strategies course. The regression equation is $Y=b0+b1+b2\ldots b14+E$. The intention is to determine if face-to-face instruction is correlated with differing outcomes, however I only know if the student was face-to-face in this course (not if they are entirely online), so I can only draw correlations between modality for the learning strategies course and outcomes.

Grade in Course and Modality: Overall

As demonstrated in the tables below, students' grades in the course are significantly higher at $p<.05$ and over a half letter grade higher if they are face-to-face versus online or hybrid modalities. This is true prior to the pandemic but becomes slightly insignificant at just over $p<0.053$ for the pandemic years. Age and gender have a statistically significant impact here as well, indicating that overall course grade is higher for older students and female students. American natives and two or more races are also significant, but since both have very low n values, I would be hesitant to draw any conclusions from this. American natives only account for .3% of the overall sample. Two or more races is much higher at 9%, but this still is a small value in a 354-person sample.

Table 2

*Regression Table of Grade Correlated with Course Modality*

	Grade in Course	Grade in Course Pre-Pandemic	Grade in Course Pandemic
Face-to-face	.683***	.85***	.519*
	(.164)	(.234)	(.266)
Black	-.251	-.383	-.256
	(.303)	(.421)	(.47)
Asian	-.097	.042	-.257
	(.446)	(.686)	(.624)
Hispanic	-.144	-.303	-.069
	(.225)	(.268)	(.421)
Pacific	-.203	-.263	-.074
	(.291)	(.306)	(.382)
International	.201	-.038	.363
	(.219)	(.379)	(.327)
Not Reported	.042	-.061	.216
	(.326)	(.475)	(.475)
Two or More Races	-.658**	-.43	-.984*
	(.309)	(.382)	(.508)
American Native	1.031***		.787*
	(.21)		(.416)
Age during 176 term	.018**	.004	.035**
	(.008)	(.01)	(.014)
Full Time 176 term	.311*	.411*	.216
	(.174)	(.229)	(.3)
Degree Seeking	-.221	-.511*	.24
	(.239)	(.263)	(.404)
Female	.46**	.458	.441*
	(.182)	(.283)	(.244)

R-squared
Note: Using a four-point scale (4=A and 0=F), results indicate the impact of being face-to-face versus online and hybrid on course grade.

Figure 1

Bar Graph Comparison of Grade by Modality Overall
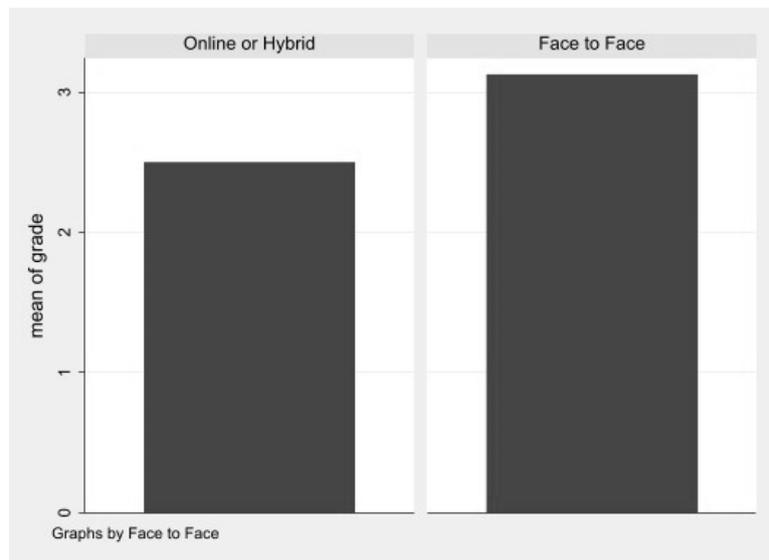
GPA and Modality: Overall

Another outcome examined was GPA. Using the regression equation $Y=b_0+b_1+b_2\ldots b_{14}+E$, GPA the semester during the course and the semester after the course was used for Y. The purpose of examining GPA was to extrapolate these results to see if the learning strategies were applied more effectively face-to-face or online and hybrid as measured by differing impacts on GPA overall. Since the course is one credit hour and is taken at varying points in the semester, it does have the potential to impact GPA the semester of enrollment especially since the strategies are applied to a co-requisite course. It is also important to see if the strategies have a long lasting impact in subsequent semesters. Therefore, I also include GPA after for those students who re-enrolled at the institution. It is, however, limited to those who re-enrolled. GPA and taking the course face-to-face are not significantly correlated overall. The pandemic does not change this result significantly. As with grade, age is a significant covariate. Full time enrollment and degree seeking also become significant for the semester of course enrollment. Full time enrollment as a positive bias is consistent with belonging research. However, for GPA the semester after, the correlation between full-time status and higher performance disappears in the pandemic years and skews the overall outcome. The reason for this disappearance could be reflective of the overall cultural upheaval at the time. Degree-seeking is inconsistent and anecdotally, I have found many students are assigned or assign themselves Associates of Liberal Arts and are qualified as degree-seeking even if they do not have a clear educational outcome in mind or particular interest in obtaining an Associate in Liberal Arts. However, since this is not the case for all students, I have continued to include degree-seeking as a control variable. The results here would indicate that being degree-seeking had a negative bias in GPA the semester of enrollment.

Table 3

GPA Semester of Course Enrollment and Modality

	GPA Semester of Course Enrollment	GPA Semester of Course Enrollment Pre-Pandemic	GPA Semester of Course Enrollment Pandemic
Face-to-face Modality	.11	.244*	.132
	(.102)	(.146)	(.173)
Black	-.239	-.37	-.208
	(.176)	(.256)	(.278)
Asian	.312	.478	.198
	(.235)	(.334)	(.34)
Hispanic	-.234	-.265	-.199
	(.15)	(.183)	(.259)
Pacific	.008	.115	-.194
	(.118)	(.188)	(.239)
International	.068	-.081	.043
	(.159)	(.225)	(.247)
Race Not Reported	.039	-.073	.042
	(.222)	(.363)	(.282)
Two or More Races	-.308	.009	-.767**
	(.204)	(.244)	(.327)
American Native	.137		-.031
	(.133)		(.261)
Age during 176 Term	.023***	.02***	.027***
	(.005)	(.007)	(.009)
Full Time during 176 Term	.29***	.464***	.15
	(.107)	(.142)	(.182)
Degree Seeking	-.358**	-.374*	-.318
	(.161)	(.212)	(.23)
Female	.182	.062	.332**
	(.126)	(.194)	(.146)

Observations	353	201	152
R-squared	.099	.139	.14

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Table 4

GPA the Semester After and Modality

	GPA Following Course Enrollment	GPA Following Course Enrollment Pre-Pandemic	GPA Following Course Enrollment Pandemic
Face-to-face Modality	.041	.035	.171
	(.102)	(.147)	(.169)
Black	-.307*	-.143	-.579*
	(.169)	(.216)	(.318)
Asian	.423*	.671***	.297
	(.224)	(.256)	(.329)
Hispanic	-.152	-.245	-.032
	(.148)	(.171)	(.274)
Pacific	-.039	-.222	-.036
	(.118)	(.169)	(.252)
International	-.063	-.214	-.098
	(.177)	(.251)	(.285)
Race Not Reported	.037	-.141	.004
	(.211)	(.436)	(.259)
Two or More Races	-.314*	-.054	-.722***
	(.189)	(.249)	(.274)
American Native			
Age during 176 Term	.02***	.019**	.023**
	(.005)	(.007)	(.009)
Full Time during 176 Term	.16	.386***	-.095
	(.107)	(.144)	(.179)

Degree Seeking	-.186	-.257	-.099
	(.143)	(.171)	(.226)
Female	.17	-.017	.352**
	(.134)	(.208)	(.154)
Observations	298	170	128
R-squared	.083	.124	.163

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1*

Retention and Persistence and Modality

The next two areas of interest are retention and persistence. In the equation $Y=b_0+b_1+b_2…b_{14}+E$, y is retention or persistence. Retention is described as re-enrollment the next semester at LMCC. Persistence is defined as either re-enrollment at LMCC, transfer to another school that semester, or graduation. Persistence and retention are linked to GPA and as such offer an additional metric in determining if students find themselves capable and equipped (Pascarella & Terenzini, 2005). Online courses also could suffer from a lack of social presence and as such, could impact students' sense of belonging according to Tinto (1975, 2006) and Astin (1997, 1999). Retention is insignificantly related to modality. Persistence is also insignificantly related to modality. The covariates Pacific or islander and American native do have a significant bias for re-enrollment. This is true for persistence as well. As stated before, these n values are very small, so no clear conclusions can be drawn, but further research is suggested to see if face-to-face modalities better serve these populations. For persistence, full-time enrollment is also a significant covariate. This is consistent with findings that full-time students persist overall at higher rates, though it does not indicate that there is a particular loyalty to LMCC. This would not support a link between belonging and persistence. Degree seeking also is significant in persistence, but as a negative bias again possibly indicating the same variable issue noted in GPA or possibly indicating that face-to-face enrollment was not related.

Table 5

Retention and Modality

	Re-enrollment at college the following semester	Re-enrollment at college the following semester Pre-Pandemic	Re-enrollment at college the following semester Pandemic
Face-to-Face Modality	.027	.063	.005
	(.042)	(.061)	(.068)
Black	-.036	-.123	.052
	(.079)	(.113)	(.106)
Asian	.023	-.029	.05

	(.1)	(.161)	(.137)
Hispanic	.002	.025	-.045
	(.059)	(.067)	(.11)
Pacific	.161***	.214***	.134
	(.048)	(.08)	(.081)
International	.001	-.033	.015
	(.078)	(.123)	(.105)
Race Not Reported	-.035	-.229	.146***
	(.101)	(.181)	(.052)
Two or More Races	.095*	.064	.121
	(.054)	(.076)	(.083)
American Native	-.848***		-.867***
	(.05)		(.091)
Age During 176 Term	0	-.001	0
	(.002)	(.003)	(.004)
Full Time During 176 Term	.071	.025	.126*
	(.043)	(.056)	(.067)
Degree Seeking	-.074	-.002	-.131
	(.061)	(.093)	(.08)
Female	.02	.038	-.009
	(.037)	(.054)	(.055)
Observations	354	201	153
R-squared	.038	.042	.097

Robust standard errors are in parentheses
*** *p<.01, ** p<.05, * p<.1*

Table 6

Persistence and Modality

	Retained, Transferred or Graduated	Retained, Transferred or Graduated	Retained, Transferred or Graduated
		Pre-Pandemic	Pandemic

Face-to-Face Modality	.032	.028	.031
	(.036)	(.047)	(.062)
Black	.052	.023	.082
	(.047)	(.057)	(.094)
Asian	-.031	-.092	.019
	(.104)	(.164)	(.14)
Hispanic	.017	.001	.031
	(.048)	(.055)	(.094)
Pacific	.083**	.085	.138*
	(.041)	(.059)	(.079)
International	-.034	-.016	-.038
	(.069)	(.097)	(.099)
Race Not Reported	-.03	-.171	.125**
	(.087)	(.161)	(.058)
Two or More Races	.05	.009	.099
	(.051)	(.07)	(.078)
American Native	.09**		.13
	(.044)		(.088)
Age During 176 Term	.001	0	.002
	(.002)	(.002)	(.003)
Full Time During 176 Term	.109***	.066	.14**
	(.038)	(.047)	(.062)
Degree Seeking	-.1**	-.008	-.195***
	(.049)	(.082)	(.05)
Female	-.02	.016	-.073
	(.029)	(.039)	(.048)
Observations	354	201	153
R-squared	.044	.035	.098

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1*

Discussion

Overall, modality is correlated most significantly and consistently with grades. Students who take the learning strategies course face-to-face achieve at least half a letter grade higher than their hybrid and online counterparts. This was consistent for pre-pandemic years as well. During the pandemic, this became slightly insignificant (at $p<0.1$).

GPA is not significantly correlated, however. The purpose of including GPA was to extrapolate these results beyond the confines of the course to determine if the learning strategies had a differing impact on GPA as a result of the modality, particularly since this course is designed to assist students in their other coursework. It seems that the overall impact is non-existent or negligible, even if a student's grades in the course are higher. Grades might have had less of an impact due to the course's overall weight as a one-credit - hour course rather than the typical three-credit-hour courses. In addition, though the face-to-face and online courses are very similar, some of the assignments in the face-to-face course are done in class with the support of an instructor. There are also a few assignments that are added in the online course in order to check that students watched recorded lectures or read the syllabus or otherwise engaged with the instruction. As such, the students had more opportunities to get a zero or poor grade. Of course, the inverse is also true.

Overall, the only firm conclusion that can be drawn is that grades are correlated with modality in normal, non-pandemic years. Students who are in-person are more likely to have higher course grades with coefficients of .68 and higher. In a scale of 4 points, that is a significant increase. Though this does not impact a student's GPA as the course is only worth one credit hour; it is possible that our three-credit-hour courses could impact GPA more significantly, and as such, we should be aware of the potential harms and benefits modality could bring for developmental students. It should be noted that some research indicates that the way a course is facilitated can cause significant changes in grade outcomes. In a study of an online geology course that utilized the same instructional design and material, the teacher's engagement via announcements, feedback, and other interactions had a pertinent difference in the number of failing students (d'Alessio et al., 2019). Therefore, it might be in our best interest to make sure that research-based, online teaching methods that promote clear social and teacher presence are utilized in the facilitation of all of our online courses.

Persistence and retention are not correlated with modality either. This indicates that students are equally well served in both formats, and that belonging may either be replicable in the online format or that belonging is less of a factor in students' persistence and retention (Astin, 1997; Kimbark et al., 2017). It is possible that the instructors in our online courses actually do create a sense of belonging that allows both modalities to have similar outcomes in GPA, persistence, and retention. Our instructors primarily have education degrees and backgrounds which could indicate a familiarity with multidimensional engagement. Additionally, the purpose of the learning strategies course is not explicitly to create a sense of belonging and community. It is possible with a cohort model or an emphasis on connection, these results would differ and modality would play a different role. As previously mentioned, this course is the only course of which we know the modality, so other courses in the students' programs may be of differing modalities, thus impacting retention and persistence differently. As such, it would be irresponsible and incorrect to directly claim that this research refutes the value of belonging or social presence in retention and persistence. I can simply claim that this does not add to the support of that vein of research.

Recommendations

In light of this research, I recommend that in order to best serve our developmental students, we should make sure that the modality a student chooses is a good fit for them. This can only be determined on an individual basis and would likely fall on the counseling and advising staff. The College Success department that offers these courses should make sure to clearly communicate these findings so that the counseling and advising staff is prepared to help students make the correct choice. I would err on the side of encouraging students to choose the face-to-face modality when possible. However, I would also recommend an audit of our engagement with students in our asynchronous course if d'Alessio and colleagues (2019) are correct in stating that teachers who sent fewer announcements, and gave less feedback ended up with more failing students, assuming that this would transfer to this context. It may also be pertinent to determine if a different method of online instruction (specifically synchronous) would produce different outcomes. However, anecdotally I can say that these courses were not popular when previously offered and if Presley and colleagues (2023) are correct in noting similar outcomes for synchronous and asynchronous courses, then this might not be worthwhile. Overall, since both modalities have similar outcomes for GPA, persistence, and retention, I would also encourage the college to continue to offer a variety of options for our students so that they have as many pathways to success as possible.

Limitations

As mentioned previously, I do not know the full modality of the students in this sample, simply in this course. As such, the conclusions I can draw must be limited to how students fare in online or face-to-face sections of this one-credit-hour learning strategies course. Additionally, I can only draw conclusions as to how students at this single institution are impacted. This research also did not specifically examine race, gender, poverty, or other subgroups individually but rather included them as control variables. Further research on these specific subgroups are impacted by our coursework would be valuable, particularly in light of Xu and Jagger's research indicating that young Black men are most likely to be unsuccessful in online courses (2013). The choice of a quantitative approach, while giving a wide view of the current climate, does not give the narrative picture that qualitative or mixed methods could have accomplished.

Conclusion

Courses aimed at providing academic support and strategies are relatively common at many universities and community colleges. As their aim is to increase access for students, it is imperative to determine whether the modality is equally effective. Since some research indicate developmental students may be more vulnerable (Xu & Jaggers, 2011), this population is particularly worthy of examination.

This research indicates that online and face-to-face students have similar outcomes in GPA, retention, and persistence. This supports the claim that online and face-to-face courses have similar outcomes (Nguyen, 2015).

The one exception to this is in overall course grade. Students in this sample enrolled in face-to-face courses had higher course grades than their counterparts in online and hybrid modalities. Several factors could play a role in this. Online courses tend to have slightly more assignments to measure course participation which offer more opportunities for both failure and success. Additionally, while all assignments are self-directed in the online course, face-to-face students complete several of their assignments in class with support from their

professor. This immediate, corrective feedback might well have a meaningful impact on academic performance.

This research contributes to the ongoing discussion of how best to support developmental learners and provide access to tools and resources that could mitigate gaps in educational preparation. Since online learning is becoming near ubiquitous and as it provides educational access to many developmental learners who would otherwise be barred from higher education, it is important to note that these courses are generally equitable. This research is of particular use for colleges that are expanding online course offerings or evaluating those offerings and utilize learning strategies courses to support students, particularly developmental students.

Declarations

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The author asserts that IRB approval was obtained from Kansas State University as well as from the institution that provided the archival data.

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