Journal of Online Learning Research (2022) **8**(2), 163-180

Enrollment Timing in Supplementary Online Courses: Do Students Who Enroll On-Time Have Better Course Outcomes?

JACQUELINE ZWEIG
Education Development Center
jzweig@edc.org

ERIN STAFFORD
Education Development Center
estafford@edc.org

MAKOTO HANITA
Education Development Center
mhanita@edc.org

Even prior to the COVID-19 pandemic, high school students across the United States were enrolling in online courses at increasing rates. As a result of pandemic related school closures, even more schools enrolled students in supplementary online courses as a method for delivering instruction during emergency remote learning. Despite enrollment increases in online courses for high school students, many questions remain about how to provide effective instruction virtually and the structures and supports that facilitate student success in their online courses. While previous studies have examined predictors of student success in online courses, there is less research on the influence of the enrollment process (e.g., which students enroll, who enrolls them, and when they are enrolled) on student outcomes. To fill this gap, this correlational study examines when students enroll in supplemental online high school courses and whether the timing of enrollment in an online course (i.e., prior to a semester, at the start of a semester, or during a semester already in progress) relates to students' subsequent course outcomes. The findings suggest that students who enroll on-time are more likely to complete their online courses than students who enroll late.

Even before the COVID-19 pandemic, high school students across the United States were enrolling in online courses at increasing rates (Digital Learning Collaborative, 2022; Gemin & Pape, 2017). For example, in the 2019-2020 school year, 23 states had state virtual schools supporting one million supplemental online course enrollments (Digital Learning Collaborative, 2022). As a result of pandemic-related school closures, even more schools enrolled students in supplementary online courses as a method for delivering instruction during emergency remote learning. According to the Center for Reinventing Public Education's (CPRE's) database of 100 large and urban districts' plans for remote learning, 39 districts had a virtual academy option as part of their 2020 reopening plans (CPRE, 2021). Although most schools returned to face-to-face instruction by the 2021-2022 school year, many students planned to continue enrolling in online courses to supplement or supplant their face-to-face instruction (Gewertz, 2021).

Despite enrollment increases in online courses, many questions remain about how to provide effective instruction virtually and about the structures and supports that facilitate student success in their online courses. Although previous studies have examined predictors of student success in online courses, such as prior academic achievement, login activity, and attempts to complete assignments (Heinrich et al., 2019; Hung et al., 2020; Kwon et al., 2019; Pazzaglia et al., 2016), there is minimal research on the influence of the enrollment process (e.g., which students enroll, who enrolls them, and when they are enrolled) on student outcomes. To fill this gap, this study examined when students enrolled and whether the timing of enrollment in an online high school course (i.e., prior to a semester, at the start of a semester, or during a semester already in progress) related to students' course outcomes.

This area of research is particularly important in supplemental online courses because students enroll in courses for a variety of reasons. For example, students may need to recover credits for a course that they previously failed, or a scheduling conflict may preclude a student from taking a specific course at their brick-and-mortar school. Students may also take online courses to fulfill their state's requirement for an online learning experience, or a qualified teacher may not be available to teach a particular course for example, Advanced Placement or Career and Technical Education (Archambault & Kennedy, 2017; Rickles et al., 2018). It could also be that a teacher unexpectedly leaves the position, and the school turns to an online course to fill the teaching gap. Other students may enroll in online courses because they took some online courses during the pandemic and learned that they prefer that environment, citing the benefits of flexibility or reduced anxiety around learning (Abramson, 2021). Thus, when students enroll during the semester can vary significantly, which may influence how they perform, even in primarily self-paced courses.

Online courses are often seen as a way for students to have agency in their learning experiences and can be used to meet the diverse needs of students. This philosophy of "any time, any place, any path, any pace" as described by the National Association of School Boards of Education (NASBE, 2001) resonates with many students and schools when students purposefully choose a virtual learning environment or when face-to-face instruction is not possible because of any of the reasons described above (Cavanaugh & Johnston, 2003; U.S. Department of Education, 2010). However, there is insufficient research on whether the promise of "any time, any place, any path, any pace" (NASBE, 2001) holds true. This study examined a specific aspect of "any time" and looks at whether timing of enrollment influences students' outcomes.

LITERATURE REVIEW

An online course is a "series of structured learning engagements aligned to state standards and delivered over the internet that allow learners to demonstrate mastery of a defined skill set" (Virtual Leadership Alliance, 2021, p. 9), where most instruction occurs asynchronously. Supplemental online courses refer to online courses taken by students in brick-and-mortar schools to augment their course schedule for a variety of reasons, as noted above. The use of supplemental online courses has grown over several years. According to the National Assessment of Educational Progress, 18% of grade 12 students in public schools across the United States in 2015 reported taking an online English course for credit; in 2019, the percentage increased to 29% (U.S. Department of Education, 2015, 2019). With the advent of COVID-19, nearly 93% of people in households with school-age children reported their children engaged in some form of distance learning from home (McElrath, 2020). For some schools, that distance learning meant utilizing online courses, particularly for students in high school.

State of Online Learning Research

Despite the widespread use of online courses, there is not enough evidence about how to most successfully deliver online courses to improve student outcomes. As stated in the What Works Clearinghouse (WWC) rapid evidence review, "There are simply not enough high-quality program evaluations, especially randomized controlled trials, conducted in the field of distance learning. This is true for all the program types, age groups, and outcomes we examined" (Sahni et al., 2021, p. 12). Four programs met WWC Group Design Standards Without Reservations and Every Student Succeeds Act (ESSA) Tier 1 rating requirements, and only one of them focused on online courses: Online Algebra 1 (Sahni et al., 2021).

There is, however, a growing body of correlational and experimental research on online course design and supports for students. For course design, some of the features studied include types of prompts, content, assignments, and format of feedback and communication (Cavalcanti et al., 2021; Huang et al., 2015; Kwon, 2019; Lin et al., 2016; Máñez et al., 2019; McGuire et al., 2017; Meyer et al., 2010; Zheng et al., 2020). For student supports, there is evidence to suggest that students who have mentors—brick-and-mortar school staff assigned to assist online students—may have better online courses outcomes (Borup & Stimson, 2017; Hannum et al., 2008; Irvin et al., 2009; Taylor et al., 2016). An orientation is another support that virtual schools often considered a best practice. However, a recent study found no significant differences in course outcomes between first-time online students assigned the orientation and those who had access to the typical supports (Zweig et al., 2021), though timing of enrollment moderated the impact.

Other studies sought to identify predictors of students' success in online courses. For example, students' grades, prior course failure, or suspensions in the prior school year, as well as whether they were enrolled in a credit recovery course, were all associated with students' academic outcomes in online courses (e.g., Hart et al., 2019; Heinrich et al., 2019; Kwon, 2019; Stevens et al., 2016). Student engagement is also seen as an important predictor—students who engaged in an online course for 2 or more hours per week had better course outcomes than students who engaged for fewer than 2 hours per week (Pazzaglia et al., 2016). A similar relationship between higher engagement and improved student outcomes was found in a study in Chicago (Heinrich et al., 2019) and in Michigan (Kwon et al., 2019). In the latter case, persistent attempts to complete course tasks week by week was the most powerful success factor for students in online courses. Other studies found similar results using clickstream data to predict student outcomes (e.g., Li et al., 2020).

Enrollment Timing

The current study adds to this growing body of research about predictors for student success and student support systems by examining enrollment timing. In research focused on postsecondary education, late enrollment in online courses is associated with negative outcomes for students (Lim, 2016; Pathak, 2019; Tompkins et al., 2019). These findings were replicated in a small number of studies focused on online courses for middle school and high school students (Ranzolin, 2015; Ricker et al., 2020) and in face-to-face courses in the literature on student mobility (e.g., Welsh, 2017). Using data from Scout from the University of California, which offers supplemental online courses to middle and high school students, the study found

that students who registered on-time were more likely to earn a higher grade than students who registered late. Despite those differences, approximately 58% of students who registered over 2 weeks late passed their course (Ranzolin, 2015). This finding was replicated in another study examining data on 414 students in an online English course. Late enrollment was negatively associated with students' final course scores (Ricker et al., 2020).

The current study builds on these findings by analyzing a large sample of over eight thousand students, being inclusive of many course subject areas, and focusing on course completion. Timing of enrollment is also operationalized in more than one way—as categorical (on-time or not) and continuous (days between enrollment and course start dates). By adding to this nascent research base, this study provides actionable evidence for virtual school administrators, brick-and-mortar school staff, and families as they make decisions about the "any time" aspect of online learning.

METHODS

Research Design

This study addressed two research questions using data on students enrolled in supplemental online high school courses:

(1) Were students who enrolled on-time more likely to complete their online courses than students who enrolled late?

(2) What was the relationship between when students enrolled and their online course outcomes?

These questions were addressed descriptively and through regression modeling. We first compared online course outcomes for students who enrolled on-time (i.e., before the course start date) to those who enrolled late (i.e., on or after the course start date; Research Question 1). For a secondary analysis, we replaced the dichotomous treatment condition variable (on-time enrollment) with the number of days lapsed since the course start date and repeated the analyses (Research Question 2).

Setting

This study used deidentified secondary data from a large state virtual school in the Midwest. State virtual schools are typically created by legislation or state-level agencies and provide online courses to schools (Digital Learning Collaborative, 2022). In this case, the state virtual school was created by legislation. Online courses provided by state virtual schools are often teacher-led, typically by teachers certified in the state. The content may be developed by the state virtual school, or the school may license content

from other external providers (Digital Learning Collaborative, 2022). This state virtual school, like most virtual schools that provide supplemental online courses, does not operate as a typical public school; for example, students do not earn diplomas through the virtual school, and teachers do not assign course grades on students' official transcripts. Instead, online teachers suggest grades and provide information about points earned to an educator in the brick-and-mortal school, who then assigns the final course grade.

Sample

The sample included 8,256 students in the state virtual school in fall 2018 who were enrolled in over 450 supplemental high school online courses. Approximately three quarters of students were enrolled in a core course. Core courses are part of the core academic curriculum, including mathematics, English language arts, science, social studies, and world language. Non-core courses include courses such as physical education or electives. For students who were enrolled in more than one online course, only one of their courses was randomly selected for inclusion in the analysis. By randomly selecting a course, the analytic sample is not biased in terms of timing of enrollment or student motivation for the course.

Data and Variables

The analyses for this study utilized data from the state virtual school, which included data related to student enrollment in the online course, such as date of enrollment, course start date, and the subject area of the course. The data also had corresponding course activity, such as points earned, points attempted, and course grade. Because the data were from the state virtual school, they did not have many of the student characteristic variables that are typically in analyses of educational outcomes, such as demographics, prior test scores, eligibility for services, or free/reduced price lunch.

The main explanatory variable is an indicator for on-time enrollment, equal to one if the student enrolled in the course prior to the course start date or zero if the student enrolled on or after the course start date. Students who enrolled on the course start date were considered late, because these students would not have had time to complete the orientation materials before their class began. There were three possible course start dates for students enrolled in courses in fall 2018: August 20, August 27, and September 4. For each start date, students could enroll in a course prior to the course start date and up until approximately 4 weeks after the course start date, which was near the end of the grace period for dropping courses. The semester was approximately 21 weeks and ended in February 2019. Forty-seven percent of students enrolled on-time (see Table 1).

Table 1
Sample Characteristics

Characteristic	*N*	%
On-time enrollment	3,915	47.4
Core course	6,048	73.3
Subject area		
Mathematics and science	1,363	16.5
World languages	2,701	32.7
English language arts	471	5.7
Other	3,721	45.1
Enrollment timing		
Prior to course start date	3,915	47.4
On course start date	996	12.1
After course start date	3,345	40.5
Course outcome		
Completed online course	6,131	74.3
Dropped course during grace period	819	9.9
Did not complete the course	1,306	15.8
N	8,256	100.0

As a secondary analysis, this study also examined the relationship between the number of days lapsed since the course start date and students' course outcomes. The number of days lapsed was equal to the number of days between when a student enrolled in the course and the course start date. If a student enrolled on the start date, the variable would have a value of zero, 10 days before would be -10, and 10 days after would be 10. On average, students enrolled 1.7 days before the course start date, with a range of 15 days before to 28 days after the course start date.

The outcome variable was course completion status, which was operationalized as a categorical variable based on their grade earned: completed course, did not complete the course (i.e., dropped after the grace period or failed), and dropped during the grace period. A course was considered complete if the grade earned was greater than or equal to 60%. Course failure occurred when the grade earned was less than 60% and the student did not drop out during the 3-week grace period. Seventy-four percent of students completed the online course, 10% dropped the course during the grace period, and 16% did not complete the course. The study had no attrition because this study included all students, even if they dropped the course.

Data Analysis

We first produced descriptive statistics for each of the key data elements and examined whether there were differences in the types of courses for students who were enrolled on-time compared to those who were enrolled late. For the first research question, we then produced a cross-tabulation between enrollment timing and course outcomes to examine descriptively the relationship between timing of enrollment and course outcomes (results are in Figure 1). We then estimated the relationship between timing of enrollment and students' course outcomes using a multinomial logistic regression because the outcome variable was categorical. Specifically, the outcome variable was course completion status, which, as noted above, was operationalized as the following: completed course, did not complete the course (i.e., dropped after the grace period or failed), and dropped during the grace period. The main explanatory variable for the first research question, which could be thought of as an indicator of treatment status, is on-time enrollment. The standard errors were clustered by section because teachers exert idiosyncratic effects on student outcomes through several factors, such as different approaches to instruction or feedback, and students from multiple schools enrolled in a section of an online course taught by the same online teacher. The models control for core course (i.e., mathematics, English language arts, social studies, science, and world language) and an indicator of whether a student was assigned an orientation course because these data were used in a prior study of the orientation (Zweig et al. 2021).

For the second research question, the main explanatory variable is a continuous variable equal to the days lapsed between the enrollment date and the course start date. As we did for Research Question 1, we examined the relationship between days lapsed and course completion descriptively and then used a regression model to confirm the patterns. To examine the relationship descriptively, we categorized days lapsed into seven groups of 5-day increments from more than 10 days before to more than 10 days after the course start date, and then we calculated the percentage of students who completed the course for each group (results in Figure 2). We estimated the relationship between days lapsed and course outcomes using the same multinomial logistic regression as in Research Question 1 but replaced on-time enrollment (a binary variable) with days lapsed (a continuous variable).

RESULTS

Baseline

As noted above, the data for this study did not include information about student demographic, socioeconomic, or academic characteristics. Thus, we examined the types of courses that students enrolled in as a student background variable. Core course was selected because it is associated with the course outcome variable $\chi 2$ (2, N = 8,256) = 44.5 p <.01. The differences in the percentage of students taking core courses by enrollment timing was statistically significantly, $\chi 2$ (2, N = 8,256) = 45.2 p <.01. The percentage of students enrolled in core courses was higher for students who enrolled on-time (77%) than for those who enrolled late (70%). Because the effect sizes for differences in enrollment in core courses was greater than .05, it was included as a covariate in the regression models (see Table 2).

Research Question 1: Were Students Who Enrolled On-time More Likely to Complete their Online Courses than Students who Enrolled Late?

Results from the descriptive and correlational analyses indicated that students who enrolled on-time were more likely to complete their courses than students who enrolled late. The descriptive analysis showed 79% of students who enrolled on-time completed their courses compared to 70% who enrolled late (see Figure 1). Using the formula for Cox's index (WWC 4.1 standards), the resulting effect size of d = 0.289 is considered a medium effect according to Cohen's benchmarks, and large according to newer approaches (Kraft, 2019). To put that effect size into context, student achievement improves about 0.40 standard deviations or less over the course of an academic year (Bloom et al., 2008; Kraft, 2020).

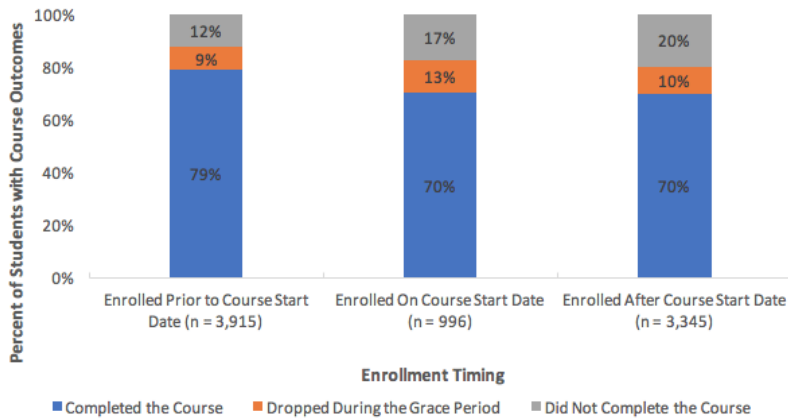

Figure 1. Course Outcomes by Enrollment Timing.

The regression results confirmed these findings. With relative risk ratios (RRRs) for on-time enrollment below 1 and statistically significant, there was a significant reduction in the risk of a student dropping the course as opposed to completing the course if they enrolled in an online course on-time (see Table 2). For on-time versus late enrollers, the relative risk of not completing the course compared to completing the course would be expected to decrease by a factor of 0.56. For on-time versus late enrollers, the relative risk of dropping during the grace period compared to completing the course would be expected to decrease by a factor of 0.73. The estimate in the model with control variables remained statistically significant and was of similar magnitude. That is, if a student were to enroll on-time, they may be more likely to complete the course. It important to keep in mind that these are correlational results and is an initial step toward more rigorous causal research.

Table 2

Relationship Between On-time Enrollment and Course Outcomes (Base = Completed the Course)

Course outcome	Model 1		Model 2	
	RRR	*SE*	RRR	*SE*
Did not complete the course				
Enrolled on-time	0.56**	.061	0.51**	.064
Orientation			1.04	.082
Orientation x enrolled on-time			1.14	.162
Core course			1.73**	.195
Constant	0.27**	.020	0.18**	.019
Dropped during the grace period				
Enrolled on-time	0.73**	.064	.68**	.077
Orientation			1.10	.110
Orientation x enrolled on-time			1.12	.161
Core course			1.17	.131
Constant	0.15**	.010	0.13	.014

Note. *N* = 8,256. RRR = Relative risk ratio. Referent outcome is completed the course.
Model 1 Pseudo R^2 = .007. Model 2 Pseudo R^2 = .013.
$^{**}p < .01$. $^{*}p < .05$. $^{+}p < .1$.

Research Question 2: What was the Relationship Between When Students Enrolled and their Online Course Outcomes?

Descriptively, the percentage of students who completed their online course was highest for students who enrolled in their online course far in advance, and the percentage steadily declined as students enrolled later into the semester. That is, 82% of students who enrolled more than 10 days before the course start date completed their course compared to 62% who enrolled 10 or more days after the course start date (see Figure 2).

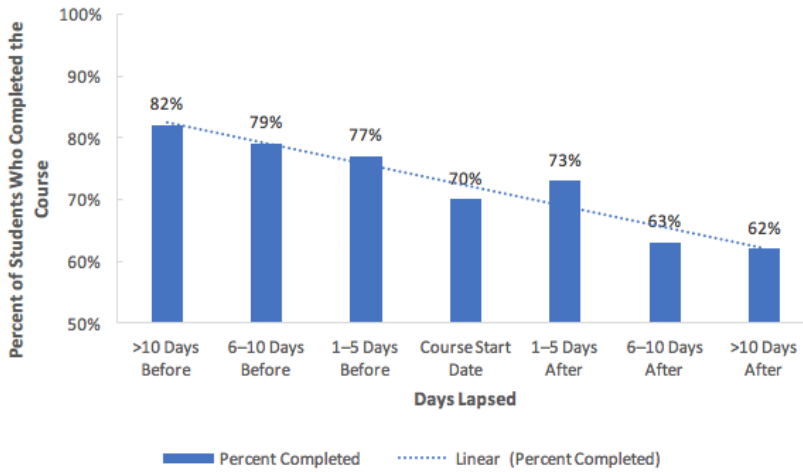

Figure 2. Course Completion by Days Lapsed Between Enrollment and Course Start Date.

The regression results confirmed these trends. The relative risk of not completing the course increased for each additional day that a student enrolled after the course start date (see Table 3). In these models, all comparisons were being made to completing the course. For each additional day, the relative risk of not completing the course compared to completing the course would be expected to increase by a factor of 1.06 (see Table 3, Model 1). For each additional day, the relative risk of dropping during the grace period (as compared to completing the course) would be expected to increase by a factor of 1.02. These relationships held regardless of the controls used in the models. In general, the results indicate that we would expect that a student who enrolls earlier to be more likely to complete the course.

Table 3

Relationship Between Lapsed Days and Course Outcomes (Base = Completed the Course)

Course outcome	*Model 1*		*Model 2*	
	RRR	*SE*	RRR	*SE*
Did not complete the course				
Lapsed days	1.06**	.010	1.06**	.008
Orientation			1.08	.068
Orientation x lapsed days			1.00	.009
Core course			1.74**	.197
Constant	.22**	.012	0.14**	.014
Dropped during the grace period				
Lapsed days	1.02**	.007	1.02**	.008
Orientation			1.13	.091
Orientation x lapsed days			0.99	.010
Core course			1.15	.128
Constant	.14**	.007	0.12**	.012

Note. N = 8,256. RRR = Relative risk ratio. Referent outcome is completed the course.
Model 1 Pseudo R2 = .011. Model 2 Pseudo R2 = .007.
**$p < .01$. *$p < .05$. $^{+}p < .1$.

Limitations

There are two key limitations of this study. The first is a lack of student background characteristics, which the state virtual school did not collect from students or schools. However, in a previously published report using a subsample of 1,781 first-time online learners, where demographic and prior academic achievement data could be merged from the state longitudinal data system, the relationship between enrollment timing and course completion remained (see Zweig et al., 2021).

The second limitation is that students were not randomly assigned to enroll early or late, meaning that it is not possible to know whether enrollment timing is causing the course outcomes or if there is an unknown factor that may influence both enrollment timing and course outcomes. For example, it could be that the reason students take an online course is related to their enrollment timing and course outcomes. However, many school counselors enrolled students in batches, rather than individually indicating that timing of enrollment may be exogenous to students' reasons for enrolling in online courses. More rigorous research is needed to draw causal conclusions.

DISCUSSION

Despite the increased prominence of online learning in K-12 education, few studies have examined factors beyond student characteristics, course design, and measures of engagement that influence course completion. The results from this study add to the body of research indicating that enrollment timing matters for students (e.g., Ranzolin, 2015; Ricker et al., 2020); students are more likely to complete their online courses if they enroll on-time. As such, beyond the state being studied here, the results will be of interest nationally and, most specifically, to school decision-makers who offer students the opportunity to take online coursework and make decisions related to enrollment timing. This may be particularly important for schools with students from historically marginalized backgrounds, who make up a larger share of the students who are seeking to continue with remote learning (Gewertz, 2021). Understanding how to effectively provide online learning options, develop implementation policies, and support students in their courses are critical aspects of providing equitable access to high-quality education.

The results of this study suggest that virtual schools, or other online learning program providers, and brick-and-mortar school staff, who most often complete the enrollment process for students, should consider how long after a course start date a student should still be enrolled. For example, they could separate course add and drop dates and consider whether the last date to be added to a course should be different from the date one could drop the course. Parents are also an integral part of supporting students in online courses (e.g., Keaton & Gilbert, 2020; Ricker et al., 2021) and should be aware of the potential benefits of on-time enrollment in online courses.

Since students and their families turn to online courses for a variety of reasons (e.g., graduation requirements, course not offered at their school), it may be important for online learning programs to consider those reasons when communicating enrollment dates and identifying possible supports. For example, school counselors can work with students who are taking an online course as part of a graduation requirement or because the course is not offered in their school to decide on their online courses early, which would allow them to enroll prior to the beginning of the school year. Other students turn to online learning because they are not on track to graduate, because they need to recover credits for courses that they previously failed, or because their traditional brick-and-mortar school is not meeting their needs (Archambault & Kennedy, 2017; Digital Learning Collaborative, 2022; Hart et al., 2019; Tonks et al., 2020; Tonks et al., 2021; Waters et al., 2018; Woodworth et al., 2015). It may be particularly important for parents and school counselors to enroll these students on-time to give students

sufficient time to understand course expectations and the course environment. However, parents and school counselors may have to balance the benefits of on-time enrollment with the urgency with which students may need to switch to an online environment, even after a course has started.

Second, both online learning program providers and brick-and-mortar school staff should consider what supports students who enroll in a course late may need to be successful. In our prior research, we found that an orientation may not benefit students, particularly those who enroll later (Zweig et al., 2021). It is possible that other supports, such as on-site mentors, could play a role in supporting student success (Borup & Stimson, 2017; Hannum et al., 2008; Irvin et al., 2009; Taylor et al., 2016).

This study also raises many questions for future research, such as examining why students are enrolled after course start dates, understanding better who decides to enroll students in online courses (e.g., students, school staff, parents), and determining empirically the ideal cut-off dates for enrolling in online courses and whether that depends on the course type. Enrollment timing could be acting as a proxy for other school or student characteristics that may influence course outcomes. Future research could examine whether the relationship between enrollment timing and course outcomes is moderated by student characteristics (e.g., students with disabilities, prior academic performance, students' previous experience with online courses). Further, more research could be done in combination with changes in enrollment practices for example, do individual counseling and enrollment improve outcomes more than batch enrollments based on requests?

The findings in this study may also intersect with research about pace of instruction and length of time to complete courses. For example, Allday and Allday (2011) found that the pace of instruction that students chose (i.e., traditional, extended, or accelerated) related to course outcomes; students with extended time had lower final grades. The pace selection was similar for those with and without disabilities. Further research on the relationship among these components of "any time" and "any pace" could help identify ways to better set up students for success.

CONCLUSION

This study only examined one aspect of "any time, any place, any path, any place" and more is to be learned about effectively delivering online courses and understanding whether the research matches the promise. Yet this study does provide initial evidence about how enrollment timing influences students' course outcomes. These results raise questions for administrators, school staff, parents, and researchers whose answers could help students be more successful in supplemental online courses.

References

Abramson, A. (2021, September). Capturing the benefits of remote learning. *Monitor on Psychology, 52*(6). https://www.apa.org/monitor/2021/09/cover-remote-learning

Allday, C., & Allday, R. (2011). Effects of pacing options on final grades of students with disabilities in virtual high school. *Quarterly Review of Distance Education, 12(*4), 223-234.

Archambault, L., & Kennedy, K. (2017). Making the choice to go online. In R. A. Fox & N. K. Buchanan (Eds.), *School choice: A handbook for researchers, practitioners, policy-makers and journalists* (pp. 384-403). John Wiley & Sons Ltd.

Bloom, H. S., Hill, C. J., Black, A. R., & Lipsey, M. W. (2008). Performance trajectories and performance gaps as achievement effect-size benchmarks for educational interventions. *Journal of Research on Educational Effectiveness, 1*(4), 289-328. https://doi.org/10.1080/19345740802400072

Borup, J., & Stimson, R. (2017). *Helping online students be successful: Mentor responsibilities.* Michigan Virtual University. https://michiganvirtual.org/research/publications/helping-online-students-be-successful-mentor-responsibilities/

Cavalcanti, A., Barbosa, A., Carvalho, R., Freitas, F., Tsai, Y., Gašević, D., & Mello, R. (2021). Automatic feedback in online learning environments: A systematic literature review. *Computers and Education: Artificial Intelligence, 2*, 1-17. https://doi.org/10.1016/j.caeai.2021.100027

Cavanaugh, C., & Johnston, S. (2003). Teaching any time, any place, any pace. In C. Cavanaugh (Ed.), *Development and management of virtual schools* (pp.116-134). Information Science Publishing. https://doi.org/10.4018/978-1-59140-154-4.ch006

Center for Reinventing Public Education. (2021). *CRPE 2021–22 school district plans database*. https://crpe.org/pandemic-learning/tracking-district-actions/

Digital Learning Collaborative. (2022). *Snapshot 2022: An inflection point for digital learning?* https://www.digitallearningcollab.com/publications-overview

Gemin, B., & Pape, L. (2017). *Keeping pace with K-12 online learning, 2016*. Evergreen Education Group. http://www.kpk12.com/wpcontent/uploads/Evergreen_Keeping Pace_2015.pdf

Gewertz, C. (2021, May 4). Remote learning isn't going away. Will it create separate—and unequal—school systems? *Education Week*. https://www.edweek.org/leadership/remote-learning-isnt-going-away-will-it-create-separate-and-unequal-school-systems/2021/05

Hannum, W. H., Irvin, M. J., Lei, P., & Farmer, T. W. (2008). Effectiveness of using learner-centered principles on student retention in distance education courses in rural schools. *Distance Education, 29*(3), 211–229. http://eric.ed.gov/?id=EJ812376

Hart, C., Berger, D., Jacob, B., Loeb, S., & Hill, M. (2019). Online learning, offline outcomes: Online course taking and high school student performance. *AERA Open 5*(1). https://journals.sagepub.com/doi/full/10.1177/2332858419832852

Heinrich, C. J., Darling-Aduana, J., Good, A., & Cheng, H. (2019). A look inside online educational settings in high school: Promise and pitfalls for improving educational opportunities and outcomes. *American Educational Research Journal, 56*(6), 2147–2188. https://eric.ed.gov/?id=EJ1234673

Huang, K., Chen, C. H., Wu, W. S., & Chen, W. Y. (2015). Interactivity of question prompts and feedback on secondary students' science knowledge acquisition and cognitive load. *Educational Technology & Society, 18*(4), 159–171. https://eric.ed.gov/?id=EJ1078330

Hung, J.-L., Rice, K., Kepka, J., & Yang, J. (2020). Improving predictive power through deep learning analysis of K-12 online student behaviors and discussion board content. *Information Discovery and Delivery, 48*(4), 199-212. https://doi.org/10.1108/IDD-02-2020-0019

Irvin, M. J., Hannum, W. H., Farmer, T. W., de la Varre, C., & Keane, J. (2009). Supporting online learning for Advanced Placement students in small rural schools: Conceptual foundations and intervention components of the facilitator preparation program. *The Rural Educator, 31*(1), 29–37. http://eric.ed.gov/?id=EJ876131

Keaton, W., & Gilbert, A. (2020). Successful online learning: What does learner interaction with peers, instructors and parents look like? *Journal of Online Learning Research, 6*(2), 129-154. Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/215616/

Kraft, M. (2020). Interpreting effect sizes of education interventions. *Educational Researcher, 49*(4), 241–253. https://doi.org/10.3102/0013189X20912798

Kwon, J., Debruler, K., & Kennedy, K. (2019). A snapshot of successful K-12 online learning: focused on the 2015-16 academic year in Michigan. *Journal of Online Learning Research, 5*(2), 199-225. https://files.eric.ed.gov/fulltext/EJ1229422.pdf

Li, Q., Baker, R., & Warschauer, M. (2020). Using clickstream data to measure, understand, and support self-regulated learning in online courses. *The Internet and Higher Education, 45*. https://doi.org/10.1016/j.iheduc.2020.100727

Lim, J. (2016). Predicting successful completion using student delay indicators in undergraduate self-paced online courses, *Distance Education, 37*(3), 317-332. https://doi.org/10.1080/01587919.2016.1233050

Lin, C. H., Zheng, B., & Kwon, J. B. (2016). Interactions and learning outcomes in online language courses. *British Journal of Educational Technology, 48*(3), 730-748. https://doi.org/10.1111/bjet.12457

Máñez, I., Vidal-Abarca, E., Kendeou, P., & Martinez, T. (2019). How do students process complex formative feedback in question-answering tasks? A think-aloud study. *Metacognition and Learning, 14*(1), 65-87. https://eric.ed.gov/?id=EJ1213684

McElrath, K. (2020). *Schooling during the COVID-19 pandemic.* U.S. Census Bureau. https://www.census.gov/library/stories/2020/08/schooling-during-the-covid-19-pandemic.html

McGuire, P., Tu, S., Logue, M. E., Mason, C. A., & Ostrow, K. (2017). Counterintuitive effects of online feedback in middle school math: Results from a randomized controlled trial in ASSISTments. *Educational Media International, 54*(3), 231–244. https://eric.ed.gov/?id=EJ1159690

Meyer, B., Wijekumar, K., Middlemiss, W., Higley, K., Lei, P., Meier, C., & Spielvogel, J. (2010). Web-based tutoring of the structure strategy with or without elaborated feedback or choice for fifth- and seventh-grade readers. *Reading Research Quarterly, 45*(1), 62-92. https://eric.ed.gov/?id=EJ871741

National Association of School Boards of Education. (2001). *Any time, any place, any path, any pace: Taking the lead on e-learning policy.* NASBE. https://eric.ed.gov/?id=ED466236

Pathak, B. (2019). Study of e-learning outcomes: The role of late-registration and self-selection. *e-Journal of Business Education & Scholarship of Teaching, 13*(1), 13-19. https://files.eric.ed.gov/fulltext/EJ1239138.pdf

Pazzaglia, A. M., Clements, M., Lavigne, H. J., & Stafford, E. T. (2016). *An analysis of student engagement patterns and online course outcomes in Wisconsin* (REL 2016–147). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. http://ies.ed.gov/ncee/edlabs

Ranzolin, D. (2015, April 1). *To serve and subsist: Reflections on finding the ideal registration window.* Michigan Virtual. https://michiganvirtual.org/blog/to-serve-and-subsist-reflections-on-finding-the-ideal-registration-window/

Ricker, G., Belenky, D., & Koziarski, M. (2021). Are parents logged in? The importance of parent involvement in K-12 online learning. *Journal of Online Learning Research, 7*(2), 185-201. https://www.learntechlib.org/p/219541/

Ricker, G., Koziarski, M., & Walters, A. (2020). Student clickstream data: Does time of day matter? *Journal of Online Learning Research 6*(2), 155-170. https://www.learntechlib.org/p/215688/

Rickles, J., Heppen, J. B., Allensworth, E., Sorensen, N., & Walters, K. (2018). Online credit recovery and the path to on-time high school graduation. *Educational Researcher, 47*(8), 481-491. https://doi.org/10.3102/0013189X18788054

Sahni, S. D., Polanin, J. R., Zhang, Q., Michaelson, L. E., Caverly, S., Polese, M. L., & Yang, J. (2021). *A What Works Clearinghouse rapid evidence review of distance learning programs (WWC 2021-005REV).* U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse. https://ies.ed.gov/ncee/wwc/Docs/ReferenceResources/ Distance_Learning_RER_508c.pdf

Stevens, D., & Frazelle, S. (2016). *Online credit recovery: Enrollment and passing patterns in Montana Digital Academy courses* (REL 2016–139). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. http://ies.ed.gov/ncee/edlabs

Taylor, S., Clements, P., Heppen, J., Rickles, J., Sorenson, N., Walters, K., & Allensworth, E. (2016). *Getting back on track: The role of in-person instructional support for students taking online credit recovery.* American Institutes for Research. https://www.air.org/sites/default/files/2022-03/In-Person-Support-Credit-Recovery-Back-on-Track-2016.pdf

Tompkins, P., Williams, M., & Pribesh, S. (2019). An examination of late-registering students' success in online and on-campus classes, *Community College Journal of Research and Practice, 43*(5), 370-381. https://doi.org/10.1080/10668926.2018.1487889

Tonks, D., Kimmons, R., & Mason, S. L. (2020). Mattering is motivating: Special education students' experiences with an online charter school. *Journal of Online Learning Research, 6*(3), 221-244. https://www.learntechlib.org/primary/p/217275/

Tonks, D., Kimmons, R., & Mason, S. L. (2021). Motivations among special education students and their parents for switching to an online school: Survey responses and emergent themes. *Online Learning, 25*(2), 171-189. https://doi.org/10.24059/olj.v25i2.2141

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2015, 2019). *National Assessment of Educational Progress (NAEP), 2015 and 2019 Reading Assessments.*

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.*

Virtual Learning Leadership Alliance. (2021). *Key online learning terms and definitions* (version 2.0). https://www.virtuallearningalliance.org/wp-content/uploads/2022/03/VLLA-Key-Online-Learning-Terms-and-Definitions_final.pdf

Waters, L., Borup, J., & Menchaca, M. (2018). Parental involvement in K-12 online and blended learning. In. K. Kennedy & R. Ferdig (Eds.), *Handbook of Research on K-12 Online and Blended Learning* (2nd ed., pp. 403-423). Carnegie Mellon University: ETC Press.

Welsh, R. O. (2017). School hopscotch: A comprehensive review of K–12 student mobility in the United States. *Review of Educational Research, 87*(3), 475-511. https://doi.org/10.3102/0034654316672068

Woodworth, J. L., Raymond, M. E., Chirbas, K., Gonzalez, M., Negassi, Y., Snow, W., & Van Donge, C. (2015). *Online charter school study 2015*. Stanford University. https://credo.stanford.edu/report/online-charter-school-study/

Zheng, B., Lin, C. H., & Kwon, J. B. (2020). The impact of learner-, instructor-, and course-level factors on online learning. *Computer Education, 150*, 103851. https://doi.org/10.1016/j.compedu.2020.103851

Zweig, J., Hanita, M., Stafford, E., & Khanani, N. (2021). Impact of an orientation on online students' course outcomes. *Journal of Research on Technology in Education.* https://doi.org/10.1080/15391523.2021.1911007

AUTHOR NOTE

This research was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305L170008 awarded to Education Development Center (PI: Jacqueline Zweig). The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.