Higher Education Studies; Vol. 8, No. 3; 2018
ISSN 1925-4741 E-ISSN 1925-475X
Published by Canadian Center of Science and Education

Online Students, Where are they and When do they do Homework? Case Study from an Online MS in GIScience Program

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Received: July 3, 2018 Accepted: July 20, 2018 Online Published: August 14, 2018

doi:10.5539/hes.v8n3p63 URL: https://doi.org/10.5539/hes.v8n3p63

Abstract

Online courses provide the flexibility of time and location for both students and educators. From an administration viewpoint, online courses do not require physical classrooms, hence they require less university resources; as such, online courses are often seen as cash cows. Unfortunately, in some cases online courses are still considered second-tier because of delayed interactions between students and faculty members in an asynchronous class. In order for an administration to properly allocate university resources to online faculty, it is essential to know where online students are from. Similarly, online faculty must know when their students conduct course activities in order to provide timely and quality responses. This study examined 97 online students attending an MS in GIScience program over where they are from, and when they do their course activities. Our findings concluded that around 90% of online students were not from the traditional catchment area, and around 70% were from out of state. We also found that an average of 72% of course activities were conducted during weeknights (40%) and weekends (32%).

Keyword: online education, graduate GIScience program, student origin, work hour, temporal pattern

1. Introduction

After years of piloting, experimenting, promoting, and success, the general public seems to accept online education as an alternative form of obtaining a diploma in situations where attending an on-campus course is challenging or simply not possible. With such awareness, online courses and degree programs are on the rise. As observed from literature, online education is flexible on both time and location (Ahn, Han, & Han, 2005; Harasim, 2000; Larreamendy-Joerns & Leinhardt, 2006; Sieber, 2005; Volery & Lord, 2000). Online courses do not require a certain meeting time, and therefore offer students a flexible schedule for course activities, such as nights or weekends, which may normally be considered unsuitable by traditional on-campus courses (Hung & Wu, 2015; Kassop, 2003; Miles, 2014; Pastore & Carr-Chellman, 2010; Steiner & Hyman, 2010). Online courses do not require face-to-face meetings; as such course activities can be done from any location with stable Internet access, such as a work place, a home, or an Internet café (Bender, Wood, & Vredevoogd 2004; Huang, 1997; Lease & Brown, 2009; Li & Irby, 2008; Valentine, 2002).

With the increased affordability of personal computers and Internet access, many non-traditional students and working professionals with full-time jobs can take advantages of online courses to obtain a higher education diploma. Knowing the advantages of online education and the potential market, universities and colleges have put effort towards offering online courses, and even online degrees. In the US, the Geographer's Craft, offered by Department of Geography, University of Texas at Austin in 1991 (and later by Department of Geography, University of Colorado at Boulder), is considered the first completely online course in GIS (Foote, 1997). In 2003, the first completely online graduate program for GIScience was created (Drews, 2004). By 2010, there were 10 online graduate GIScience programs (Wikle, 2010). By 2015, there were 17 completely online graduate programs for GIS&T (geographic information science and technology) (Ramirez, 2016). The number of universities offering graduate degrees in GIS&T, both online and campus-based, is still growing (Lukinbeal & Monk, 2015; Monk & Foote, 2015).

With rising competitions, recruitment is a key element in the success of an online program (Wikle, 2010). Due to budget restrictions in recent years, it is essential to know where potential online students are, and spend money

on recruitment activities that are both effective, and relevant to the areas in which potential online students reside. On the other hand, retention is also an important element in the success of an online program. Unfortunately, online courses are still seen by many as second tier compared to their campus-based counterparts (Beaudoin, 2002; LaPointe & Reisetter, 2008). In an asynchronous online class, students may not receive a response, to a question that was posted the night before, until next working day. In some cases, students may have to wait until the next week to receive a response to a question that was posted on the weekend (Hung & Wu, 2015). The worst case scenario, students are forced to wait on faculty for over a week, if the question was posted during Thanksgiving Break or Spring Break. Like most people, many faculty do not work at night, on weekends, or during holidays. Unfortunately, as most faculty have experienced, many students will wait until the last minute and do their homework, regardless of when it was released. The lack of an immediate response from faculty may cause frustration or even panic for these students, especially when the due date is fast approaching. Such frustration and panic can easily, and quickly, lead to a substandard learning experience and a negative perception of online courses. To improve response time, and successfully retain online students, it is essential to know when online students perform their course activities, so that educators can provide timely responses and quality interactions.

Online students have very different needs from their on-campus counterparts. With on-campus students, most courses and associated activities (such as lectures, labs, discussions, or quizzes/exams) are normally offered on weekdays (Monday through Friday) between 8:00 am and 5:00 pm. It is fair to say that the interaction between faculty members and on-campus students are constricted to these hours (Detwiler, 2008; DiBiase & Kidwai, 2010). However, this is not the case for online students. For a working professional these hours are typically designated towards their full-time job. It is hard to imagine that they can complete course activities during these work hours.

1.1 Purpose of the Study

The quality of an online program greatly depends on students' perception on how they are treated as well as interactions with faculty members. Traditional recruitment and retention activities and policies are geared toward on-campus students. With rising competitions in online education and difficulties in finance, administrators need to be smarter on allocating university resources on recruitment and adjust policies for retention activities. The purpose of this study is to quantitatively examine the geographic distribution of online students, as well as the temporal pattern of when they complete their course activities. We do this by using an online graduate GIScience program as a case study. Data on student origins was collected from all students enrolled in this program between 2003 and 2013. Data for temporal patterns was collected from five different online courses (eight sections) offered in the 2012 – 2013 academic year, including Fall 2012, Spring 2013, and Summer 2013 trimesters. Using findings from this study, this paper presents recommendations on where to invest university resources for better recruitment, how to adjust office hour policy for better student-faculty interactions, and when to set due dates for better utilization of flexibility with online courses.

2. Spatial Distribution of Online Students

2.1 Catchment Area and Student Origins

Traditionally, the authors' university is a regional university with the majority of its students originating from its home state and the golden circle, a circular area within 100 miles of the university (Schenkel, 2014). The Department of Education in the State of Missouri has officially designated 19 counties in northwest Missouri as the official service region (catchment area) to the authors' university, and describe it as a Master's level university with moderately selective admissions (Missouri Department of Higher Education, 2016; Schenkel, 2014). According to internal enrollment data (Schenkel, 2014), in recent years the total student headcount has fluctuated around 6,500. Among them, about 40-50% of students (both undergraduate and graduate) are from within the catchment area, and 70%-80% of students are from the State of Missouri; this implies that around 20%-30% of students do not originate from within the State of Missouri (at-large), this includes international students.

2.2 Geographic Distribution of Online Students

The authors' department hosted an online MS in GIScience program that launched in Fall 2003. In the first year, there were 46 students who enrolled and took online courses. Among these 46 students, six (13%) were from the designated service region (catchment area) and 11 (24%) from within the state (including the catchment area); this implies that 35 (76%) were from out of state (at large). Table 1 details the distribution of online students in this program by year. 10 years' worth of data shows that (from Fall 2003 to Spring 2013), on average about 8% of the students in this program (ranging from 6% to 13%) come from within the catchment area, about 30%

(ranging from 24% to 36%) come from within the state (including the catchment area), and around 70% (ranging from 64% to 76%) are at large (including international origins).

Table 1. Summary of the origins of online students, within or outside of the traditional catchment area. State: from within the state, including catchment area. At Large: from out of state. AL: At large

	Catchment	State	At Large	Total	Catch %	State %	AL %
2003 – 2004	6	11	35	46	13%	24%	76%
2004 – 2005	6	18	41	59	10%	31%	69%
2005 Fall	4	18	53	71	6%	25%	75%
2006 Spring	6	24	55	79	8%	30%	70%
2006 Fall	9	25	57	82	11%	30%	70%
2007 Spring	7	28	57	85	8%	33%	67%
2007 Fall	6	30	59	89	7%	34%	66%
2008 Spring	10	35	61	96	10%	36%	64%
2008 Fall	9	35	75	110	8%	32%	68%
2009 Spring	8	36	73	109	7%	33%	67%
2009 Fall	9	31	73	104	9%	30%	70%
2010 Spring	10	29	76	105	10%	28%	72%
2010 Fall	10	36	71	107	9%	34%	66%
2011 Spring	8	32	77	109	7%	29%	71%
2011 Fall	8	27	73	100	8%	27%	73%
2012 Spring	8	28	82	110	7%	25%	75%
2012 Fall	6	30	74	104	6%	29%	71%
2013 Spring	9	36	70	106	8%	34%	66%
Average					8%	30%	70%

3. Temporal Pattern of Student Course Activities

3.1 Course Activities and Time Slots

Five courses underwent examination in this study: 545 (Principles of GIS), 601 (GIScience Research Seminar), 563 (Digital Image Processing), 620 (GIS Theory and Research), and 630 (Raster-based GIS and Modeling). Among them, 545 is the prerequisite course, students will either take it as their first class, or test out. 601 is the recommended starting class (after 545) for Master's students. 563, 620, and 630 are all technical-oriented classes. Each of these three classes has a course project component. Many students use the course project as a stepping stone for their thesis research, or as a research component project to fulfill requirements for their Master's degree. Table 2 summarizes the registered students (sample size) by course and semester. In total, there are 97 students registered for eight sections of five online courses.

Table 2. Summary of registered students by courses and by semesters

Course	Fall 2012	Spring 2013	Summer 2013	Total
545	18	14		32
601	9	6		15
563			10	10
620	11	10		21
630	19			19
Total	57	30	10	97

Three types of course activities were considered in this study: threaded discussions, writing assignments, and exams. Threaded discussions include thematic discussions, which focus on a certain theme that contributes to the topic under study, and open discussions, which are open to all kinds of questions. Writing assignments also includes lab exercises and presentation PowerPoint files. Exams include mid-term exams, final exams, and quizzes.

Three time slots are defined here: weekdays, weeknights, and weekends. Weekdays are defined as Monday through Friday, from 8:00 am to 5:00 pm. Weeknights are defined as Monday through Thursday, from 5:00 pm to 8:00 am the next morning. Weekends are defined as Friday, 5:00 pm, through Monday, 8:00 am. Among these three time slots, the weekday is the typical meeting time for on-campus classes. Additionally, the weekday is

when on-campus students conduct the course activities described earlier: having discussions, turning in assignments, and taking exams. Online students, on the other hand, cannot do course activities during this time slot because of work commitments.

3.2 Threaded Discussion

Posts for discussions are automatically time stamped upon submission for grading purposes. By examining the time stamp for each post, one can determine during which of the aforementioned time slots the discussion takes place in. Table 3 shows the amount of posts during each time slot from the 601 course in Fall 2012. Online % is the percentage of posts submitted during weeknights and weekends, with this particular course average being 62%. Table 4 summarizes discussions posted during different time slots from all eight sections of every courses, with the average being 64%. Among all sections in this study, the online % for discussions ranges from as low as 53% to as high as 88%.

Table 3. Time slot and count of discussions posted to the course website, from course 601 in Fall 2012. Week 13 is Thanksgiving Break, no course activities. Online % is the percentage of student activities conducted during weeknights and weekends

	Weekdays	Weeknights	Weekends	Online%
Week 1	23	17	1	44%
Week 2	7	36	6	86%
Week 3	17	19	5	59%
Week 4	13	9	8	57%
Week 5	16	23	8	66%
Week 6	16	14	12	62%
Week 7	11	20	14	76%
Week 8	15	15	6	58%
Week 9	21	4	6	32%
Week 10	10	7	13	67%
Week 11	0	1	0	100%
Week 12	9	10	12	71%
Week 13				
Week 14	12	15	13	70%
Week 15	13	15	6	62%
Week 16	23	15	0	39%
Total/Average	206	220	110	62%

Table 4. Average count and percentage for discussions posted to the course website during different time slots, from all eight sections

	Count	Percent
Weekdays	1098	36%
Weeknights	984	32%
Weekends	994	32%
Total/Online %	3076	64%

3.3 Assignment

Similar to posts in threaded discussions, when assignments are turned in, they are time stamped for grading purposes. Assignments were sorted into the three time slots based on their timestamps. In cases where students had multiple submissions at different times for a single assignment; all submissions were counted separately. Table 5 summarizes assignments submitted during different time slots from all eight sections of every course. Among all sections under this study, the online % for assignments ranges from as low as 62% to as high as 86%, with an average of 70%.

Table 5. Average count and percentage for assignments submitted to the course website during different time slots, from all eight sections

	Count	Percent
Weekdays	554	30%
Weeknights	718	40%
Weekends	549	30%
Total/Online %	1821	70%

3.4 Exam

Using the same method as discussions and assignments, exams were sorted into three time slots based on their timestamps. Table 6 summarizes exams submitted during different time slots from all eight sections. Among all sections under this study, the online % for exams ranges from as low as 65% to as high as 95%, with an average of 82%.

Table 6. Average count and percentages for exams taken from the course website during different time slots, from all eight sections

	Count	Percent
Weekdays	59	18%
Weeknights	152	47%
Weekends	115	35%
Total/Online %	326	82%

3.5 Pattern for Online Student Course Activities

Table 7 is a summary of various online student course activities during different time slots from all eight sections. The average for weekdays was calculated without any extra weight given to discussions, assignments, or exams. The same calculation was applied to the average for weeknights, and weekends. The result was an average of 72% for all course activities conducted during weeknights or weekends (referred to as online hours in Table 7). Within the 72% of online course activities, 40% was conducted during weeknights, and the remaining 32% was conducted during weekends. On the other hand, only 28% of online course activities were conducted during weekdays; the time when traditional on-campus students do their discussions, turn in their assignments, and take their exams.

Table 7. Summary of online student course activities during different time slots, from all eight sections

	Discussion	Assignment	Exam	Average
Weekdays	36%	30%	18%	28%
Weeknights	32%	40%	47%	40%
Weekends	32%	30%	35%	32%
Online hours %	64%	70%	82%	72%

4. Discussion

Among the three course activities, discussions can be as short as 10 sentences, and finished in only minutes (up to half an hour for longer posts such as a one-page essays). Assignments can be broken down into parts. Students can finish one part at a time, and continue onto the next part at a later date. Each part can take anywhere from just a few minutes to a few hours to finish. Exams require a large block of uninterrupted time (recommended more than two hours, including two hours of exam time as well as additional time for some pre-test and post-test necessities).

Using the length of time associated with different course activities, one can observe an interesting temporal pattern from table 7 and figure 1. As the required length of time increases (ordered discussion, assignment, and exam) the average percent conducted during weekdays decreases, from 36% to 30% to 18%, respectively. On the other hand, the average percent conducted during weeknights increases from 32% to 40% to 47%, respectively. However, the average percent conducted during weekends fluctuates, but only slightly (between 30% and 35%). This can be attributed to the fact that the majority of online students have a day-time job. It is more difficult for online students to allocate a lengthy and uninterrupted block of time (such as the time required to take exams) during weekdays. Therefore online students prefer to utilize weeknights to perform such tasks. This does not

affect those who prefer weekends to complete online course activities, as weekends are already flexible enough for them to arrange or rearrange their schedule. Another interesting finding from table 7 is that the plurality of the online students completed their discussions during weekdays, but did their assignments and exams during weeknights. This can again be contributed to the length of required time to do such tasks.

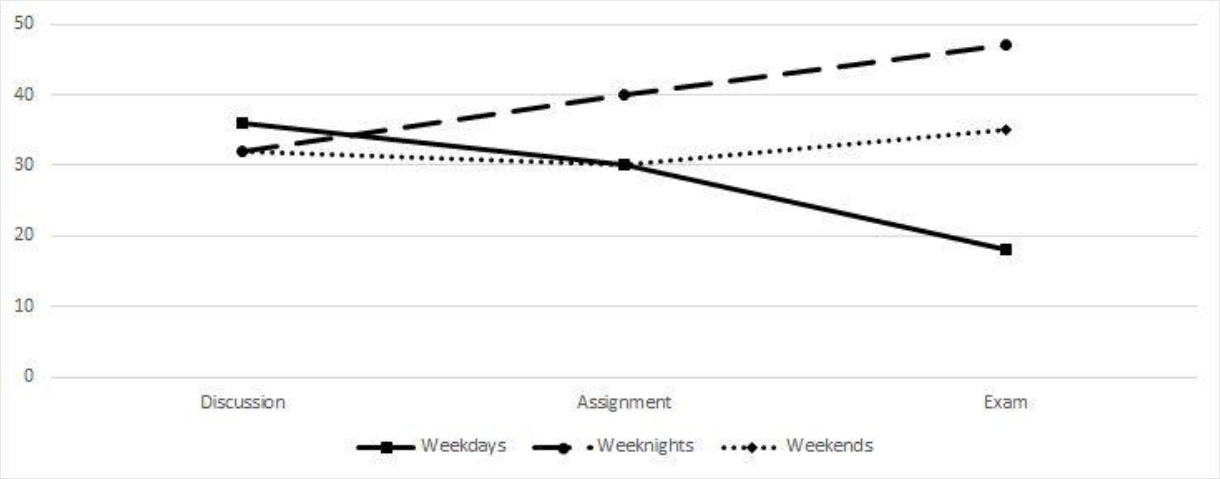

Figure 1. Trends of online student course activities during different time slots

This temporal pattern in online student course activities corresponds to a general impression on online courses: flexibility on time (Hung & Wu, 2015; Kassop, 2003; Shea, 2007; DiBiase, 2000; Mbuva, 2014). From the online program, most of our students are working professionals with a full-time job. Occasionally some are required to travel for business, such as field trips, visiting clients, conferences, etc., sometimes they even take personal trips (like honeymoons or backcountry hiking). The students may have asked for an extension before they left on their trip, but many still turned in their homework in time. They informed us that as long as they have Internet access from their hotel rooms, they can still complete required course activities. Traveling, or leaving home for a short period of time, did not significantly affect their ability to conduct or participate in course activities.

Additional flexibility on time allows online students to complete their course activities while simultaneously dealing with personal or family issues. One of our online students told us his story of taking an exam. He had originally planned to take his exam on a weeknight after a family dinner. He went to his study room to take his exam as planned. The exam had a two hour time limit. One hour into his exam, he had to leave in order to coax his baby to sleep. Even then, he was still able to finish his exam within the time limit. This situation would only have been possible through an online education. As long as the exam is submitted within the time limit, students can complete a multitude of other tasks.

The data does have a few issues. Although 97 students is a nice size in terms of statistics, there may be some repeated samples. For example, a student can take 545 in Fall 2012, then take 601 in Spring 2013. The same student was counted twice because he/she took two courses during the studied time period. The same problem afflicts the distribution of student origins. If a student took classes in Fall 2007, then he/she was counted in that particular semester. If the same student took classes again in Spring 2008, he/she was then counted again. Depending on the courses a particular student took in a semester, he/she may be counted more than once if he/she was enrolled in more than one course. Repeated samples may influence the results, although not significantly. This study is to examine the distribution of student origin and temporal pattern of course activities. These issues are student-centered. Even though a student may be counted more than once, the data was collected based on course and semester. Each enrollment was treated as an individual sample.

Each course activity has a due date; unfortunately, due dates are not consistent across the five courses. For example, thematic discussions in 601 and 563 are due at the end of Friday. While comment posts in thematic discussions for 545, 620, and 630 are due at the end of Monday; original posts retain the same due date of Friday. For all five courses, assignments are due at the end of Monday. 563 has exams due at the end of Sunday, but for 601, 545, 620, and 630 exams are due at the end of Monday.

This study did not factor in the time online students spent reading textbooks and utilizing supplemental materials.

This category (study on their own time) could be as large as the time spent on course activities (discussions, assignments, exams), but due to the design of the course website, there is no way to track study time. Furthermore, this study only examined the time in which students turned in their assignments, not the time students spent completing the assignment. The time recorded for discussions is only when students clicked on the post button to upload their posts. It does not, however, record how much time students spent creating their posts. The same detriment applies to assignments, the website only recorded the time when student uploaded their files. Our experience has told us that it is very likely students will take more than one night to finish assignments. It is reasonable to assume that they will utilize a similar time slot to complete their assignment as they do to turn it in. On the other hand, the time spent on exams, in this study, is the actual time spent taking the exam (but not study time prior to the exam). The course website records when students begin their exams and exactly how much time (in hours, minutes, and seconds) students spend taking their exam.

5. Conclusion

This study found that on average 70% of online students (under this study) come from out of state. This study also found that on average 72% of course activities are conducted during weeknights or weekends (for students in this study). These findings confirm the two major benefits of online education: flexibility in both time and location. By understanding the geographic distribution of online students, as well as the temporal pattern of their course activities, administrators can invest their resources more efficiently for the recruitment effort. For example, sending a recruitment team to a career fair sponsored by the university or a local industry is not effective considering only 30% of online students come from within the state, and only 8% from the traditional catchment area. A better recruitment effort is something visible nationally or even globally, such as a booth in large scale conferences. Other methods of recruitment also need to be considered, such as print advertisements in trade magazines, radio or TV commercials, online advertisements on search engines, or even social media, such as Instagram or Facebook.

In addition, this study presented a reverse relationship between the length of time required for various course activities and the percentage of course activities conducted during weekdays. The online students in this study tended to do tasks that required less time during weekdays, but the tasks that required more time were done during weeknights. This also gives educators hints on how to better design their course activities, due dates, and office hours in order to fit the students' participating patterns. University should encourage online faculty to promptly respond to inquiries submitted during weeknights or weekends by loosening office hour requirements. Consequently, online faculty can arrange their office hours to better fit online students' working patterns, such as office hours on weeknights or during weekends, as opposed to all office hours located during weekdays in a traditional setting. Like many other universities, authors' university requires seven office hours every week between Monday and Friday, preferably between 8:00 am and 5:00 pm. These office hours work well for on-campus students, but not for online students considering only 28% of course activities are done during this time frame, according to our findings. Additionally, due dates can be set at the beginning (8:00 am) or noon (12:00 pm) of the next day as opposed to the end of a day (5:00 pm or 11:59 pm), so that online students can do homework on weeknights. Following the same logic, due dates can be set to the beginning of the next week (Monday), as opposed to end of a week (Friday), so that online students can do their homework on weekends.

There are opportunities to further this study. This study was conducted from a faculty viewpoint; it examined the time online students posted their discussions, turned in their assignments, or took their exams, but not how much time they spent on doing these course activities. These times were stamped by the course website when students logged in, or began certain course activities. A unique point of this study is that it can be easily repeated by other educators or administrators as long as they have access to online course websites. A survey can be conducted among online students to discover the same temporal pattern, but from a student viewpoint, such as, how much time they spend on course activities, as well as when they do them. Reading time was not included in this study, but can be included in a future survey to enhance the credibility of the temporal pattern. A collaboration with other similar online programs to include more students as samples will similarly increase the credibility of the findings.

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