
Report

Prepared for: Houston Community College

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Report Title: The Effectiveness of On-Line Tutoring at Houston Community College (HCC)



Note: AskUp, Inc. and the AskUp software referenced herein was acquired by Upswing International, Inc. in 2014. Houston Community College has since continued using similar software under the Upswing/AskUp brand, “AskUp.”

Introduction

Measuring the impact of any student support service is problematic at best, and tutoring is no exception. Estimating the impact of tutoring on student achievement is particularly difficult when using recently developed modern technology like online tutoring. Here the students and tutors never meet face to face, users are largely anonymous, and it’s difficult to determine the proper way to quantify both student achievement and usage.

Accurately measuring the effect of student support services like tutoring is particularly crucial for community colleges. Compared to four-year institutions, community colleges serve a more at-risk, disadvantaged population, and demand for both space and services has expanded rapidly over the last decade. According to the Department of Education, total enrollment increased over ten percent at two-year universities between 2000 and 2006, with over 6.5 million students now attending these institutions.¹ Many of those students will need extra support and assistance in order to complete their programs and achieve their educational goals.

However, while the need for community colleges and support services is seemingly unlimited, budgets are not. Given the economic situation, it seems unlikely that community colleges will be able to count on a large influx of state, local, or federal dollars anytime soon. To serve their students, community colleges must make efficient use of the funds that are available and to do that they need effective and reliable estimates of the impact of different services.

On-line tutoring services, like AskUp by Upswing at Houston Community College, are becoming an increasingly popular, low-cost method of student support. However, like many support services, it has never been satisfactorily demonstrated that they truly improve either student achievement or retention. This paper attempts to provide reliable, quantitative estimates of the impact of online tutoring on student achievement so that administrators at HCC and other community colleges can make informed decisions about how and where to spend their budgets for support services.

¹ The Department of Education National Center for Education Statistics (NCES) website, accessed January 25, 2009.

http://nces.ed.gov/programs/coe/2008/analysis/sa_table.asp?tableID=1054

Academic Theory & Review of Selected Works

The mission of the community college system in the United States is to provide access to postsecondary education and credentials for those who might not otherwise be able to attend college. According to the American Association of Community Colleges (AACC), “Community colleges are the gateway to postsecondary education for many minority, low income, and first-generation postsecondary education students...[they] also provide access to education for many nontraditional students who are adults and working while enrolled.”² However, after that access has been achieved, it is necessary to ensure that that the programs and services offered by HCC and other community colleges are truly increasing the skills and academic abilities of their students rather than simply perpetuating disadvantage as some critics have claimed (Kreps et al 2007). Online tutoring and other support services are one way that community colleges attempt to bridge the achievement gap with their students.

This mission is even more crucial in the 21st Century. The rise of globalization and the expansion of technology have done nothing but increase the need for skills and education for individuals to compete economically. Community college student represented approximately half of the undergraduate population in the United States. Many of these students come from disadvantaged backgrounds. As mentioned above, they are disproportionately low-income or minority students. They are frequently ‘non-traditional’ students as well, working adults with families and jobs that are significantly older on average than the four-year college population.³ Their economic well being, not to mention that of the nation as a whole, depends on the community college system’s ability to help these students achieve their educational goals. Due to the demographics of the community college student population, achievement often depends on the availability and effectiveness of support services, everything from childcare to tutoring.

As one of the largest and most diverse community colleges in the country, Houston Community College (HCC) has been at the forefront of offering educational opportunity and support services for their students. HCC serves a population of over 55,000 predominantly minority students. According to the most recent statistics, Houston Community College’s student body is approximately 28% Hispanic, 25% African American, 19% Caucasian and 10% Asian, and also contains the largest international student enrollment among community colleges in the nation comprising approximately 10% of the student population (HCCS Quick Facts 2008). The racial and ethnic composition of the HCC student body offers a prescient glimpse at the population that other community colleges and institutions of higher learning will increasingly be serving in the coming decades. Being able to design and implement innovative new academic support services, such as online tutoring, that increase the achievement of minorities and other disadvantaged groups is necessary for HCC and other community colleges to continue their mission of serving as the ‘gateway to

² American Association of Community Colleges website, accessed January 25, 2009.
<http://www2.aacc.nche.edu/research/index.htm>.

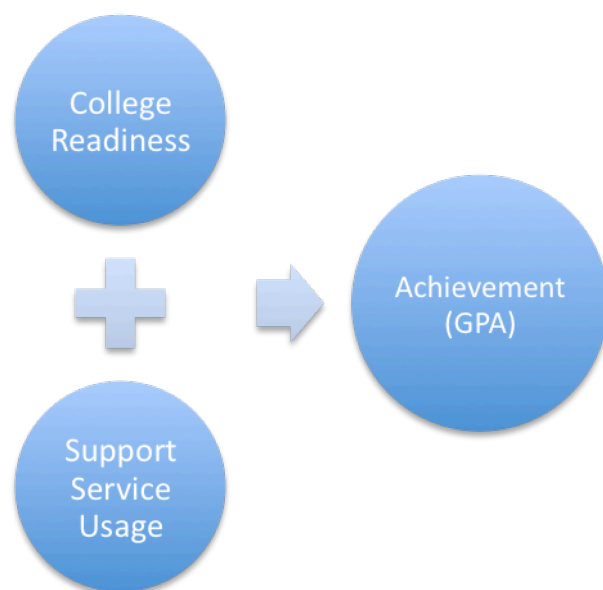
³ American Association of Community Colleges website, accessed January 25, 2009.
<http://www2.aacc.nche.edu/research/index.htm>.

opportunity' for their students

There are two primary theoretical views that relate to the effectiveness of online tutoring and other support services. First, the traditional view argues that supplemental instruction and services like tutoring improve basic skills and correct underlying academic deficiencies related to under preparation for college. This improvement in basic skills should increase measureable indicators of academic achievement, such as GPA, increasing the likelihood of student retention and success (Hedges and Majer 1976; Zeidenberg et al 2007). The availability of these services should support the efforts of non-traditional and disadvantaged students, given their greater levels of under preparation, increasing their academic achievement and helping them progress towards their professional and educational goals.

Unfortunately, while the academic research available on tutoring and other support services has a long if sparse history, the empirical results concerning the effectiveness of support services like tutoring have been mixed. Much older research supported the traditional model finding that support services, specifically individualized tutoring, could have a positive effect on achievement (Hedges and Majer 1976). At least one meta-analysis using 65 different studies found that individualized tutoring could be successful at all educational levels (Cohen et al 1982). Other experimental research found evidence for increased academic success, but only for high achievers and in very narrow subject areas (Irwin 1980, 1981). In one of the more rigorous and recent empirical studies in this area, Muraskin found that federally funded student support programs increased both grade point averages and the likelihood of student retention (Muraskin, 1997). Unfortunately, many studies in this area have often suffered from a lack of appropriate controls, such as previous academic ability, or a lack of methodological rigor (Bailey and Alfonso 2005). This report attempts to acknowledge these oversights by using appropriate controls and taking into account the unique issues present in the community college system.

In short, within the traditional framework, support services should be directed at correcting the specific academic deficiencies of different individuals and improving their basic skills in reading, writing, and subject matter knowledge. Services like tutoring that focus on specific problem areas should improve understanding, increase achievement and contribute to the success of disadvantaged students by offering targeted support. Figure 1 below presents a simple diagram of the impact of support services in this framework. Each individual student's college readiness, defined almost

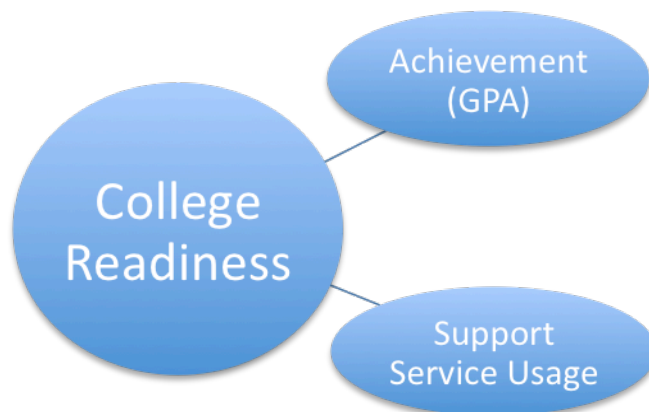


entirely by academic preparation, combines with support service usage to produce academic achievement. It is this model of support services that this report will test.

However, much recent research argues exactly the opposite of the traditional model. In a review of the literature on peer tutoring at the college level, Maxwell found no consistent evidence of increased achievement for weaker or at-risk students who used tutoring services. Other evidence suggested that those who were successful were better prepared for college initially, both culturally and academically (Maxwell 1990). In addition, when controlling for academic preparation using SAT scores, McGinty found that tutoring had, at best, a marginal positive impact on GPA for most students and no impact on those with the weakest academic preparation (McGinty 1989). When using a matched samples approach to address the selection bias inherent in the use of support service, an issue discussed in more detail below, Pribesh and her colleagues also found little effect on the achievement levels of disadvantaged primary school students, although generalizing this finding to college-age students is obviously problematic (Pribesh et al 2007).

Scholars such as these argue that to be at all successful, support services need to follow the 'student integration' model, originally proposed by Tinto to address student retention and graduation rates (1976; 1993). According to this more sociological view, many types of support services often perpetuate disadvantage and fail to improve either the retention or achievement of the most at-risk students, particularly minorities (Rosenbaum et al 2006). The strongest supporters of this viewpoint even argue that the entire structure of the community college system perpetuates disadvantages and that support services such as tutoring assists only those with the necessary 'pre-existing social and cultural resources can take full advantage of them (2008).'

Within this framework, represented by Figure 2 below, targeted academic support services such as tutoring primarily assist previously advantaged students and should have a limited impact on both the achievement and retention of disadvantaged students. These students are subject to environmental, cultural, and economic strains that cannot be addressed effectively by simple academic assistance, if, indeed, they can even access them. These scholars argue that only programs that address the social integration of disadvantaged students will be successful and purely academic support services do not correct underlying differences in college readiness, which includes factors beyond simple academic preparation. In short, the same thing that drives academic achievement drives usage as well, resulting in possible correlation between usage and achievement but no causal relationship between the two. Simply put, support services like online tutoring only assist those who would likely have prospered anyway and any link between usage and achievement is



spurious. Unfortunately, programs like this are almost impossible to implement in the community college system, which deals almost exclusively with working adults, commuters, and other “non-traditional” students.

Applicability of Previous Research to Online Tutoring

To summarize, despite the importance of community colleges to the educational system as a whole and the importance of support services like tutoring on the achievement of students, the evidence from the extant research has been minimal, mixed, methodologically suspect at times, and failed to address the specific issues of the community college population (Bailey and Alfonso 2005). It’s arguable whether support services have any positive effect on student achievement and even more uncertain whether new technologies like online tutoring can have any impact. All told, the academic research reviewed here seems to indicate that while support services certainly can increase academic achievement, context, structure, and availability matter. Access should be as open as possible and information should be available as widely as possible if the services are to be effective. Costs to student time and the requirement of previous knowledge should be limited. Researchers skeptical of the effectiveness of support services have a point that barriers to access can limit the reach of services like tutoring. Certainly, accessing support services can be a drain on student time, requires prior knowledge, can entail simple monetary costs, and frequently requires students to overcome the social stigma of needing tutoring.

However, there are numerous reasons to question the applicability of recent research that has downplayed the effectiveness of support services to online tutoring. Online tutoring directly addresses many of these problems, presumably diminishing the related student access costs and broadening the reach of the service to a larger population of at-risk students. First and foremost, the online tutoring available at Houston Community College is entirely cost free for students in a financial sense, since it is included in their admission. There are no restrictions on either access or frequency of use. Secondly, it is available 24-7 and requires only as much time from the student as it takes to login, upload a document, and log out. While there might be certain access issues related to the availability of technology for some students, we believe that this is minimal and diminishing rapidly. Certainly computer access is widely available on the HCC campuses. Finally, the system is relatively anonymous. Students are identified only by a username they themselves select and can therefore avoid any reluctance they have to ask for help face-to-face. Communication is done by email and message posts. Tutors download the files at their convenience and re-upload them promptly with comments and suggested improvements for the student to access at their convenience. Since the literature focuses on the costs associated with access and usage, the low costs associated with online tutoring should result in improved achievement for the broadest possible group of students.

In addition, recent research on support services has been almost uniformly qualitative, often due to lack of data reliability and availability. The quantitative work that has been done on the impact of support services has often been survey-based or limited to case studies. However, the nature of the AskUp tutoring system at Houston Community College

has allowed us to gather a wealth of quantitative data on individual students, their use of the system, their previous academic ability, and their subsequent achievement levels. This provides us the opportunity to specifically test the effectiveness of AskUp in a more statistically rigorous manner than has been attempted before. While this report is specifically focused on the quantifiable impact of the AskUp program, the results have implications for other support services and their impact on student achievement more generally

Research Design & Data

The best and most direct way to observe what, if any, relationship exists between online tutoring and student achievement is to measure and analyze both at the individual level. A specific student either does or does not utilize the AskUp system, and their scores improve, decline, or stay the same. Users and non-users can be compared and their achievement analyzed in light of different demographic characteristics and achievement levels. This requires that both achievement and service usage be tracked and compiled for individual students rather than in the aggregate. Therefore, it was necessary for this study to gather data from two sources: AskUp and HCC student records. Thankfully, AskUp requires a unique username to login and tracks individual student usage of the service. This information allowed us to compile a dataset that contains an accurate and complete history of individual student usage overtime. AskUp was initially able to provide usage data on 5,733 individual student users from 2006-2008.

All other data came directly from student records provided by HCC. This allowed for the inclusion of both demographic information and measures of academic ability in the resulting dataset. The biggest deficit in most research on support services has been the lack of an appropriate measure to control for student academic ability and preparation. Without controlling for student ability and preparation, it is impossible to determine whether increased achievement is due directly to service usage or to a selection bias in the user population. Measures on entry-level assessment tests are particularly useful for controlling for this possible selection bias (Bailey and Alfonso 2005). As luck would have it, academic readiness exams are a requirement for enrollment at Houston Community College.⁴ Unless they have received a waiver, each incoming student must prove “college-readiness” by taking a Texas State Initiative (TSI) approved test.⁵ While this requirement does not extend to transfer students, it will provide us with a baseline from which to measure student improvement. Scores on their enrollment test will serve as a pretest to control for each student’s incoming level of academic readiness, allowing us to get at the

⁴Houston Community College Website, accessed on May 19, 2009.

<http://www.hccs.edu/hccs/future-students/requirements/testing-requirements-to-attend-hcc>.

⁵ Houston Community College Website, accessed on May 20, 2009.

<http://www.hccs.edu/portal/site/hcc/menuitem.f6a945c7befcd217d3ef7510d07401ca/?vgnextoid=8c031de612dc5110VgnVCM100000054710acRCRD&vgnnextchannel=08a4b3a3bd5f4110VgnVCM100000054710acRCRD&vgnnextfmt=default>).

independent impact of online tutoring. Including academic readiness in the subsequent analyses will control for the largest confounding factor in quantifying the impact of support services as indicated by the literature reviewed above. Other demographic information provided by HCC allowed for the examination of different subgroups of HCC students, particularly minorities, in the final analysis.

Finally, the usage data from AskUp were merged with the student records provided by HCC using recovered student identification numbers. Unfortunately, not all of the individual students who used AskUp could be matched with their academic records from HCC. This was primarily due to difficulties in matching different student identification numbers used by different departments within HCC to the identification numbers captured by AskUp. In the end, 1,196 individual users were matched with their enrollment and achievement information from the HCC database. While this subset of students cannot be compared demographically to those who could not be matched to their individual HCC records, diagnostics did not indicate there was any significant variation between the service usage of matched and unmatched students. In addition, the students who could be matched to their transcripts approximately mirrored college-wide averages on several other traits available from their records. Finally, in order to provide a control group for these service users, HCC provided the same academic information for a random sample of 5,000 students from the same time period who were not among the original 5,733 users provided by AskUp. These combined samples of users and non-users served as the initial dataset for this project.

Analysis

Descriptive Statistics

Before moving into inferential statistics and hypothesis testing, it seems reasonable to offer some descriptive statistics comparing the sample of online tutoring users to the sample of non-users. First, Tables 1 and 2 below offer a quick summary of system usage. All measures are per semester averages of usage. As you can see, from the students that could be matched to their transcripts and were included in the final analysis, average usage was a little more than three times per semester and student users uploaded about two files per semester as well. This is only average usage; some students were far more frequent users, others far less. This is easily seen in the range from .5 uses up to an average of 25 uses per semester in Table 1.

Table 1

Summary of Average Uses of AskOnline					
Variable	Obs	Mean	Std. Dev.	Min	Max
avg_uses	937	3.342761	3.16193	0.5	25

Table 2

Table of Usage by Type			
stats	avg_files	avg_uses	avg_logins
mean	2.023482	3.722281	8.744703

Figures 3, 4, and 5 below offer more detailed, side-by-side comparisons between the user and non-user groups on age, gender, and race. What is immediately obvious is that there are few gender or age differences between tutoring users and non-users. Online tutoring users are slightly younger and more likely to be female on average, compared to the population of the HCC student body as a whole, but the differences are not particularly significant. Users are likely to be approximately a year younger, on average, than non-users, which, while statistically meaningful, is not particularly substantively interesting. Table 3 was included to help clarify the relationship between age and tutoring usage, since the Figure 4 tends to visually overemphasize the differences between the two groups.

However, while there are not significant difference between users and non-users by age or gender, there are significant racial and ethnic differences between those HCC student who take advantage of and use the AskUp system and those that do not as shown in Figure 5. First, it's important to note that the sample of non-users provided by HCC using a random sample of 5,000 roughly mirrors the overall racial distribution of the HCC student body as described earlier. This gives us greater confidence that the inferences made using this data are more likely to be generalizable to the student body as a whole. Secondly, it's obvious that two groups are overrepresented in the population of users of the AskUp system, *international* students and *Asian* students, particularly international students. White students are also severely underrepresented in the user population, relative to the make-up of the student body as a whole. This is likely for two reasons: one positive, one negative.

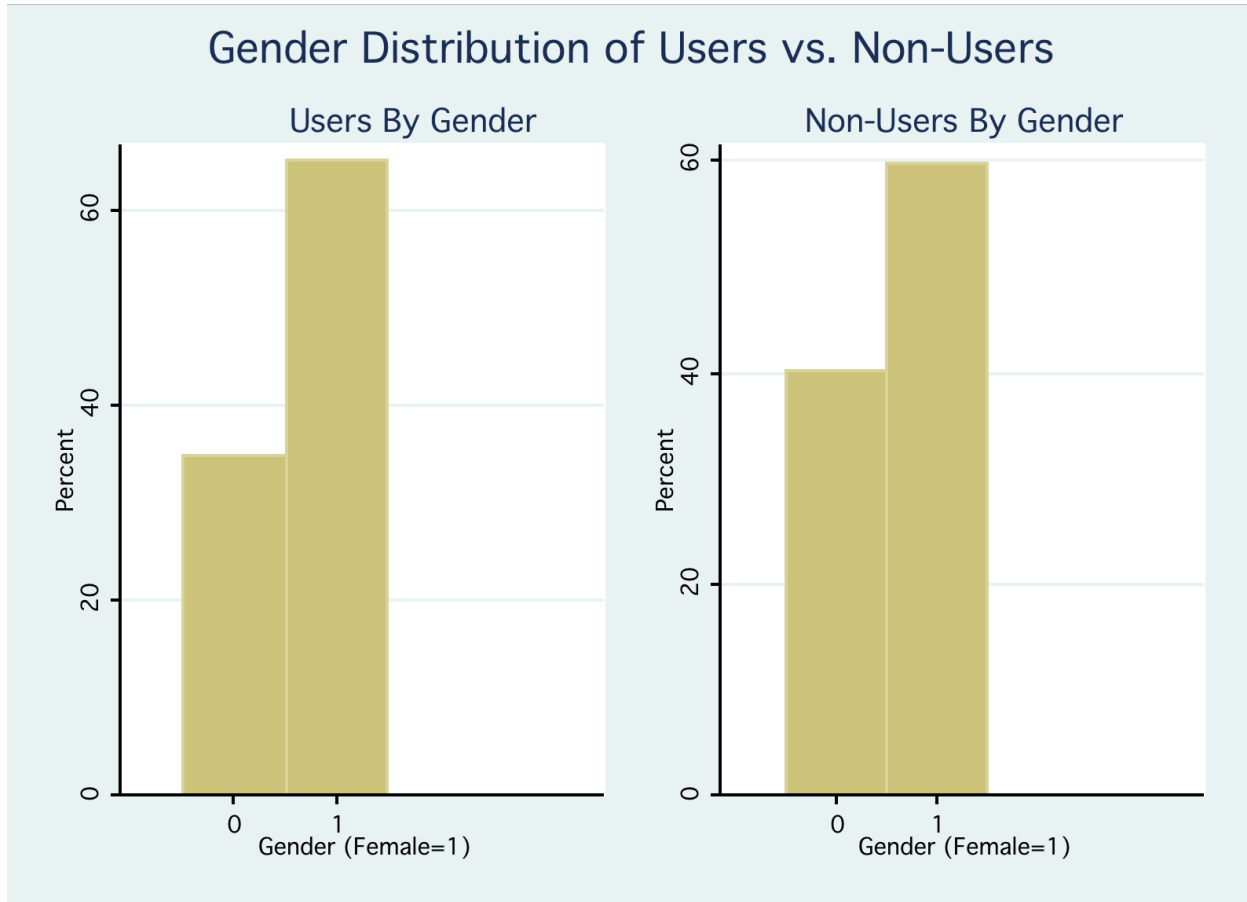


Figure 3

First and most obviously, AskUp is being used by those with the most obvious need. International students, likely with limited English proficiency, are taking advantage of the system to improve their assignments. The service originally offered primarily English tutoring, adding other subjects gradually. This overrepresentation is likely due to lag time in adoption by students for whom English is their primary language.

However, the significant underrepresentation of white students in the user population, as well as the more moderate underrepresentation of blacks and Hispanics, indicates that knowledge of the system may not be widespread among the general student body. These three groups collectively represent more than 70% of the HCC student body. In short, particular groups are using the system, likely learning about it through word-of-mouth or from their instructors, while the general population seems to be less aware of the service. This is also indicated by the relatively small number of unique users that AskUp was able to identify – 5,733 – compared to the size of the HCC student body as a whole, approximately 55,000. In other words, only roughly 10% of HCC students have even utilized the AskUp system even once, and those users are highly concentrated in non-representative subpopulations within the HCC student body.

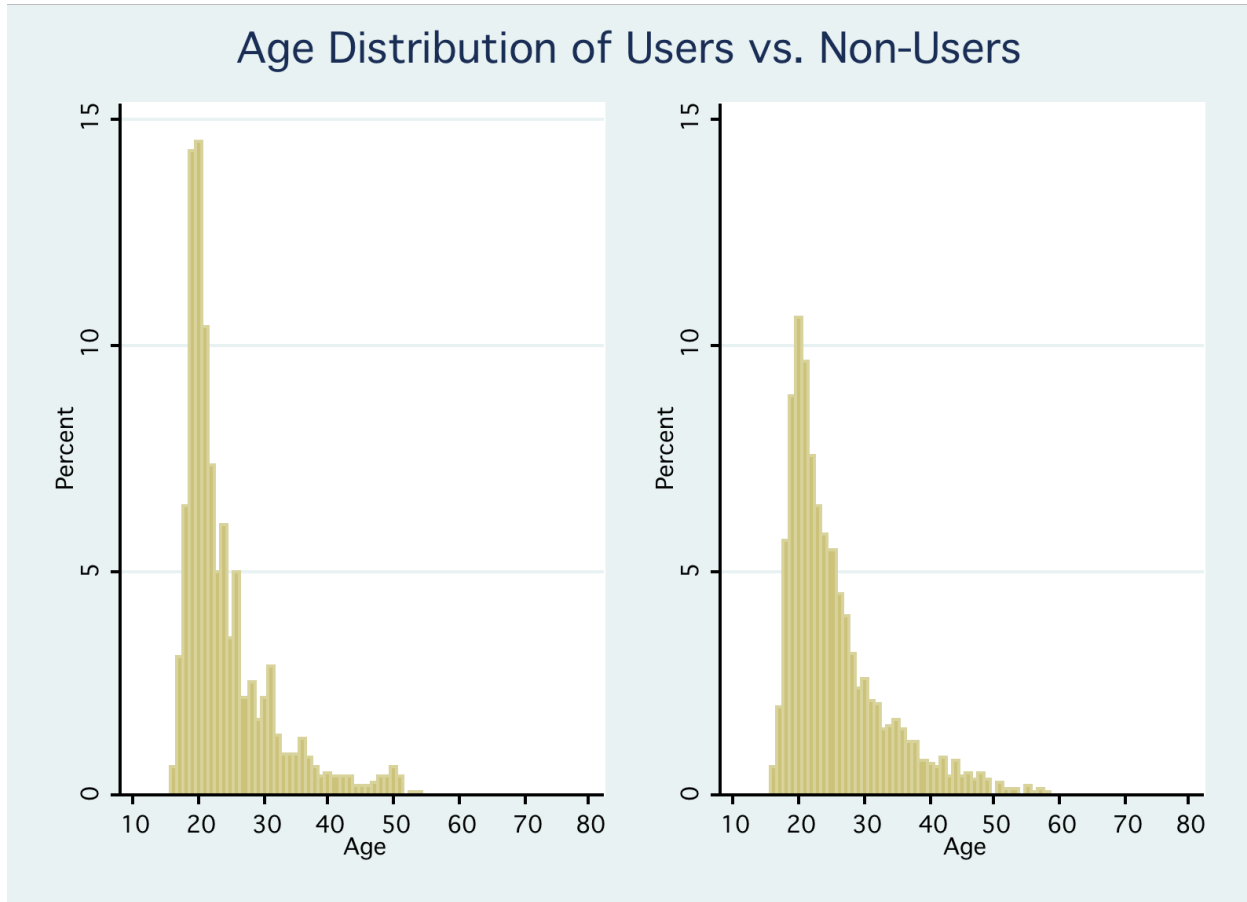


Figure 4

Mean estimation		Number of obs = 5128			
0: tutor_use = 0					
1: tutor_use = 1					
Over	Mean	Std. Err.	[95% Conf. Interval]		
age	0	25.76554	.1213821	25.52757	26.0035
	1	24.14619	.2264826	23.70218	24.59019

Table 3

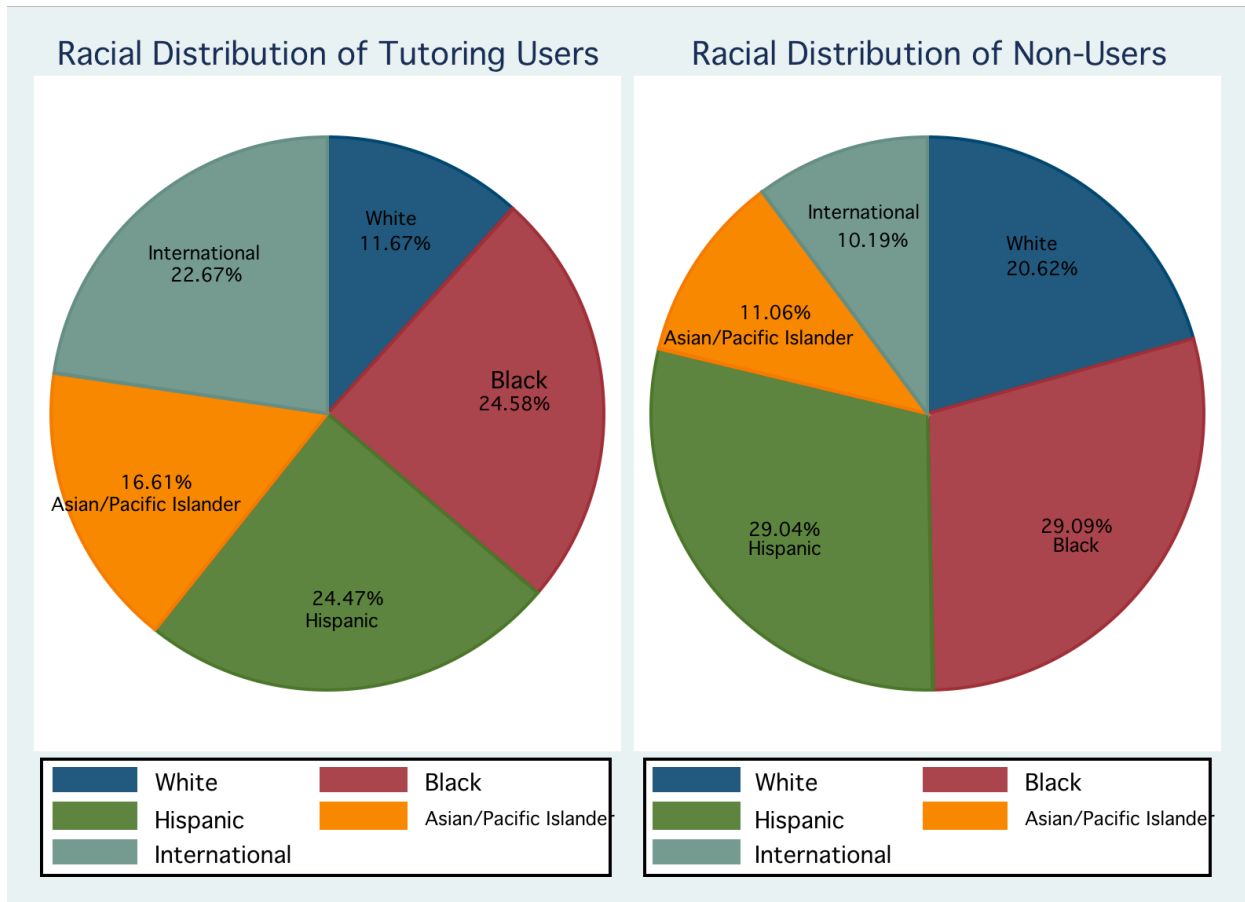


Figure 5

In short, given the simple statistics presented here, it seems that a broader and more coordinated outreach effort is needed to inform the general student body about the AskUp system. As I understand it, this outreach effort is already in progress, with AskUp tutors attending various HCC student events at different campuses, promoting the system and encouraging student use. If this outreach effort succeeds and a broader range of students learns about the system, it is likely that the disparities between users and non-users will decline, eliminating the racial and ethnic usage gaps summarized above.

Inferential Statistics & Analysis

As useful as the statistics above are, they tell us very little about the effectiveness of the system. If the system is effective, they can be helpful in determining who to target for outreach, but they tell us very little about whether or not the students using the system are increasing their achievement. For that, we need to turn to regression modeling and inferential statistics.

This report uses a simple cross-sectional design to test the impact of usage on achievement for the students included in the final sample. The primary explanatory variable measuring usage is average number of AskUp usages per long semester for each student user from fall

2006 to spring 2008, excluding summer and winter break semesters. This provides a more consistent measure of the student usage than simply using the total number of logins over the period. Similarly, the primary dependent variable is the cumulative GPA for each student for the four semesters included. This also provides a more consistent overall measure of the impact of service usage on achievement, rather than attempting to break down the effect of usage on particular subject areas such as English, math, etc. Finally the model includes a set of controls based on previous research in this area (Zeindenberg 2007). In addition to scores on the entrance-exam described above, the model includes age and gender, as well as race and ethnicity coded as a series of dummy variables based on the Census Bureau categories. While this is a very parsimonious model and could be expanded to include other variables, it matches models used in previous research and includes variables that relate to the most pertinent and relevant theoretical concepts. Subsequent regression analysis was conducted using the general linear model provided below:

$$Achievement_i = Constant + \beta_1 CollegeReadiness + \beta_2 Ethnicity + \beta_3 Age + \beta_4 Gender + \beta_5 Usage$$

While the model above includes a control for academic readiness, there still exists the possibility of imbalance between the treated and untreated groups in the dataset. Since it is not clear what the treatment assignment mechanism was, other than self-selection, service usage cannot be assumed to be random (Icarus et al 2008), and the evidence indicates quite obviously that it is not. Table 4 below shows a simple mean estimation of the GPA for users and non-users in the sample. While Table 4 indicates that users are more likely to have significantly higher GPA's than non-users, we cannot determine from this information whether the increased achievement is due to service usage or previous academic ability. Remember Figures 1 & 2 above. These simple statistics cannot distinguish cause from effect. The effect is equally likely to be an artifact that students who are more likely to be successful to begin with, choose to use AskUp more frequently than more disadvantaged students. In this case, increased outreach and service usage would be unlikely to translate into increased gains from new users. While certainly heartening, the considerable difference in the scores likelt indicates a considerable selection bias in service usage and the need to control, as much as possible, for the imbalance between the treated and non-treated groups, even after controlling for college readiness using entrance exam scores.

Table 4

Mean Estimation		
	GPA	SE
Service Users	2.915	0.023
Non-Users	2.685	0.014

To further reduce the impact of the imbalance between the treated and non-treated groups (users and non-users respectively) in the sample on the subsequent analysis, I employed coarsened exact matching (CEM) as described in Icarus et al 2008. The sample was matched on all the variables in the model, including college readiness, gender, and ethnicity with usage coded as a 0/1 dummy as the treatment variable. The matching resulted in a

final analysis sample of 3535 cases, with multiple control (non-user) cases matched to each treated case. The multivariate L1 distance, a measure of imbalance in the sample, was 1.3006001 before the matching process and 1.0648765 afterward, resulting in an approximately 18% reduction in the imbalance. More simply put, each individual student user was matched, as closely as possible, to another student or students identical to themselves in terms of age, race, level of college readiness, and gender. As much as possible, the only difference allowed was usage of AskUp. Statistically speaking this gives us more confidence in our inferences concerning magnitude of effect and the causal relationship between tutoring and achievement, *conditional upon* the fact that we have matched on all the appropriate variables. Given the research reviewed above and the available data, I believe this matching represents the best possible way of reducing imbalance between student users and non-users. All subsequent analyses were run on this matched dataset using linear regression and the weights provided by the CEM program to ensure appropriate standard errors and confidence intervals.

Finally, some few students had extreme values on the primary explanatory variable, average usage per semester, that were far in excess of most of the rest of the sample. For example, one student used the service an average of 115 times per semester. These few outliers had a substantive impact on the results of the regression, and therefore, the analysis only included students who used the service less than an average of 23 times per semester, resulting in eight cases being dropped from the sample. The extremely small number of Native American students, twelve, were also excluded from the final analysis. In short, the final sample uses matching techniques to minimize the difference between the treated and untreated students on all available variables related to concepts that might impact achievement and includes a distribution of students that should be representative of the HCC student body. The results of the regression analysis can be seen below in Table 5.

Table 5

Table of Coefficients: OLS		
	Coef	SE
Exam	0.010***	0.001
White	(dropped)	
Black	-0.192***	0.057
Hispanic	0.151***	0.056
Asian	0.184***	0.064
Internat'l	0.346***	0.055
Unknown Ethnicity	-0.072	0.090
Age	0.030***	0.003
Female	0.313***	0.033
Avg_Use	0.053***	0.008
Constant	1.103***	0.102
note: *** p<0.01, ** p<0.05, * p<0.1, N = 3270		

The above table requires a small amount of explanation. First and foremost, the coefficients indicate the impact of one unit of the variable on overall GPA. For example, a one year increase in *age*, results in a .03 increase in GPA over the time period. Secondly, the asterisks represent *statistical significance*, whether or not the impact indicated has a “true” effect or whether the result could have happened by chance. For example, the *unknown* racial variable is not statistically significant, likely due to the heterogeneity of the students within the population, so the negative impact is insignificant. More asterisks mean that the effect is *less* likely to have occurred by chance. Almost all the variables are highly significant, indicating that we can have a very high degree of confidence in the impact of the different variables, including usage of the AskUp system. Next, the *Constant* indicates the baseline GPA a student would have achieved if all other variables were set to zero. Finally, the variable for ‘white’ was dropped in the analysis, ensuring that the impact of the other racial groups on achievement is relative to the Caucasian students. For example, all else being equal, the achievement of Asian student is .184 grade points above that of white students as a group.

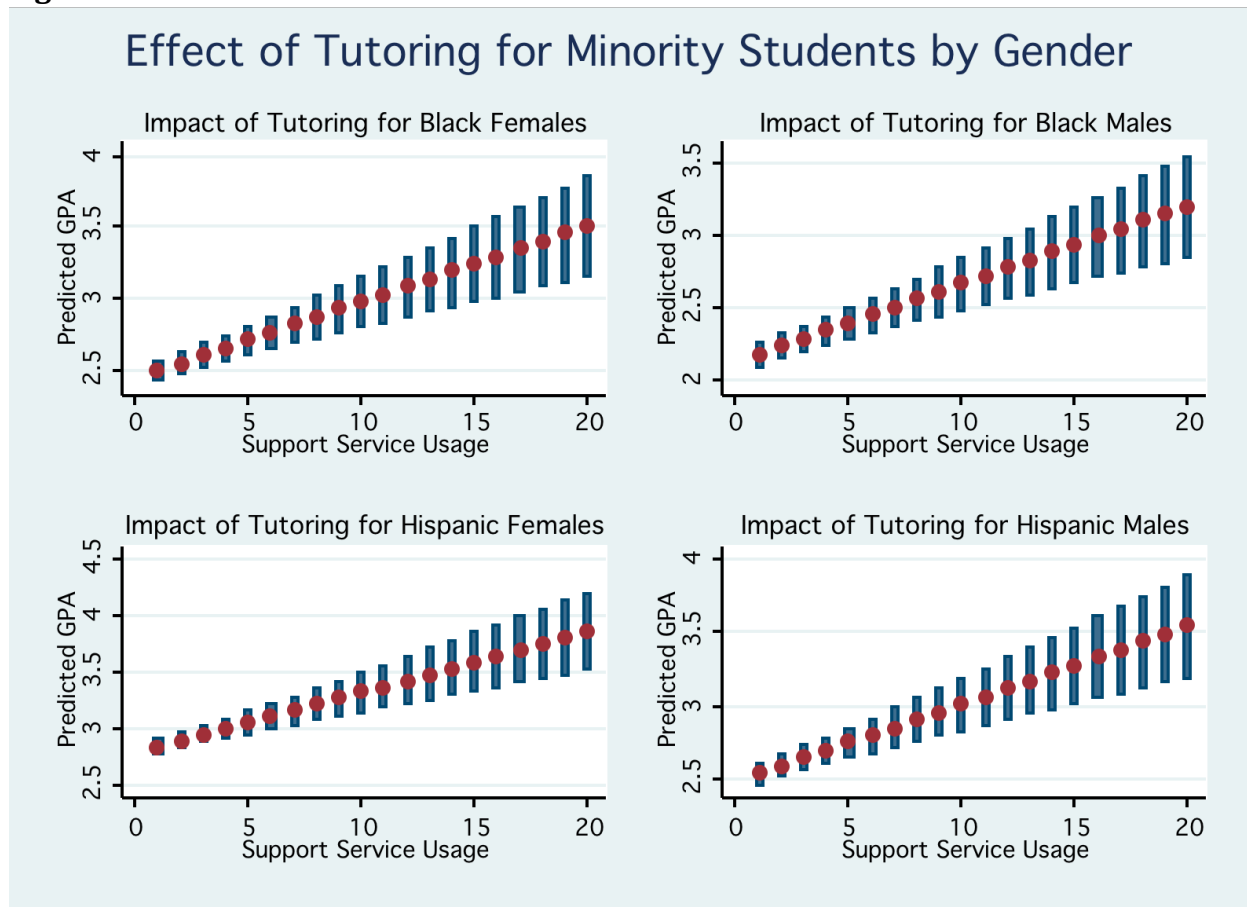
That said, as you can see, our primary variable of interest, average usage of the AskUp system per semester, is statistically significant in the model above and has a considerable *substantive* impact on GPA as well. For every one-unit increase in tutoring usage per semester, student GPA increases by approximately .05 points. For example, a student who used the service five times a semester on average would increase their GPA about .25, enough to turn a high C into a low B or a high B into an A. Increased usage, obviously, would result in increased improvement in GPA, which supports the traditional model of support services and indicates that service usage does have both a *positive* and *significant* impact on student achievement, even for disadvantaged students and those with lower levels of college readiness.

In addition, the effect of the usage variable has more overall impact than both age and college readiness, at least as measured by scores on the COMPASS exam. The impact of tutoring is over five times that of college readiness, indicating that targeted, supplemental academic instruction can help students at all levels of academic preparation improve, and help disadvantaged students compensate for initial academic under preparation. In this case, the instruction provides none of the social integration or community building that is argued for by supporters of the student integration model, but still significantly and substantively increases student achievement.

Finally, the magnitude of the usage variable is large enough that moderate, continuous usage over time seems to be enough to compensate for any socio-cultural disadvantage captured by the ethnic and racial variables. For example, an African-American student who used the service an average of four times per semester, approximately the average usage of those who used the system, would more than compensate for any racial disadvantage in achievement. This is strong evidence that the AskUp system at HCC can and does increase the academic success of minority students, even after addressing the selection bias inherent in the usage of the service and previous academic preparation.

The graphs below show this more clearly and intuitively. The analysis above was conducted using Gary King's Clarify program for STATA, which uses simulation to create confidence intervals around predicted values of the dependent variable (King et al 2000). In Figure 3 below, the substantive effect of tutoring on GPA is graphed for both blacks and Hispanics. Scores on the entrance exam and age are set at their mean, while the genders are shown side-by-side, given the strong impact of gender shown in Table 5. The blue bars represent 95% confidence intervals around the predicted GPA, indicating our faith in the predicted GPA's. All other graphs for different ethnic and racial groups follow a similar pattern, differing only by the intercept. In other words, the impact of online tutoring on achievement is constant and positive all levels of college readiness, different racial groups, ages, and gender.

Figure 6



Obviously, the reliability of the predictions diminishes as the usage increases since very few students use the service more than an average of about ten times per semester. However, the direction and magnitude of the effect of increased usage of AskUp are obvious. Predicted GPA increases approximately one point as usage goes from zero to twenty times per semester, the equivalent of going from an 85 average to a 95 average, or turning a B-student into an A-student. This effect is stable across both gender and race and holds for other groups, such as international students, not included in Figure 3. In short, support services like tutoring can be effective at substantively improving the achievement of community college students, particularly minority and other disadvantaged students, even controlling for academic preparation and limiting the assistance to supplemental academic instruction.

Conclusion & Recommendations

To conclude, the AskUp service *is* effective at increasing student achievement, has a substantive impact on student grades, and significantly improves the GPA's of disadvantaged students. This finding is statistically robust and continues even after controlling for a number of confounding factors. In short, AskUp works, and it works well. This is not to say that the AskUp system will turn D students into honor roll students by

itself. Instead, students motivated to use the system will find their overall grades improving and even moderate usage, approximately 3-4 times a semester, is enough to improve students' letter grades, from high B's or C's, to A's or B's.

That said, the main recommendations to come from this analysis of the data are ones of outreach. The system works for those that use it, but the student users are not representative of the student body as a whole. Whites, blacks, and Hispanics are the most common groups in the HCC student body, but underrepresented among users. While this might be related to the early introduction of English tutoring and usage of AskUp by ESL students, it also indicates that the broader HCC population may be unaware of the service. Given the relative ease with which increased traffic can be accommodated by the AskUp system, particularly compared to other academic service options, increased outreach seems a low-cost way to improve the achievement of students.

In addition, the outreach can target different demographic groups. For example, black males have the overall lowest academic achievement within the sample, as indicated by the graph in Figure 6 above. If usage among this group could be increased substantially, the overall improvement for this group could be improved significantly, bringing them to parity with the student body as a whole. While this analysis has primarily focused on different racial and ethnic groups, achievement gaps between other groups could also be addressed. For example, GED students or part-time students could be targeted for intensive outreach. While obviously no one can be forced to use the AskUp system, increased usage among different groups should result in a substantive, moderate increase in GPA and other measures of achievement.

In the end, this research supports the continued and even increased usage of the AskUp system as well as the idea that simple, academic support services can increase achievement for HCC students. The relationship between service usage and achievement is strong and stable across a variety of students. Improvements in GPA hold true even after controlling for academic preparation and utilizing matching, persists across all minority groups included, as well as across age groups and gender. HCC serves a student body that represents what higher education will look like for a growing number of institutions in the coming decades and simple, relatively inexpensive support services like AskUp can improve the achievement of users from disadvantaged groups. As more and more students continue to enroll in higher education at the nation's community colleges, the evidence here supports the idea that online tutoring and similar support services offered by these institutions can and do provide a 'gateway to opportunity' for community college students.

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