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Facilities and Support

A. *Describe how classroom space, classroom technology, laboratory space and equipment impact student success.*

Over the past few years, efforts by the college to create classrooms containing the same basic equipment has helped tremendously with consistency issues. The nearly universal presence of classroom podiums with attendant AV devices is considerably useful. For example, most instructors use computer-based calculator emulators when instructing their students on calculator use - this allows explicit keystroking examples to be demonstrated that were not possible before the podiums appeared. The document cameras found in most classrooms are used by most mathematics instructors. Having an instructor computer with internet access has also been a great help as instructors have access to a wide variety of tools to engage students, as well as a source for quick answers when unusual questions arise.

Several classrooms on the Sylvania campus have Starboards or Smart Boards integrated with their AV systems. Many mathematics instructors use these tools as their primary presentation vehicles. Documents can be preloaded into the software and the screens allow instructors to write their work directly onto the document. Among other things, this makes it easy to save the work into pdf files that can be accessed by students outside of class. This equipment is not used as much on the other campuses, but there are instructors on other campuses that say they would use them if they were widely available on their campus.

A few instructors have begun creating lessons with LiveScribe technology. The technology allows the instructor to make an audio/visual record of their lecture without a computer or third person recording device. The technology allows, among other things, instructors to post a 'live copy' of their actual class lecture online. The students do not simply see a static copy of the notes that were written; the students see the notes emerge as they were being written and they hear the words that were spoken while they were written. The use of LiveScribe technology is strongly supported by Disability Services, and for that reason alone continued experimentation with its use is strongly encouraged.

Despite all of the improvements that have been made in classrooms over the past few years, there still are some serious issues.

Rooms are assigned randomly, which often leads to mathematics classes being scheduled in rooms that are not appropriate for a math class. For example, scheduling a math class in a room with individual student desks creates a lot of problems; many instructors have students take notes, refer to their text, and use their calculator all at the same time and there simply is not enough room on the individual desktops to keep all of that material in place. More significantly, this furniture is especially ill-suited for group work. Not only does the movement of desks and sharing of work exacerbate the material's issue (materials frequently falling off the desks), students simply cannot share their work in the efficient way that work can be shared when they are gathered about tables. It would be helpful if all non-computer-based math classes could be scheduled in rooms with tables.

Another problem relates to an inadequate number of computerized classrooms and insufficient space in many of the existing computerized classroom. Both of these shortages has greatly increased due to Bond-related construction. Several sections of MTH 243 and MTH 244 (statistics courses), which are normally taught in computerized classrooms, have been scheduled in regular classrooms. Many of the statistics courses that have been scheduled in computerized classrooms have been scheduled in rooms that seat only 28, 24, or even 20 students. When possible, we generally limit our class capacities at 34 or 35. Needless to say, running multiple sections of classes in rooms well below those capacities creates many problems. This is especially problematic for student success, as it hinders students' ability to register due to undersized classrooms.

Finally, the computerized classrooms could be configured in such a way that maximizes potential for meaningful student engagement and minimizes potential for students to get off course due to internet access. We believe that all computerized classrooms need to come equipped with software that allows the instructor control of the student computers such as LanSchool Classroom Management Software. The need for this technology is dire; it will reduce or eliminate students being off task when using computers, and it will allow another avenue to facilitate instruction as the instructor will be able to 'see' any student computer and 'interact' with any student computer. It can also be used to solicit student feedback in an anonymous manner. The gathering of anonymous feedback can frequently provide a better gauge of the general level of understanding than activities such as the traditional showing of hands.

Recommendations

All mathematics classes should be scheduled in rooms that are either computerized (upon request) or have multi-person tables (as opposed to individual desks).

All computerized classrooms should have at least 30, if not 34, individual work stations.

An adequate number of classrooms on all campus should be equipped with Smartboards so that all instructors who want access to the technology can teach every one of their classes in rooms equipped with the technology.

The computer image for all computerized classrooms should include software that allows the instructor computer complete and direct access to each student computer.

B. *Describe how students are using the library or other outside-the-classroom information resources.*

In order to research how students are using the library and other outside-the-classroom resources, we conducted a stratified sampling method survey of 976 on-campus students and 291 online students; the participants were chosen in a random manner. We gave scantron surveys to the on-campus students and used SurveyMonkey for the online students. We found that students are generally knowledgeable about library resources and other outside-the-classroom resources. The complete survey, together with its results, is given in appendix E on the next page; we have summarized our comments below in relation to each question that we asked.

- Q1.** Not surprisingly, library resources and other campus-based resources are used more frequently by our on-campus students than by our online students. This could be due to less frequent visits to campus for online students and/or online students already having similar resources available to them via the internet.
- Q2.** We found that nearly 70% of instructors include resource information in their syllabi. This figure was consistent regardless of the level of the class (DE/transfer level) or the employment status of the instructor (full/part-time).

We found that a majority of our instructors are using online resources to connect with students. Online communication between students and instructors is conducted across many platforms such as instructor websites, Desire2Learn, MyPCC, online graphing applications, and online homework platforms.

We found that students are using external educational websites such as Khan Academy, PatrickJMT, PurpleMath, and YouTube. The data suggest online students use these services more than on-campus students.

- Q3.** The use of online homework (such as WeBWork, MyMathLab, MyStatLab, and ALEKS) has grown significantly over the past few years. However, the data suggests that significantly more full-time instructors than part-time instructors are directing their students towards these tools (as either a required or optional component of the course). Additionally, there is a general trend that online homework programs are being used more frequently in online classes than in on-campus classes. Both of these discrepancies may reflect the need to distribute more information to faculty about these software resources.
- Q4.** The math SAC needs to address whether or not we should be requiring students to use online resources that impose additional costs upon the students and, if so, what would constitute a reasonable cost to the student. To that end, our survey asked if students would be willing to pay up to \$35 to access online homework and other resources. We found that online students were more willing to pay an extra fee than those enrolled in on-campus classes.
- Q5.** The PCC mathematics website offers a wealth of materials that are frequently accessed by students. These include course-specific supplements, calculator manuals, and the required Calculus I lab manual; all of these materials were written by PCC mathematics faculty. Students may print these materials for free from any PCC computer lab. The website also links to PCC-specific information relevant to mathematics students (such as tutoring resources) as well as outside resources (such as the Texas Instruments website).
- Q7.** The PCC mathematics website offers a wealth of materials that are frequently accessed by students. These include course-specific supplements, calculator manuals, and the required Calculus I lab manual; all of these materials were written by PCC mathematics faculty. Students may print these materials for free from any PCC computer lab. The website also links to PCC-specific information relevant to mathematics students (such as tutoring resources) as well as outside resources (such as the Texas Instruments website).
- Q9.** In addition to the previously mentioned resources we also encourage students to use resources offered at PCC such as on-campus Student Learning Centers, online tutoring, Collaborate, and/or Elluminate. A significant number of students registered in on-campus sections are using these resources whereas students enrolled in online sections generally are not. This is not especially surprising since on-campus students are, well, on campus whereas many online students rarely visit a campus .

Recommendations

The majority of our data suggests that students are using a variety of resources to further their knowledge. We recommend that instructors continue to educate students about both PCC resources and non-PCC resources. We need to uniformly encourage students to use resources such as online tutoring, student learning centers, Collaborate, and/or Elluminate; this includes resource citations in each and every course syllabus.

A broader education campaign should be engaged to distribute information to part-time faculty regarding online homework such as WeBWork, MyMathLab, MyStatLab, and ALEKS.

Instructors should consider quality, accessibility and cost to students when requiring specific curriculum materials.

C. *Provide information on clerical, technical, administrative and/or tutoring support.*

Bibliography

- [1] Hughes and Leavitt. *Accessible Content Creation in Mathematics*. 2013. URL: <http://www.pcc.edu/resources/instructional-support/access/documents/math-accessibilityreport.pdf>.
- [2] “The Mathematics Required of First Year College Students”. In: *National Center on Education and the Economy* (2013), p. 6.



Resource survey results

sec:resourcesurvey)

Survey data details: $n = 976$ face to face and $n = 291$ online responses.

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1. Have you used any of the resources available through the library (e.g. calculator, netbook, or iPad rentals, textbook checkouts, scanners, or online database search engines) during your time as a student in a PCC math course?
 - (a) Yes. I frequently used these resources.
 - (b) Yes, but I seldom/rarely used these resources.
 - (c) No, but I knew that such resources were available.
 - (d) No, and I was unaware that such resources were available.

We found that our students both in face-to-face and online classes are generally knowledgeable about library and out of the classroom resources such as calculator rentals, netbook and iPad rentals, textbook checkouts, scanners and online searchable databases.

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Student knowledge of library and out-of classroom resources	
Face-to-face	81.45%
Online/hybrid	74.25%

Not surprising that library and other out-of-the-classroom information is being used more frequently by our face-to-face students than that of online students. This could be due to less frequent visits to campus for online students and/or online students already have the resources available to them.

Actual use of library and out-of-classroom resources	
Face-to-face	48.76%
Online/hybrid	25.77%

2. Were the library and related resources listed on your most recent math course syllabus?
 - (a) Yes, it is listed on the syllabus with links.
 - (b) Yes, it is mentioned but no links are provided.
 - (c) No, it is not listed as a resource.
 - (d) I don't have a copy of the syllabus available.

We found that both Part-time faculty and Full-time faculty included information regarding library and out-of-classroom resources on their syllabi.

Percentage of classes where the syllabus included resources	
Part-time faculty	69.41%
Full-time faculty	69.48%

The data suggests that there was very little distinction of which classes encourage more students to use outside resources in both our college level and pre-college level mathematics.

Percentage of classes where the syllabus included resources	
College level	70.05%
Pre-College level	68.83%

3. Does your current math course have online homework and/or online assessments available (e.g. WebWork, MyStatLab, MyMathLab, ALEKS)?
- (a) Yes, it is required.
 - (b) Yes, but it is optional.
 - (c) No such resource is available.

Online homework has grown in popularity over the past few years. There has been much debate within our SAC if students should be required to use online homework in face-to-face and online classes. The question has often been raised if students should be required to pay an extra cost for such features and if so, what is a reasonable cost to the student? The data shows a general trend that online homework programs such as Webwork, MyMathLab, MyStatLab, and ALEKS are being used more frequently in online than face-to-face classes.

Percentage of classes requiring online homework	
Face-to-face	13.93%
Online/hybrid	70.45%

Data suggests that significantly more Full-time instructors are offering some form of online homework (either required or optional) than that of Part-time instructors. This discrepancy may reflect the need to convey and distribute more information about these programs should Part-time instructors want to offer similar options to their students.

Percentage of classes offering some form of online homework	
Full-time faculty	70.78%
Part-time faculty	54.93%

4. I am willing to pay up to \$35 extra for access to online homework and resources that may help me succeed.
- (a) Strongly agree
 - (b) Agree
 - (c) Neutral
 - (d) Disagree
 - (e) Strongly disagree

When asked if students would be willing to pay up to \$35 to access online homework and resources that may help them to succeed, we found that online students were more willing to pay an extra fee. It should be mentioned that we previously mentioned data that online students were more likely to have used online homework and hence be better equipped to compare cost versus benefit. In contrast, a student who has not been previously exposed

to an online homework system may not be able to properly address possible benefits and instead answer purely based on willingness to pay the given dollar amount.

Percentage of student willing to pay for online homework	
Face-to-face	18.44%
Online/hybrid	42.61%
Percentage of student unwilling to pay for online homework	
Face-to-face	56.86%
Online/hybrid	27.14%

Note that the above values do not include the students who responded "neutral" on the question as these differences were not statistically significant.

5. What Learning Management Software are available for your math course? Bubble in all that apply.
 - (a) Instructor web page
 - (b) D2L and/or MyPCC
 - (c) MyMathLab or MyStatLab
 - (d) Other
 - (e) None of the above
6. Of the available Learning Management Software, which ones have you used? Bubble in all that apply.
 - (a) Instructor web page
 - (b) D2L and/or MyPCC
 - (c) MyMathLab or MyStatLab
 - (d) Other
 - (e) None of the above

We found that a majority of our courses are using outside resources to connect with students. These resources include but are not limited to personal instructor websites, DesiretoLearn, MyPCC, MyMathLab, MyStatLab, etc.

Percentage of classes offering additional resources	
Face-to-face	89.75%
Online/hybrid	99.31%

A larger separation existed for Part-time instructors who do not use any of the above mentioned resources. This could be due to lack of information or lack of knowledge about available resources.

Percentage of classes offering additional resources	
Full-time faculty	95.32%
Part-time faculty	86.72%

Overall MyMathLab and MyStatLab are used more frequently in pre-college level classes in contrast to college level classes.

Percentage of classes offering MML or MSL	
College level	31.49%
Pre-College level	48.54%

7. What resources available from the PCC Math Department have you used? Bubble in all that apply.

- (a) Course supplements
- (b) Calculator manuals
- (c) Math 251 Lab Manual
- (d) Other
- (e) None of the above

Our math department website offers additional materials for students. This includes course specific supplements to the textbook, calculator manuals specific to PCC math courses, required Calculus 1 lab, and other information regarding course description. Students may print these materials for free from any PCC computer lab.

8. What graphing software programs have you used? Bubble in all that apply.

- (a) WolframAlpha
- (b) Graph
- (c) WinPlot
- (d) Other (e.g. Fooplot, Maple, GeoGebra)
- (e) None of the above

Resources used by students in College Level Courses	
Wolfram Alpha	24.88%
Graph	14.90%
Winplot	6.14%
Other (Maple, GeoGebra, FooPlot,etc)	27.34%
None of the above	51.77%

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9. Which of the following resources available at PCC have you used? Bubble all that apply.

- (a) On-campus Student Learning Centers
- (b) Online tutoring
- (c) The Student Help Desk
- (d) Other (e.g. Collaborate or Elluminate)
- (e) None of the above

We encourage students to use some of the resources that PCC offers such as On-campus Student Learning centers, online tutoring, student help desk, Collaborate and/or Elluminate. We found that a significant amount of students in Face-to-Face classes were using the resources whereas students enrolled in an online class were not. This is not especially surprising since the nature of online courses allows infrequent campus visits for the student. However, we could work to encourage the use of online tutoring to our online demographic.

Percentage of students using PCC learning resources	
Face-to-face	67.32%
Online/hybrid	36.08%

10. Which of the following resources do you use for your math class that is available outside of PCC? Bubble all that apply.

- (a) Private Tutoring
- (b) Math websites (such as Khan Academy, Purple Math, etc.)
- (c) Youtube videos not provided by instructor
- (d) Other
- (e) None of the above

With the wide-spread availability of the internet, students have been increasingly using sites like Khan academy, PatrickJMT, PurpleMath, YouTube etc to supplement class time. In the absence of formal lecture, the data suggests online students using these services more than their face-to-face classmates. For others, private tutoring or help from their peers is another option.

Percentage of students using external web videos like Khan, PatrickJMT, PurpleMath, etc	
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Face-to-face	45.49%
Online/hybrid	56.36%

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The data suggests that both Pre-college and College Level are using these resources. It isn't surprising to see these resources used more readily by College Level students based on word of mouth or more knowledge of which sites are reputable and which are not. The more math classes the student takes, the more resources they can use to assist in their learning.

Percentage of students using some form of learning resource outside of the PCC network.	
College level	79.57%
Online/hybrid	63.47%