As part of their National Science Foundation TCUP planning efforts, Honolulu Community College (HCC) conducted a survey of a sample of students to determine the following:

1. The degree to which students believe their high school prepared them for college courses in mathematics, science and technology
2. Their interest in a summer bridge program, if it had been available to them.
3. The instructional methods and technological enhancements most effective for their learning.
4. Their interest in careers in science, technology, engineering, and mathematics (STEM) areas.
5. Their recommendations for ways in which HCC can assist them master STEM courses.

The survey was administered at the end of fall quarter 2002. The survey questionnaire was distributed in a selected set of science and math courses, including entry-level freshman classes. Students completed the surveys during the class session. The survey was administered in December 2002 just before the conclusion of the fall semester 2002. The number of respondents is 540, a good sample size for the college. Although the sample of students was drawn randomly, the views of the student respondents are viewed as reflective of newly entering students who are taking STEM courses.

Most student respondents are attending HCC to complete a two-year Associates degree as illustrated in Table 1.

<table>
<thead>
<tr>
<th>Academic Goal of Students at HCC</th>
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<tbody>
<tr>
<td>A.A.</td>
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<tr>
<td>A.S.</td>
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<tr>
<td>A.A.S.</td>
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<tr>
<td>Certificate</td>
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<tr>
<td>Other</td>
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High School Preparation

Since they will need to complete STEM courses to complete a two year degree, students were asked how well they believed their high school prepared them to take HCC courses in mathematics, science, and information technology. They were asked to rate their preparation on a four-point scale ranging from poor, fair, good, and excellent. In general, students felt they had fair to good preparation for mathematics and science courses (approximately 70% of the students gave a fair to good rating). Students felt they were less prepared by their high school for information technology courses (58% said they had fair to good preparation). However, only half the respondents rated the preparation for information technology, indicating that many did not know how to answer this or had no
courses in this area in high school. Figure 1 illustrates the percentage of respondents’ ratings of high school preparation for each of the three areas.

Figure 1 Studnets Ratings of High School Prepartation for College Courses

However, it is important to note that half of the students rated preparation as poor to fair for information technology, and slightly over a third of the students felt they had poor to fair preparation for HCC mathematics and science courses.

Interest in Summer Preparation Courses
HCC is interested in knowing whether there is interest in summer programs to help students prepare for STEM courses. Students were asked to rate their interest in bridge courses if they had been available. The ratings made on a five point scale ranging from definitely, probably, possibly, not very likely, and definitely not.

Interestingly, although students felt slightly more prepared for by their high school for HCC mathematics courses, this area rated highest for interest in a bridge summer course. Next highest was science, and they were least interested in courses in information technology.

As illustrated in Figure 2, one in three students indicated they would have definitely or probably taken a bridge course in mathematics. Another 29% possibly would have taken a summer course.
Approximately one third of the students would have definitely or probably taken a summer science course, and another 20% possibly would have taken a course (Figure 3).
Although students felt less prepared to take courses in information technology, they were less interested in taking summer bridge courses in this area. Only 27% said they would definitely or probably take courses (Figure 4).

The survey data suggests that there is a market for summer bridge courses in mathematics and science. Although less interest is expressed for information technology, perhaps technology could be integrated into summer mathematics and sciences courses to help students become more familiar with using computers.
Student Instructional Method Preferences and Value of Technological Enhancements

The survey explored how students view the effectiveness of nine different instructional methods in helping them learn. They rated the effectiveness on an anchored five-point scale with 1 being the least effective, 3 being fairly effective, and 5 being most effective. Students were also given a “not applicable” option if they had no experience with the method.

Most of the methods received relatively high ratings – with means ranging from 3.97 to 2.91. Laboratory work rated the highest suggesting that hands-on, experiential exercises are very effective. The high rating for field trips (mean of 3.65) also supports the popularity of engaging students in learning experiences. Lectures are the second most effective method (mean 3.84). This suggests the importance of information in the learning process.

Students also valued participation, rating student group discussions as the forth most effective method (mean 3.55). Students indicated an interest in learning from guest speakers (mean 3.46). Interactive methods such as role-playing and simulation of the sixth highest method (mean 3.34), and student self-directed projects rated seventh (mean 3.11). The lowest rated methods were formal seminars and student presentations (means 2.92 and 2.91 respectively). The ranking of instructional methods is illustrated in Figure 5.

![Figure 5 Student Ratings of Effectiveness of Instructional Methods](image-url)
Technological enhancements can make an important contribution to instruction. Students were asked to rate the effectiveness of five different enhancements on the same five-point scale used to rate instructional methods. Use of technology is viewed as quite effective in helping students learn. Ratings for the five technological enhances ranged from 4.09 to 3.58. Calculators are viewed as quite useful (mean 4.09), followed by computer projectors (mean 3.81), visual presenters (mean 3.75), computer aided instruction (3.72), and videotape and audiovisual aids (mean 3.58).

**Figure 6 Student Ratings of Technological Enhancements**

<table>
<thead>
<tr>
<th>Enhancement</th>
<th>Rating</th>
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<tbody>
<tr>
<td>Calculators</td>
<td>4.09</td>
</tr>
<tr>
<td>Computer projectors</td>
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<td>Visual presenters</td>
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<tr>
<td>Computer aided instruction</td>
<td>3.72</td>
</tr>
<tr>
<td>Video tape &amp; audiovisual aids</td>
<td>3.58</td>
</tr>
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</table>

**Student Interest in STEM Careers**

Students were asked if they were interested in pursuing careers in any of the stem fields. They indicated interest on a four-point scale ranging from not interested, somewhat interested, quite interested, and extremely interested. For a better understanding of interest, the two fields, quite interested and extremely interested were combined in the analysis. Results are illustrated in Figure 7. 40% of the students indicated they could be quite to extremely interested in science or information technology. There is less interest in engineering and careers in mathematics, but just under one-third (29%) indicated high interest in these areas.
In an open-ended question, students were asked to indicate the kind of work they would like to do in major STEM areas. Open ended-responses were wide ranging and a number of students wrote more than one area of interest. 245 comments were coded into STEM or medical fields.

As can be seen in Figure 8, major categories for these interests is somewhat inconsistent with the lower level of interest indicated in computer technology on in the previous question which asked to rate their interest in the STEM fields. This is due to the fact that many students indicated they would need to know how to work with computers in seeking a career in medical or science fields, so they listed technology in addition to other areas of interest. Aspects of computer technology were also frequently mentioned in their open-end list of interests designing hardware, web design, network support, programming, and use of computer technology to assist in work here technology is commonly used.

Many of those who indicated interest in nursing or other aspects of a medical career explained that they needed to know the science to help them in this area. Nursing was the most commonly mentioned career. Medical areas also included forensic sciences, physical therapy, pharmacology, and general medicine.

Those interested in engineering mentioned the following fields: electrical, mechanical, civil, and structural engineering.

Life sciences included interest in plants, biology, and the environment. Marine biology of singled out and it included ocean studies as well as marine studies.
A number of students are interested in teaching in STEM areas. Mathematics was mentioned most often as an area of interest for teaching. Some students also noted mathematics was important for their interest in economics or accounting.

**Figure 8 Student Interest in STEM Career Areas**

A few students noted interest in space related sciences including astronomy and physical sciences such as chemistry.

**Student Responses to the Q27: “What can HCC so to help you succeed in your mathematics, sciences, engineering, and/or information technology classes?”**

There were 190 comments that were coded into categories in response to this open-ended question. The Figure 9 below describes the major categories and the percent of the responses that were coded into them.
Instructional Methods

48 comments related to instructional methods. These were sub-coded into: Improving quality; more hand-on methods; better use of technology; making classes better/easier, and miscellaneous. Percentages of responses in these areas are illustrated in Figure 10.

Figure 10 Instructional Methods
**Tutoring and Support**
41 comments related to wanting more tutoring or better access to tutoring. These comments were sub-coded into the following categories: general requests, math tutoring, better access to tutoring; support from teachers, and special requests for assistance.

![Figure 11 Tutoring and Support](image)

**Need for More Courses**
33 comments related to requests for more courses and two comments suggested deleting courses or requirements. The comments were sub-coded into the following categories: general requests; specific course requests; preparatory courses; and suggestions for deletions.

![Figure 12 Need for More Courses](image)
Availability of Courses:
28 comments related to making courses more accessible for working students. Sub-categories include: general requests, more evening courses, and ability to take summer courses.

Value of Good Teachers
22 comments mentioned the value of teachers. These comments were coded into the following subcategories: general comments; praise for good teachers; and criticism of teachers.
There were a number of miscellaneous comments that did not fit into categories. These were not sub coded.

**Students Written Statements In Each Category**
The previous section provided quantitative summaries of the coded categories. This section lists all of the comments within each coded and sub-coded category. The last section includes positive comments. They were not coded into the major categories, as they did not offer any information on what students might need to succeed; however, it is important to include these as they indicate that a number of students are quite satisfied with the services and instruction they are receiving at HCC.

### Instructional Methods

**Making classes easier or better for learning:**

- *I think classes could be a little longer for more questions.*
- *...Focus on it more instead of rushing.*
- *Teach simply.*
- *Explain course better - means more information - better lecture*
- *Lessen the homework and have more group work and in class work so that we can ask all of our questions in class and not try to figure it out the wrong way at home*
- *More reliable resources, explained lectures, understandable instructions on tests and quizzes.*
- *I am currently enrolled in a science telecourse and I find that it is not interactive enough for me to grasp the concepts of the laboratory exercises.*
- *More time for lectures so that we can better understand the material.*
- *...Give solutions/answers to all homework, and more practice problems with answers in math*
- *You are doing a good job but finals are the hard part we should just have quiz and test, not finals.*

### More hands-on approaches:

- *More applicable or on the job training.*
- *I strongly feel that hands-on experience works well for me.*
- *More examples in the work we do. More labs make it a lot more*
- *Give students more practice.*
- *I think all should need more hands-on experience, guest speakers, and field trips to companies to show the real world experience and work environment*
- *Provide more hands on equipment and more class participation. These will help some students to succeed. Also, more teacher interaction with the students.*
• By providing more hands-on activity around campus that students could go to. For example, challenging students on how well their skills are by making scavenger hunts, or interactive activities to put their knowledge to the test
• Less lectures and more hands-on!
• Have more hands-on learning.
• Hands-on activities and guest speakers.
• More work in class and give tests everyday.

More and better use of technology:
• Computer-generated visual aids. People like myself can understand mathematic theories better if we can see them happening. Things that a teacher cannot easily express on a chalkboard can be quickly, easily and clearly demonstrated with the aid of A.V. equipment.
• For sciences they should have more visual teaching techniques, like
• Power point so students can take the teacher's presentation home and display it on their home pc.
• Provide good computers,
• Provide better technology, labs, instructors. Most of all put the students in first priority.
• Provide computers in each class(es); 1 computer per student; more visual aids; create website for students that need help on specific subjects.
• More course materials and use of technological aids like visual aids and such
• Provide more computers for students and extend library and computer lab hours!!
• Up-to-date computers to better understand information.
• I think there should be a renewed effort to use video
• To have more computers available to students everywhere on campus.

More teacher/student or student/student interaction
• Make more students and teacher a one-on-one basis
• Better, smaller class sizes, more individual student-teacher interaction,
• Group discussion may be good because it’s a way of learning and sharing what you don’t know and what you know.
• Make it a bit more fun that way the students would remember the information being given since it was interesting and fun to learn. Only lectures would make students sleep.
• Make it fun.
Improving quality of instruction and instructional support

- HCC can teach the teachers to show the student the real deal. Make math and science interesting. Have good and better supplies for lab. Some things need to change
- Keep classes relatively small (<20), so it's not weird to ask questions.
- Offer more in these classes.
- Have teachers that teach all types of ways to solve different types of problems.
- Use more interesting material.
- Extend library hours and provide more resources.
- Provide quality courses to the students.
- Better lab classes and lecture classes.
- More applicable or on the job training.

Miscellaneous comments:

- Looking closely at the methods.
- Don't start us off so low. I was placed in a math class which I learned all of this work in intermediate, high school.

Need for Tutoring and Support

General Requests for Tutoring

- More help and tutoring with courses.
- Offer and encourage more tutoring.
- Individual help... one to one basis out of class.
- Develop a better more efficient tutoring system.
- The system of tutoring in place is alternately effective. It's up to students to utilize it.
- Have more tutoring classes available.
- Tutor
- Having one on one confrontation with the student with the student to see where the problem is.
- Offer more tutors.
- Offer tutors in the morning for all levels of math and sciences.
- Student/Teacher/Tutor -
- More tutors, convenient hours
- On-hand help from teachers. More tutoring by skilled and interesting tutors. Alfie was an excellent tutor.
• More available tutors.
• Provide more tutoring.
• Make available tutors
  • Have a tutor for each subject to help students understand more of these subjects. We need more tutors!!
• I would like to gain assistance in learning to understand the material and work step by step
• Tutoring.
• More available tutoring.
• Offer more help.
• HCC should provide more student help and websites that can help you learn step-by-step.

**Math Tutoring**
• More math tutoring classes
• For math have the teachers/professors help more with work.
• Offer math review/tutoring classes.
• In order for me to succeed, I need more math tutors in math lab.
• The tutoring department at the Hawaiian Studies Program was very helpful for my math class.
• More individual help with mathematics.
• Tutors for the higher math levels while help greatly (levels 135 and higher)
• HCC would need more tutors for any math courses from Math 24 and up.

**Special Tutoring or Support**
• Better tutoring for placement examinations.
• On the entrance exam, offer a study booklet.

**Better Access to Tutoring Services**
• Tutoring available during evening hours
• Open more tutor help to those who have little time, such as working people.
• Make availability of tutoring more accessible.
• More tutoring in the evening.
• Have easier Internet access and helpers on homework.
**Supportive Teachers**

- Keep hiring teachers that are like Mrs. Hiraoka, willing to help students and encourage them giving up their free time to help with tutoring, etc.
- Recommend teachers to give up more of their spare time to assist students.
- Teachers who are willing to help.
- Provide more outside class help. Professors aren't that reliable for help after class unlike English professors who provide a lot of help and instruction. Math is an extremely in-depth subject, and many people struggle with it. So I think professors should be more helpful and reliable.

**Need for More Courses**

**General Comments**

- Offer more varieties of classes, different sections available.
- Don't cancel any class you offered to us.
- Still hold the classes even though there is low enrollment.
- Have more science courses offered. Have higher science courses offered like 200 level.
- Offer more types of science classes.
- They can provide the courses necessary to learn the subject matter required for the IT field.
- Offer more courses.
- Provide more classes to choose from.
- Offer more appealing courses.
- Offer more science courses at HCC.
- Offer more classes.
- Offer more science classes.
- More lecture or training on mathematics and technology.
- More classes to select.

**Specific Course Requests**

- For higher level classes such as Math 231 and above, Phys 170/170L.
- Have more computer classes.
- Offer more variety. Only have Geology 101 and biology limited courses available.
- Offer more science courses like Chemistry 152, Zoology 141/141 Lab, Zoology 142/142L and Pharmacology.
- Offer more science such as Zoology, Pharmacology, Chemistry 152, etc.
- Have more science classes like Zoology and Pharmacology.
• Try and get a Forensics program - Chemistry is a good start along with the other science courses
• Have more pre-nursing courses at HCC campus.
• They should at least hold a zoology class relating to nursing majors.
• Have commercial aviation classes transferable to UH.
• Have a better transition for engineering students to move to UH Manoa.
• Offer lower level engineering courses.
• For vocational tech students, just give them a basic math course because math 50 does not pertain to a lot of vocational tech majors.

Preparatory Courses
• I think that Math (higher Math) is very challenging for most people.
• There should be preparatory classes.
• I think that a preparatory summer class for math is a good idea as a lot of students find math to be more challenging than other disciplines.
• Provide easy learning environment for prerequisite classes for such fields of interest.
• I would be interested in taking a pre-medical class to prepare and refresh for Math/Science courses.

Course Deletion
• Rid the campus of Math 20 course.
• Require less core classes, especially if an equivalent to that class has been taken. It's ridiculous to make someone who has transferred here to receive credit but not the "O", "H", "E", or "WI". If this wasn't so stupid, I could take further math courses instead of additional speech, etc.
• The higher levels are only offered in the afternoons.
• This (making classes more available) also applies the amount of classes for the higher levels in the morning.
• Smaller class sizes; more available classes,
• Have more available classes in the morning.
• Offer more class-level time to fit the individual's schedule (i.e. Math 115 in the morning).
• Better class schedules/times, more class availability,
• Offer more math and science courses at different times because people work.
• Some of the classes should be flexible scheduled.
• Add classes on weekends and late afternoons.
• More classes to fit my working schedule.
Evening Courses

- Offer more night courses for the people who work during the day.
- Have more evening classes and Internet or telecourses available.
- Offer evening and/or weekend classes for professionals that have fulltime jobs.
- More evening classes.
- Evening classes.
- Provide more evening classes,
- Offer more classes at night,
- Offer more science courses in the evening. Currently there are almost no science classes available for evening students. Because of the limited availability, I am currently enrolled at another campus to get my science courses.
- I do wish HCC would offer more advanced mathematics/science courses in the evening.
- Have more evening classes and Internet or telecourses available.
- Put more available courses at night.
- More night classes.
- Offer more night classes.
- More class time offered during night and weekends relating to architectural engineering technology.

Summer Courses

- Offer more computer classes during the summer; reduce the tuition OR offer financial aid during the summer.
- Have summer classes that student can sit in and not counted as credits.
- I'm hoping that a summer school class is conducted with the same rate (price per credit) as regular classes to speed up the process of going to school. Money is one of the reasons why I don't go to summer school.

Comments Regarding Teaching and Teachers

General Comments on the Value of Teachers

- Clear, outspoken teachers
- Teachers should try to see if students understand rather than just expecting them to understand. Not every student can pick things up fast.
- Have good instructors.
- Have good teachers.
- Good teachers.
• Instructors to be patient and interact more with student class work instead of lectures.
• Have knowledgeable and helpful teachers.
• Teachers
• Continue to have nice and helpful faculty members.
• Qualified instructors with good communication skills.
• Good instruction for higher math classes.

Praise for Good Teachers
• I haven't really learned this much Math in years and my teacher rocks, so get more teachers like Carol Hiraoka and you will be doing just fine.
• This math teacher was the best I've had. My impression of this campus is there are many good math teachers. HCC can help students by continuing to staff these types of teachers.
• Keep Ms. Hiraoka!
• We need more teachers like Dr. Gopal..
• Keep Mauz on the payroll (friendly, very helpful)
• I have been fortunate enough to receive the instruction of a great teacher. He was very knowledgeable and I enjoyed the class. Needless to say, the instructor you get is the "luck of the draw", so HCC can't do much there however,
• Have Mr. Mauz teach every class!
• Appreciate the good teachers- keep up the patience and caring attitude! This really helps a student to succeed!

Criticism of Teachers
• The teachers could be nicer!! I have never experienced so many rude teachers.
• Science – the teachers shouldn't teach so fast. These are some students who do not understand science, like me. I hate science.

Miscellaneous Comments
• Not much. Students tend to stay from these fields. Perhaps a marketing approach for the trendy children?
• lower summer tuitions,
• Provide me some money, Mahalo!
• Bring OAT to HCC!
• Some advice: rewrite first part of this survey, not all subjects can be learned in the same way: for example, I do not learn math the same way I learn sciences.
• I really blame my high school for not preparing me well enough for college. They did not require you to take math in your senior year, that's why I'm suffering now!

• Offer complex classes.

• To give more chances to the students to learn such as more scholarship or financial aids, etc.

• I feel taking summer courses and preparing with assistance of pre-medical courses (evening school) help, the older students.

• Continue teaching these courses and allow students to get their BA here at HCC.

• HCC can help me succeed by listing the correct info (location of class) in the course guide. They can also help by not being so rude in the administration building, and make registering and counselor visits less demanding.

• Provide 4-year programs.

• HCC should not give any hundred level courses to those who are trying to transfer to another school. When HCC decides to install a new computer system they should work out the bugs before the next session starts.

• Make the texts affordable - they're ridiculously expensive.

• Drop the 2-year language requirements so we can focus on our major!! at UH or at least offer upper level classes during the year.

• Not too much else needs to be done. It’s mostly up to the students. Maybe small improvements to the way the CENT program is run, like classes required should be more related to the actual CENT course, i.e. Personal development? I don't see why that's required to train for being a computer technician.

Positive Comments

• I enjoy learning at HCC and feel that the office hours are helpful.

• Doing pretty good.

• It's doing good so far, I think for Mathematics, it's more preparation from high school.

• Doing fine.

• You're doing pretty well thus far. I haven't really learned this much Math in years and my teacher rocks, so get more teachers like Carol Hiraoka and you will be doing just fine.

• They've probably have everything for me so that I can get everything done but I need to jump on it and make use of it.

• Not much more.

• Keep up the good work!

• Keep up the good work that they are doing.
• As long as the tuition is cheap, HCC is helping me more than I can ask for. HCC is my stepping stone on achieving my goals.

• I am not sure since so far I have only taken Math 24. But I can say that so far my experience has been very good as I am doing pretty well in the class and any type of math has always been extremely difficult for me.

• It's fine the way it is.

• Keep up the good work.

• Keep up the good work.

• HCC has helped me succeed in these areas in every way. The professors here are excellent. Not only did I not have a bad instructor, I have never even had a mediocre one, especially in math, science (ocean), and ICS!

• Nothing, everything is going well.

• In high school math was a joke. HCC is teaching me math so I can get a better understanding of it.

• I think HCC does a pretty good job already.

• Instructors are patient to help students with problems after class.

• Not much, it must be done before you get to HCC.

• I don't think HCC needs to do anything because HCC is already a good school.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).