How Students' Math Beliefs Influence Their Math Course Selection at Oxnard College

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Sabbatical

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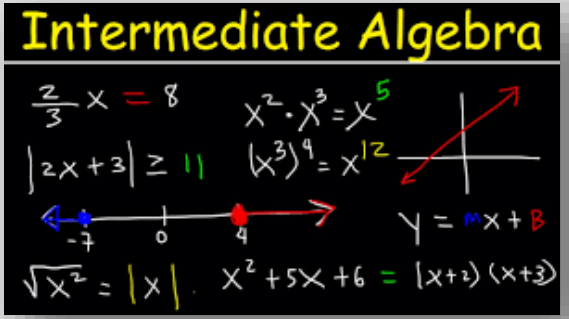
Regardless of good intentions, we have created math hurdles because we do not believe in the abilities of the students we serve.

Rigorous algebraic skills are not prerequisites an introductory statistics.

Too many students with strong math abilities self-place into lower-level math courses believing they need to build up their math skills, regardless of their successful completion of three-years of HS college prep math courses or their academic goal.



Overview

- Oxnard Community College
  - Hispanic Serving Institute
  - Less than 50% of OC students are enrolled in transfer -level math courses
  - 75% of OC students plan to transfer to a 4 -year college or university
- California Assembly Bill 705 (Irwin, 2017)
  - "to maximize the probability that the student will enter and complete transfer-level coursework in English and mathematics within a one -year timeframe"
  - Prohibiting CCC "from requiring students to enroll in remedial English or mathematics coursework … unless placement research … shows that those students are highly unlikely to succeed in transfer -level coursework "
  - Encourages developmental education reform

Focus of Study

- How do students' math beliefs relate to various student demographics?
- How do students choose their current math course?
- If corequisite courses benefit students' math beliefs

Overview

- Historical perspective of developmental math reform
- Understanding the complexity of Hispanic Serving Institutions
- Three-Math Beliefs scale
  - Math Confidence Scale
  - Math Value Scale
    - Class Devaluation
    - Math Value
  - Health Belief Model
    - Math Anxiety
    - Discouraging Word

Historical Perspective of Developmental Math Reform - Placement Practice

- Multiple Measures for Placement Challenges
  - Many students do not meet with a counselor for advice (Bailey & Cho, 2010)
  - The primary use of a placement test can misplace students (Melguizo et al., 2016; Ngo & Kwon, 2015).
  - Students that completed three years of HS college preparatory math are eligible for transfer -level math courses.
    - If students have a low level of math confidence, they may under place themselves in a developmental math course

Problems of Developmental Course Sequences

- Low throughput rate - rate of success from developmental math course through transfer -level course (Hern, 2012)
- Hypothetical scenario: 75% pass rate and a 75% persistence rate
  - 100 students enroll in three levels below, and 75% (75 students) pass, and 75% (56 students) persist
  - 56 students enroll in two levels below, 75% (42 students) pass, and 75% (32 students) persist
  - 32 students enroll in one level below, 75% (24 students) pass, and 75% (18 students) persist
  - 18 students enroll in a transfer -level, 75% (13 students) pass
  - In other words, $.75 \times .75 \times .75 \times .75 \times .75 \times .75 \times .75 = (.75)^7 = .13$ is the throughput rate, exponential decay
- These are known as exit points

AB 705 Placement Rules

California Community Colleges

Academic Senate for California Community Colleges

LEADERSHIP. EMPOWERMENT. VOICE.

High School Performance Metric for Statistics/Liberal Arts Mathematics	Recommended AB 705 Placement for Statistics/Liberal Arts Mathematics
HSGPA ≥ 3.0 Success rate = 75%	**Transfer-Level Statistics/Liberal Arts Mathematics** No additional academic or concurrent support required for students
HSGPA from 2.3 to 2.9 Success rate = 50%	**Transfer-Level Statistics/Liberal Arts Mathematics** Additional academic and concurrent support recommended for students
HSGPA < 2.3 Success rate of 29%	**Transfer-Level Statistics/Liberal Arts Mathematics** Additional academic and concurrent support strongly recommended for students

High School Performance Metric BSTEM Mathematics[1]	Recommended AB 705 Placement for BSTEM Mathematics
HSGPA ≥ 3.4 OR HSGPA ≥ 2.6 AND enrolled in a HS Calculus course Success rate = 75%	**Transfer-Level BSTEM Mathematics** No additional academic or concurrent support required for students
HSGPA ≥2.6 or Enrolled in HS Precalculus Success rate = 53%	**Transfer-Level BSTEM Mathematics** Additional academic and concurrent support recommended for students
HSGPA ≤ 2.6 and no Precalculus Success rate = 28%	**Transfer-Level BSTEM Mathematics** Additional academic and concurrent support strongly recommended for students

1 Note: The BSTEM table presumes student completion of Intermediate Algebra/Algebra 2, an equivalent such as Integrated Math III, or higher course in high school. Students who have not completed Algebra 2 or higher in high school but who enter college with intentions to major in STEM fields are rare. However, good practice suggests they should be informed that Algebra 2 is highly recommended as preparation for a STEM-oriented gateway mathematics course and that their likelihood of success will be higher in a statistics course.

Hispanic Serving Institution

- Two - and four -year colleges and universities with at least 25% Hispanic undergraduates (Higher Education Act, 1998)
- With a minimum of 50% of students at the poverty -level qualify to apply for and receive grants from Higher Education Act's Title III and Title V
- Serve students by providing
  - Academic and student services relevant to the needs of the students, their parents, and their community
  - Curriculum that reflects Latinx cultural, values and experiences (Garcia, 2019)

Hispanic Serving Institution

- Latinx students
  - May be native -born or foreign -born
  - May have parents
    - Who lack English skills
    - Earn low pay for low -skill service employment
    - Do not understand the higher education process (Laden, 2001; 2004)
  - May experience low expectations from peers, instructors, and educational institutions (Cerezo & McWhirter, 2012)
- In 2011, 43.9% of Latinx college students attended a two -year college
  - compared to 24.1% of Whites, 32.9% of African Americans, and 17.3% of Asian Americans (Bauman, 2017)
- In 2017, 17.2% of Latinx adults had at least a bachelor's degree
  - compared to 53.9% Asian Americans, 38.1% Whites, and 24.3% of African Americans (Hispanic Association of Colleges and Universities, 2017)

Hispanic Serving Institution

- First-generation students – neither parent completed a bachelor's degree
  - Disadvantages include lack of knowledge of
    - high school academic preparation
    - cost of college education, the application process
    - degree expectations (Pascarella, Pierson, Wolniak, & Terenzini, 2004).
  - Desire go to college but burdened with imposter syndrome (McMurtrie, 2019)
- Low-income students – eligible for Pell Grants and the California Promise Grant
  - less likely to receive financial support from parents
  - more likely to have family and work responsibilities (Engle & Tinto, 2008)
- First-generation and low-income students
  - less likely to interact with faculty and use support services
  - more likely to be older, female, disabled, people of color, non-native English speakers, single parents, have dependent children
  - have more of these risk factors than traditional college students (Engle & Tinto, 2008)

Hispanic Serving Institution

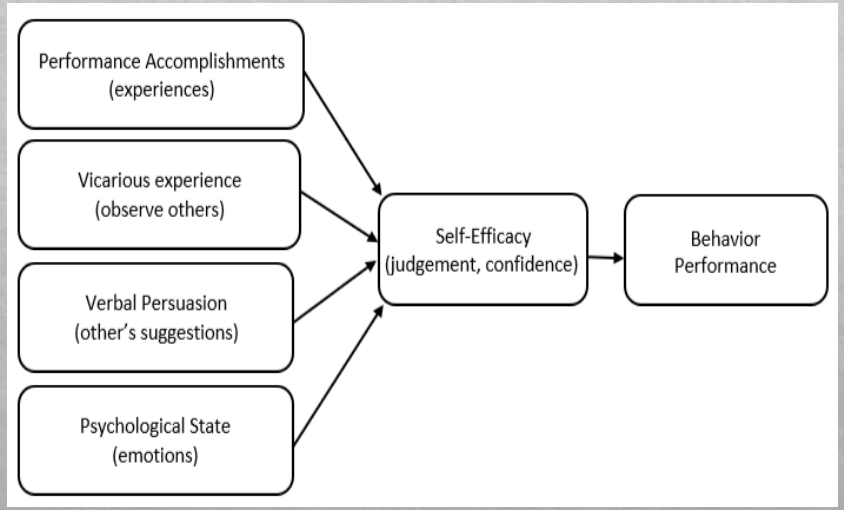
- Pay attention to improving services, access and success in higher education for all citizens, particularly those who have been previously underrepresented in higher education, such as first-generation, low income, non-traditional students, and students of color (Engle & Tinto, 2008; Garcia, 2019; Laden, 2001; 2004)
- Share national interest for the United States to remain competitive in the global knowledge economy (Engle & Tinto, 2008)

Three-Math Beliefs (Hendy, Schorschinsky, & Wade, 2014)

- Math Confidence – Bandura's (1997) Self-Efficacy Theory
- Value of Math – Expectancy-Value Theory
- Math Barriers – Health Belief Model

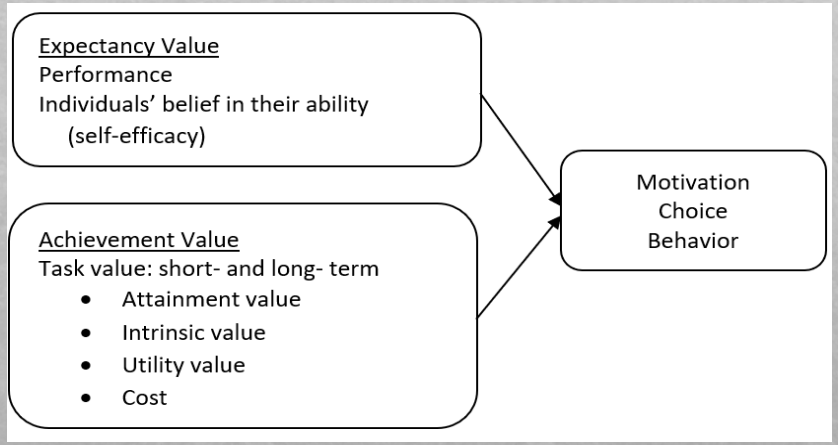
Self-Efficacy

- A person's belief or perception of their ability to accomplish a goal or desired outcome (Bandura, 1997)
- Not concerned with the actual skills a person has, but rather their perception of those skills (Bandura, 1977; Bandura, 1986; Pajares & Miller, 1995)
- Math self-efficacy scales can discover the need for students to develop positive attitudes toward math, build confidence in ability to learn math, and reduce anxiety (Hall & Ponton, 2005)



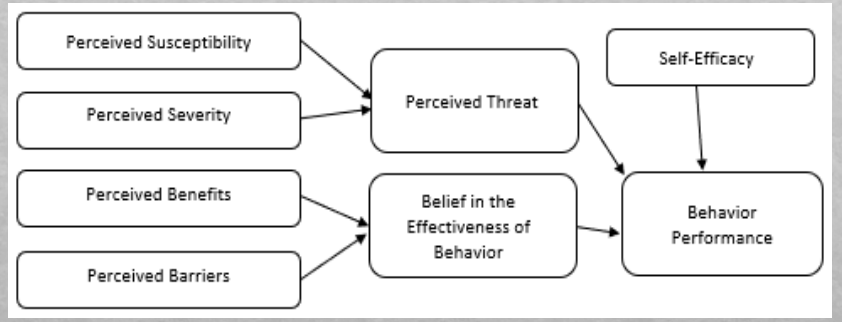
Expectancy-Value Theorem

- Expectancy and value theory are defined as a person's anticipation that their performance will be followed by success or failure (Atkinson, 1957)
- Expectancy: Individual confidence, self-efficacy
- Achievement value: the short - and long -term value of the task
- Expectancy and value impact a person's choice, effort, persistence, and performance and can be explained by their belief in their ability to perform a given task and the extent that they value the task (Wigfield & Eccles, 1992, 2000).



Health Belief Model

- The Health Belief Model (HBM) was developed in the 1950s to explain why individuals failed to perform health-related behavior. It hypothesized that behavior depends on the value a person places on a goal and the person's belief that a given action will achieve the desired goal (Rosenstock, 1974)

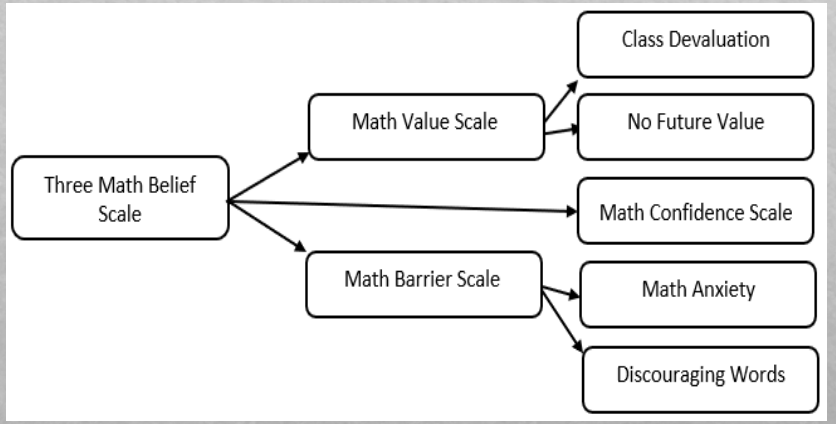


- HBM suggests that perceived barriers to performing a suggested behavior may prevent individuals from changing their behavior despite the perceived value of the suggested behavior (expectancy-value theory) and the perceived confidence in doing the behavior (self-efficacy) (Hendy, Schorschinsky , & Wade, 2014)

Three Math Beliefs Scales

Hendy, Schorschinsky , and Wade (2014) studied the math beliefs of algebra students at a university on the East Coast. The Three - Math Belief Scale are guided by

- Math Value Scale which derived from concepts of expectancy-value theory
- Math Confidence Scale which derived from concepts of self-efficacy theory
- Math Barrier Scale which derived from concepts of the health belief model



Research Questions

The overarching goals for this study are to understand how students choose their math course, and study the effects, if any, of a corequisite course on students' math beliefs.

1. How do OC students' math beliefs relate to their gender, age, ethnicity, family educational background, financial aid status, HSGPA, the highest math course taken, and their education goal?
2. How are students' math beliefs related to their math self-placement?
3. How do students' math beliefs change after eight weeks of math instruction with or without a corequisite course?

Research Design

This study will collect data from students enrolled in entry -level transferable math courses, and non -transferable Associate's degree applicable math courses

- Research question one and two are a non-experimental causal-comparative quantitative design
- Research question two includes an embedded explanatory qualitative component
- Research question three is a quasi-experimental pre- and post-test design

Data Collection

- The first research question will use quantitative methods utilizing the three math beliefs survey and a demographic questionnaire administered during the third week of the 18 -week semester
- The second research question uses mixed methods
  - For the quantitative portion, the three math beliefs survey and students' current math course
  - For the qualitative portion, the survey will include two open -ended questions
- The third question will also use quantitative methods from the math belief scales measured during
  - Week three for pre -survey
  - Week eight for post -survey

Three Math Beliefs Survey

Hendy, Schorschinsky , and Wade's (2014) three math beliefs survey, as revised by Holm -Smith and Lee (2018)

- The Math Value Scale has two subscales
  - Class Devaluation with seven items
  - No Future value with three items.
- The Math Confidence Scale consists of six items.
- Math Barrier Scale has two subscales
  - Math Anxiety with eight items
  - Discouraging Words with three items.
- The open-ended questions on the survey instrument
  - What advice would you give a student who is deciding what math course to take next semester?
  - Is this the right math course for you? Why or why not?

Guiding Research Questions

1. How are the math beliefs of student attending an HSI community college related to their gender, age, and ethnicity, family educational background, and financial aid status?
2. How are student math beliefs related to their math course enrollment, HSGPA, highest math course taken, time elapsed since their last math course, and their education goal?
3. How, if at all, do student math belief change after eight weeks of math instruction?

Demographic Questionnaire

- The demographic questionnaire asks students to self -report
  - High school grade point average (HSGPA)
  - Highest math course taken
  - Who and what influenced their math placement
  - Major (BSTEM, SLAM, or Associate degree/not transferring)
  - Parents' educational level
  - Pell Grant or California Promise Grant
  - Gender
  - Age
  - Ethnicity
- The personal demographics are intentionally placed at the end of the survey to mediate stereotype threat, the fears of confirming negative stereotypes, and the affects an individual's ability to engage in a task (McClain, 2018)

Participant Sample

- Participants will be math students at Oxnard College in entry-level transferable or Associates Degree applicable math courses, whose math instructors grant permission to survey their class, and students willing to complete the survey
- The entry level math courses offered at Oxnard College are:
  - Math 5 – Intermediate Algebra for SLAM and Math 15 Intermediate Algebra for BSTEM
    - One-level below transfer, Associate's degree applicable
  - Introductory Statistics with or without corequisite support
  - College Algebra with or without corequisite support
  - Math for Elementary School Teachers
  - Business Calculus with or without corequisite support.

Data Analysis

- Descriptive statistics and goodness of fit will be calculated for each of the five subscales of the three math beliefs
- Research Question One
  - Independent variables = students' demographics
  - Dependent variables = the five subscales of the math beliefs
  - An Analysis of Covariance (ANCOVA)
- Research Question Two

  Quantitative analysis
  - Independent variables = each of the five math beliefs subscales
  - Dependent variables = students' course selection
  - A hierarchical multiple regression analysis

  Qualitative analysis of the open -ended questions
  - Reviewed to discover general topics, group into major topics that will be coded.
  - Descriptions and themes will describe the qualitative narrative to communicate the findings (Creswell, 2019)
- Research Question Three
  - The math beliefs' five subscales during week three and eight
  - Dependent *t*-test for each of the subscales

579 Participants

84.3% - First Generation

66.3% - Pell Grant/CA Promise Grant Recipients

56.1% - Females, 41.8% Males, .5% Binary, 1.6% Declined to state

79.5% - Latinx/Hispanic/Mexican American
6.8% - Multi-Racial
3.3% - Asian
2.4% - African American
1.9% - Decline to State
.5% - Pacific Islander
.2% - American Indian/Alaskan Native

Age range from 14 to 67 years of age
23.3% - 18 and under
29.3% - 19 to 20
24.2% - 21 to 25
19.2% - 26 to 30
3.1% - 30 and older

Educational Background

Previous Math Course

5.7%- Calculus
32.1%- Transfer Level
19.9%- One Level below Transfer
23.0%- Two Levels below Transfer
6.7%- Three Levels below Transfer

Time Elapsed since Last Math Course

44.7%- Less than a year
24.1%- 1 year to 1½ years
10.1%- 2 years
14.1%- 3 t to 9 years
7.1%- 10 or more years

Majors

Associates Degree/Certificate
Sociology and Liberal Arts, Transfer
Business, Transfer
STEM, Transfer

Self-Reported HSGPA

32.1%- HS A student
54.4%- HS B student
12.3%- HS C student
1.1%- HS D student

Current Math Course

17.1%- Math SLAM
14.3%- Math BSTEM
7.1%- Math for Elementary School Teachers
18.3%- Introduction to Statistics
15.5%- Introduction to Statistics w/corequisite
3.8%- Business Calculus
5.9%- Business Calculus w/corequisite
12.3%- College Algebra for STEM
5.7%- College Algebra for STEM w/corequisite

OC Participant Math Beliefs

	Mean (6 possible)
Math Confidence	4.47
Class Devaluation	2.81
No Future Value	2.38
Discouraging Words	1.93
Math Anxiety	3.23

Five Math Beliefs Subscale

- OC participants had a moderate level math confidence.
- OC participants valued learning by attending math class.
- OC participants believed earning good grades in math would positively impact their completion of a college degree, future employment possibilities, and/or their future financial well -being
- OC participants did not hear Discouraging Words from others about their math abilities
- OC participants did experience moderate levels of math anxiety

Significant Differences in Math Beliefs by Demographics

	First Generation	Pell or CA Promise Grant	Gender	Age	Ethnicity
Math Confidence	p = .026	NS	p = .007	NS	NS
Class Devaluation	NS	NS	p < .001	NS	NS
No Future Value	NS	NS	p = .022	NS	NS
Discouraging Words	NS	NS	NS	NS	NS
Math Anxiety	NS	p = .014	p < .001	NS	NS

Five Math Beliefs Subscale

- First generation OC participants reported a lower level of Math Confidence than their peers.
- Pell or CA Promise Grant recipients indicating a higher level of Math Anxiety than their peers.
- Males reported a higher -level of math confidence than females.

- Females reported valuing math and its future effect on their college success, employment, and financial wellbeing more than males.
- Males indicating a lower level of Math Anxiety than females

Significant Differences in Math Beliefs by Math Course

	Math SLAM	Math BSTEM	Math Elem Tchr	Intro Stats	Intro Stat Coreq	Bus Calc	Bus Clac Coreq	Coll Alg	Coll Alg Coreq
Math Confidence	NS	NS	NS	NS	p = .008	NS	p < .001	NS	NS
Class Devaluation	NS	NS	p = .009	NS	NS	NS	NS	NS	p = .022
No Future Value	NS	NS	NS	NS	NS	NS	NS	p = .004	NS
Discouraging Words	NS	NS	NS	NS	p = .04	NS	NS	NS	NS
Math Anxiety	NS	NS	NS	NS	NS	NS	NS	NS	NS

Significant Differences in Math Beliefs by Math Course

Math Confidence Post Hoc Test

- Math SLAM participants have a lower level of math confidence than Math BSTEM participants.
- Math SLAM participants have a lower level of math confidence than participants enrolled in Introduction to Statistics with corequisite support.
- Math SLAM participants have a lower level of math confidence than participants enrolled in Introduction to Statistics.
- Introduction to Statistics participants have a higher level of math confidence than participants enrolled Introduction to Statistics with corequisite support.
- Math BSTEM participants have a higher level of confidence than participants enrolled in Business Calculus with corequisite support.

Significant Differences in Math Beliefs by Math Course

Class Devaluation Post Hoc Test

- Math SLAM participants value learning in the classroom more than MATH BSTEM peers
- Participants enrolled in Introduction to Statistics with corequisite support value learning in the class more then their peers in Introduction to Statistics.
- Participants enrolled in Business Calculus with corequisite support valued learning math in the classroom more so then their peers in Business Calculus without support

Discouraging Words

- Math BSTEM participants experience discouraging words about their math abilities more than their peer in Business Calculus with corequisite support.

Significant Differences in Math Beliefs by Educational Background

	HSGPA	Last Math Course Taken	Time Elapsed	Major
Math Confidence	p < .001	p < .001	NS	p < .001
Class Devaluation	NS	p < .001	p = .041	p < .001
No Future Value	NS	NS	NS	NS
Discouraging Words	p = .001	p = .001	NS	p = .001
Math Anxiety	p < .001	p < .001	p = .022	p < .001

Significant Differences in Math Beliefs by Educational Background

Math Confidence

Math Confidence Post Hoc Test

- Math SLAM participants have a lower level of math confidence than Math BSTEM participants.
- Math SLAM participants have a lower level of math confidence than participants enrolled in Introduction to Statistics with corequisite support.
- Business majors experienced higher level of math confidence then their peers majoring in Sociology/Liberal Arts or studying to earn an Associate's degree or certificate.

Significant Differences in Math Beliefs by Educational Background

Math Value Scale

Class Devaluation Post Hoc Test

- Calculus participants valued learning in class less than their peers enrolled in Pre - Algebra, Beginning Algebra, Intermediate Algebra and students enrolled in a transfer level course.
- Participants who had not taken a math course in at least ten years, valued class less than participants who had taken a course within the last two years.
- Business and STEM majors value class time less then Sociology/Liberal Arts Majors.

No Future Value Subscale

- No significant finds

Significant Differences in Math Beliefs by Educational Background

Math Barrier Scales

Discouraging Words Post Hoc Test

- Participants enrolled in Beginning Algebra experienced more often discouraging words than their Calculus peers.

Math Anxiety Post Hoc Test

- Participants who reported a HSGPA of C students had a higher level of math anxiety than their peers who reported a HSGPA of an A or B.
- Participants enrolled in an Intermediate Algebra or lower math class reported higher levels of anxiety than their Calculus peers.
- Participants who had not taken a math course within the last three years, experienced higher levels of math anxiety than their peers.

What helped select your math?

Participating students were asked to identify all deciding factor for course enrollment. The top five responses are:

	n	%
Counselor	410	71.30%
Next course in the sequence	112	19.50%
Fits my schedule	59	10.30%
Friend	46	8.00%
Repeat	44	7.70%

Participants identify counselors as their number one resource to select a math course. Counselors are vital to the college matriculation for first generation, low income, nontraditional college students.

Student that identified the next course in the sequence may have learned from the counselor the math path required for their major.

What course to take?

The top two themes that participants advices their peers to select a math course was (1) math abilities and (2) to consult with a counselor for advice. These are a few of their comments.

Math Abilities

“use the last math you took in high school for guidance. If it has been a while, take a lower level.”

“take a refresher course or an easy class.”

“In my opinion, every student who wants to do good in math should take Math SLAM first.”

“I believe Math BSTEM is a great course to build foundation.”

What course to take?

Counselors

“Talk to a counselor, let them guide you.”
“Your counselor is your best option. You do not have to decide on your own.”
“See a counselor and relax.”

Participants referred their peers to see a counselor to discuss placement, review high school transcripts, and educational planning. Also, they recommended to come prepared to the counselor appointment with transcripts, prior research and lots of questions.

Why this Math Class?

Five hundred thirteen agreed with their math placement, while 34 did not. Counselors did not reach the top of the list, but educational goals did. Counselors provide advisement for educational success. The two themes were math skills and ability, and educational goals

Math Skills and Abilities

"Yes [I'm in the right math class], I haven't done math in six years, and I do not remember much from high school."

"Yes, I am comfortable and understand the material well."

"Yes, I can do the math problems."

"I jumped into stats and without the support class, it would be tough."

Why this Math Class?

Educational Goal

“I need this class to graduate.”

“I need this math to transfer to a 4 -year college.”

“[This course] meets my gen ed and major.”

“Yes, because I will be able to use stats when I open my business.”

“I want to know everything about math to have a successful career with math.”

“I want to help kids learn math,” said a participant enrolled in Math for Elementary Teachers.

Differences in mean math beliefs, pre- and post-survey.

OC participants completed the Math Beliefs Survey at weeks three and eight of the semester. The purpose was to study the difference, in any, in the five Math Belief subscales after students had five additional weeks of instruction.

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Mean Difference of Pre- and Post-Math Belief Survey by Math Course

Math Confidence Level Declined for

- OC Participants
- Introduction to Statistics with corequisite support

Class Devaluation – Value Learning in Class Declined for

- Math for Elementary School Teachers decrease
- College Algebra with corequisite support

No Future Value – Value of Math in their Future Declined for

- OC Participants values less
- College Algebra for STEM

Discouraging Words – Hearing Discouraging Words More Often Increase

- Introduction Statistics with corequisite support

Math Anxiety

- No Significant change in means

.	OC Participants	Math SLAM	Math BSTEM	Math Elem Tchr	Stats	Stats Coreq	Bus Calc	Bus Calc Coreq	Coll Alg	Coll Alg Coreq
Math Confidence	p < .001	NS	NS	NS	NS	0.008	NS	p < .001	NS	NS
Class Devaluation	NS	NS	NS	p = .009	NS	NS	NS	NS	NS	p = .022
No Future Value	p = .004	NS	NS	NS	NS	NS	NS	NS	p = .004	NS
Discouraging Words	NS	NS	NS	NS	NS	p = .04	NS	NS	NS	NS
Math Anxiety	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Interpretation of Findings

Insight into OC student Math Beliefs and how those influence students' math placement practices

- Participants from low-income backgrounds conveyed a higher level of math anxiety.
- The student survey showed participants enrolled in transferable math courses with corequisite support and advised their peers also to take the transferable math course with the corequisite.
- Similarly, students who planned to transfer and who were enrolled in a course one level below transfer also recommended their peers take a nontransferable math course for review, creating a sequence of a review course followed by the transferable course

Interpretation of Findings

Most OC students' open-ended responses claimed that advice from counselors was essential in choosing their math course and reaffirming their correct math placement. Latinx, low-income, first-generation, nontraditional, and returning students stressed the importance of meeting with counselors as a vital step in matriculation. The findings of this study emphasize the importance of counselors addressing the needs of students who lack knowledge of the matriculation process and building confidence by recommending courses that align with students’ major and academic needs.

The survey response showed counselors encouraged and validated participants’ seats in transfer-level math courses for OC students, even though those students scored low on the Math Confidence scale, high on the Math Anxiety subscale, and high on the No Future Value subscale of the Math Beliefs survey. This study shows a vital and essential role counselor performance at an HSI; hence funding should be secured to maintain a manageable and productive ratio of counselors to students.

Survey Instrument

Dear Math Student:

Thank you for agreeing to take this survey. The purpose of my study is to examine relationships between students' math courses and their math beliefs, so we may better inform students of their math placement options. This study has been approved by Fresno State and Ventura County Community College District.

The first phase of my study starts with questions about students' math beliefs, which consists of Math Value, Math Confidence and Math Barriers, two open-ended questions about your math placement, and general information about Oxnard College students.

For the second phase, I will return with a similar survey to measure any change in your response to your math beliefs after eight weeks of instruction. The survey is anonymous, and all information will be kept strictly confidential and used for the sole purpose of this study. I am seeking your participation and will be asking other Oxnard College math students to participate.

If you have any questions or if you would like to know more about my study, please feel free to contact me at the email address or phone number listed below. Your participation is appreciated and entirely volunteer. You may choose to opt-out at any time by not completing the survey. Participation in this survey will not affect your grade in this course. Again, I want to assure you that your responses to the survey will be anonymous.

Thank you so much for taking the time to complete this survey.

Sincerely,

Lilia Ruvalcaba
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805.986.5800

Math Value Scale	Math Confidence Scale	Math Barrier Scale
1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____	1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____	1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____
Class Devaluation (1 + 2 + 3 + 7 + 8 + 9 + 10) ÷ 7 = _____ The lower the number, the more you value class.	Math Confidence (1 + 2 + 3 + 4 + 5 + 6 + 7) ÷ 7 = _____ The higher the number, the stronger your math confidence.	Math Anxiety (1 + 5 + 6 + 7 + 8 + 9 + 10 + 11) ÷ 8 = _____ The higher the number the stronger your math anxiety.
No Future Value (4 + 5 + 6) ÷ 3 = _____ The lower the number, the more you value math in your educational and financial goals.		Discouraging Words (2 + 3 + 4) ÷ 3 = _____ The higher the number, the more influenced you are to discouraging words.

Growth Mindset vs. Fixed Mindset https://youtu.be/KUWn_TJTrnU

Growth Mindset vs. Fixed Mindset https://youtu.be/M1CHPnZfFmU

GRIT: Traits that Matter for School, Work, and Life https://youtu.be/vzle_Puyq5o

GRIT by Angela Duckworth | Animated CORE Message https://youtu.be/sWctLEdIqi4

Implicit Bias, Stereotype Threat and Higher Education: Russell McClain https://youtu.be/yiZQaE0q9BY

Survey Instrument

Math Value Scale

Instructions: Please use the six-point rating to report how much you agree or disagree with each math belief described

1 = strongly disagree 2=disagree 3 = somewhat disagree 4 = somewhat agree 5 = agree 6= strongly agree

____ 1. I can learn the math material without coming to class.
____ 2. I can get a good grade in math even if I skip classes.
____ 3. I can get a good grade in math even if I skip the assigned homework.
____ 4. Getting a bad grade in math will not seriously affect my future employment possibilities.
____ 5. Getting a bad grade in math will not seriously affect my future financial well-being.
____ 6. Getting a bad grade in math will not seriously affect the completion of my college degree.
____ 7. If I miss math classes, I can always learn it on my own from the textbook.
____ 8. If I miss a math class, I am confident that I can make up the work.
____ 9. If I miss math classes, I can always catch up later.
____ 10. If I skip homework assignments, I can always catch up later.

Scoring:

CLASS DEVALUATION (6 items) = #1, #2, #3, #7, #8, #9, #10
Calculate the mean six-point rating for the seven items. _____

NO FUTURE VALUE (items) = #4, #5, #6
Calculate the mean six-point rating for the three items _____

Math Confidence Scale

Instructions: Please use the six-point rating to report how much you agree or disagree with each math belief described

1 = strongly disagree 2=disagree 3 = somewhat disagree 4 = somewhat agree 5 = agree 6= strongly agree

____ 1. I am confident that I can get a passing grade in math.
____ 2. I am confident that I can get an A in math.
____ 3. Even if I do not understand a math problem at first, I am confident I will get it eventually.
____ 4. Math seems easy for me and I am confident I will get a good grade in this math class.
____ 5. If I get a bad grade on a math test, I know I can do better next time with more practice.
____ 6. I am confident I can practice math problems by myself until I understand them.

Scoring:

MATH CONFIDENCE (7 items) = #1, #2, #3, #4, #5, #6, #7
Calculate the mean six-point rating for the six items _____

Survey Instrument

Math Barrier Scale

Instructions: Please use the six-point rating to report how much you agree or disagree with each math belief described

1 = strongly disagree 2=disagree 3 = somewhat disagree 4 = somewhat agree 5 = agree 6= strongly agree

_____ 1. I have trouble remembering the steps in solving math problems.

_____ 2. My parents have told me that I am bad at math.

_____ 3. My teachers have told me that I am bad at math.

_____ 4. My friends have told me that I am bad at math.

_____ 5. When I am taking a math exam, I feel tense and have trouble breathing.

_____ 6. When I do math problems, I feel nervous.

_____ 7. When I do math problems, I feel frustrated and angry.

_____ 8. When I do math problems, I feel stupid.

_____ 9. When I get confused about something in math, I feel embarrassed.

_____ 10. When I am taking a math exam, I forget everything that I have practiced.

_____ 11. I cannot concentrate on math for more than short periods of time.

Scoring:

MATH ANXIETY (8 items) = #1, #5, #6, #7, #8, #9, #10, #11

Calculate the mean five-point rating for the eight items. _____

DISCOURAGING WORDS (3 items) = #2, #3, #4

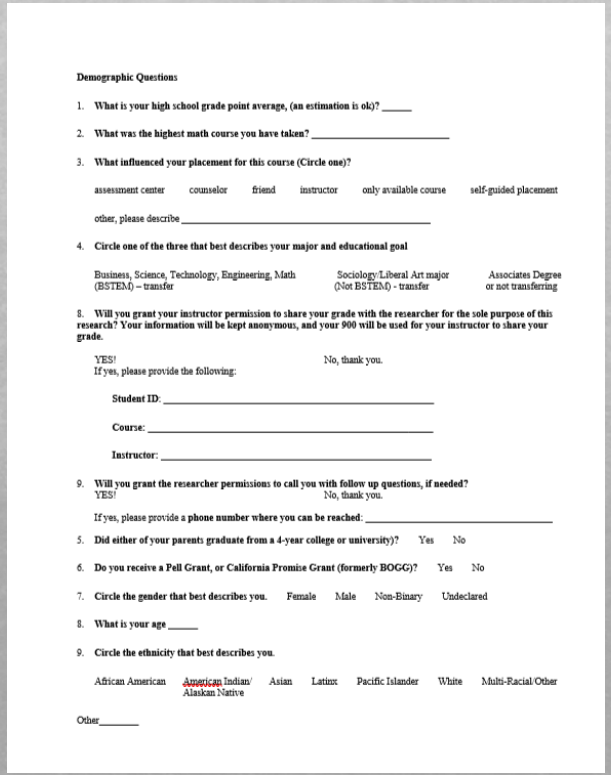
Calculate the mean five-point rating for the three items. _____

Open ended question.

1. What advice would you give a student who is deciding what math course to take next semester?

2. Is this the right math course for you? Why or why not?

Demographic Questionnaire



Demographic Questions

1. **What is your high school grade point average, (an estimation is ok)?** _____

2. **What was the highest math course you have taken?** _____

3. **What influenced your placement for this course (Circle one)?**

   assessment center counselor friend instructor only available course self-guided placement

   other, please describe _____

4. **Circle one of the three that best describes your major and educational goal**

   Business, Science, Technology, Engineering, Math (BSTEM) – transfer Sociology/Liberal Art major (Not BSTEM) - transfer Associates Degree or not transferring

8. **Will you grant your instructor permission to share your grade with the researcher for the sole purpose of this research? Your information will be kept anonymous, and your 900 will be used for your instructor to share your grade.**

   YES! No, thank you.
   If yes, please provide the following:

   Student ID: _____

   Course: _____

   Instructor: _____

9. **Will you grant the researcher permissions to call you with follow up questions, if needed?**
   YES! No, thank you.

   If yes, please provide a **phone number where you can be reached**: _____

5. **Did either of your parents graduate from a 4-year college or university)?** Yes No

6. **Do you receive a Pell Grant, or California Promise Grant (formerly BOGG)?** Yes No

7. **Circle the gender that best describes you.** Female Male Non-Binary Undeclared

8. **What is your age** _____

9. **Circle the ethnicity that best describes you.**

   African American American Indian/ Alaskan Native Asian Latinx Pacific Islander White Multi-Racial/Other

Other_____

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