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Developmental Math in the STEM Degree Pathways: Perspectives from Developmental Students Attending Rural Community Colleges

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Introduction & Purpose

- Recent investigations into developmental math have primarily focused upon outcomes and trajectories. Our study employed a case-study methodology to give voice to a larger sample of students who are in or have recently (Fall 2016-Spring 2017) completed developmental math sequences in the rural community college setting.
- The purpose of this qualitative study was to explore the perspectives of specific populations (females, student athletes, Latino males) and how they describe their confidence and challenges with developmental math education courses.



Research Question

The following research question guided this study:

How do students describe their confidence and challenges with developmental education courses?

Literature Review



- Students placed in lowest developmental education coursework are unlikely to complete the developmental education sequence (Baily & Cho, 2010; Jagers & Hodara, 2011)
- The majority (75%) of students do not pass developmental math on the first attempt (Bahr, 2008)
- Students often fail to prepare for placement assessments (Benken et al., 2015)
- Students are experiencing developmental math through different lenses (Duranczyk, 2007)
- Student beliefs may be contextualized by motivation (Ing, 2014).
- Student beliefs may also be contextualized by the cultural environment (Levine et al., 2014).

Participants

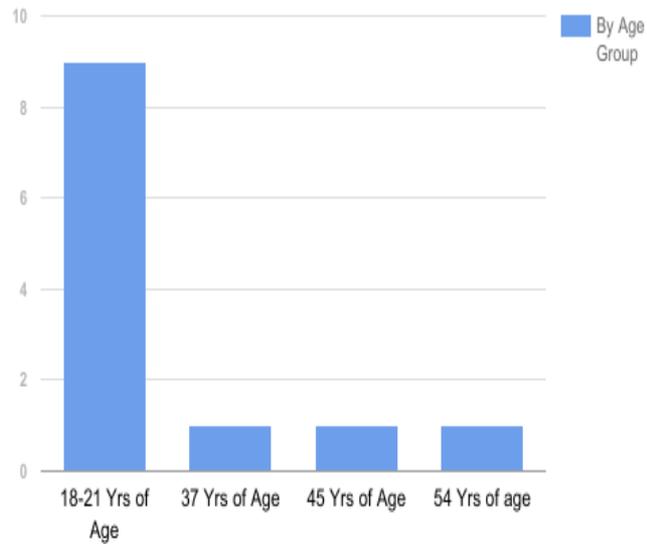


- Six community colleges were invited to participate in this project.
- Through the use of gatekeepers, materials were distributed to potential participants. A total of 12 students volunteered from two of the six sites.
- Breakdown of student demographic:
 - 7 males & 5 females
 - 2 student athletes
 - 4 African American
 - 4 Caucasian
 - 4 Hispanic

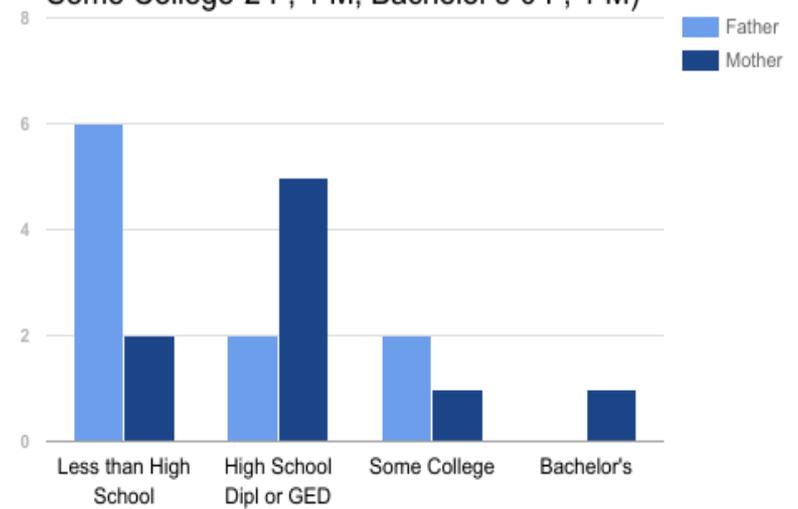


Participants

Age of Participants (12 Interviewees--9 between 18-21, 1=37, 1=45, 1=54)



Parents' Education (12 Interviewees--Less than H.S.-6 F, 2 M; H.S. diploma-2 F, 5 M; Some College-2 F, 1 M; Bachelor's-0 F, 1 M)





Interview Protocol

- Research team made collectively developed interview protocol
- Practiced prior to interviewing participants
- Community college gatekeeper sent out recruitment materials for participants and doctoral students set up interview times with those who responded
- Implemented interview protocol
- Research team collectively conducted debrief after interviews



Interview Protocol

- IP Qs #1-9 asked students to reflect on their math experiences, describe their current math skills, and identify skills that would help them be successful in the future.
- IP Qs #10, 12-16 focused on the students' experiences with the developmental math courses.
- IP Qs #11, 17-21 focused on specific student populations – non-native English language speakers, student athletes, and military veterans.
- IP Qs #22-27 focused on advising, placement test issues, and future educational plans.
- IP Qs #29 & 30 asked the students about people who supported and influenced them in pursuit of a college degree.



Methodology continued

Data Sources - Participant Survey & 30 Question Interview Protocol

- 8 face to face interviews
- 4 Skype interviews

Data analysis

- Axial Coding
- Constant comparative method in analysis and team discussions on emerging themes

Trustworthiness

- Purposeful selection of participants
- Use of audit trail
- Peer debriefing



Overall Student Perspective

- Students felt ill-prepared for math at the post-secondary level.

“I felt like I’ve never seen any of that material before in my life... was mostly like Oh my God what is this? Like what am I gettin’ myself into?”

“Before, I guess ,coming here, I was like very uncertain.”

-Kay



Overall Student Perspective

- Students gained confidence in math skills during developmental courses when the **learning was active and appropriate time was allowed for one on one interaction with instructor.**

“...like that key word (is) developmental so I was thinking, you know, my teacher was going to be more hands on, one on one you know. Let’s get this kid ready for the next thing.”

Caspian



Special Populations:

- Non-traditional students populations (25 years of age or older) were more proactive in seeking resources and further academic support (advising).
- Younger students were less likely to seek out advising and were more likely to over-estimate ability.
- Latino and student athletes relied on support from formal advisors and/or coaching staff. Further, family played a significant role in their motivation and success.
- Female students noted higher testing anxiety, failing grades and personal motivation as impacting their math completion. They further were more likely to underestimate their confidence in math ability.



Comparison of 2016 to 2017 Studies

Faculty perception of Developmental Math challenges:

•Student-level

- Academic preparedness & math foundation
- Self-efficacy
- Lack of motivation
- Negative student identity
- External barriers (e.g. work, family)
- Self-regulation skills
- Regional economic constraints

•Secondary school level

- Negative influence of secondary school teachers
- Over-testing burnout
- Adapting to college teaching styles

•Postsecondary Level

- Developmental education stigma
- Delayed college course enrollment
- Negative perception of DM student

Student perception of Developmental Math challenges:

- Preparedness: Self-doubt “Can’t do it alone.” “I knew I wasn’t good in math.”
- Time - for homework completion, tutoring, work/academics balance
- Test Anxiety



Conclusion

The impact of developmental math programming's role on the selection or non-selection of STEM field majors is inconclusive based on participant responses.

Negative experience in K-12 math and lack of appropriate advising and support may have some impact on student major choice in STEM fields and the perception of developmental coursework.

Teacher/student relationship and engagement does impact student feelings of confidence in math skills.



Items for future study and consideration with regard to Developmental Math Education at the Community College

Role of College Academic Advisor in preparation for
Accuplacer/TSI or other placement tests

Compare test anxiety impact on appropriate/accurate
placement

Further examination of the importance of math lab
and/or tutor access during extended hours



Regarding the limitations of this study –

Time to adequately prepare proposal, develop protocol, collect data, analyze data and reflect on findings

Limited community college partner participation

Sample size limitations due to time constraints



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