Development of Peer Learning Assistance Skills in General Chemistry Undergraduate Teaching Assistants

PRIMES

Partnership for Retention Improvement in Mathematics, Engineering, and Science

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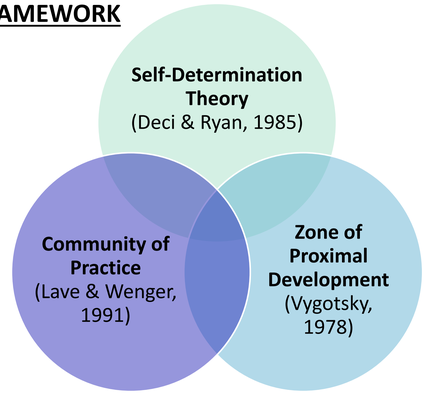
Introduction

PROJECT GOALS

- Increase retention and graduation of undergrad STEM majors
- Investigate an undergraduate teaching assistant (UTA) program in Chemistry Department (6 UTAs in CHEM 201)
- Evaluate UTA peer learning assistance skill development
  - From chemistry student perspective
  - From UTA perspective

THEORETICAL FRAMEWORK



PEER LEARNING ASSISTANCE SKILLS FOR AUTONOMY SUPPORT

- Encourage questions
- Support student choice in learning activities
- Foster student self-assessment of conceptual understanding

UTA PREPARATION AND SUPPORT:

- 3-day workshop pre-semester emphasizing *experiencing* and *distilling* best practice strategies such as formulating guiding questions, using formative assessments, & promoting metacognitive learning.
- Semester-long seminar series continuing to unpack strategies (bimonthly)
- Weekly recitation section planning sessions with chemistry faculty

Research Questions

1) How did general chemistry students perceive UTA peer learning assistance skills?

2) How did UTAs describe their own peer learning assistance skill development?

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Methods

RESEARCH DESIGN

Parallel mixed method: untreated control group with dependent post-test only (QUAN) and phenomenological descriptions of UTA practice (qual)

SAMPLE

6 supported UTAs leading 284 students and 3 comparison graduate teaching assistants (GTAs) leading 310 students in weekly small group recitation sessions

DATA SOURCES

- Undergraduate Course Experience Survey (5-pt Likert scale)
- Six UTA reflections on practice of strategies with students

DATA ANALYSES

- Principal components analysis of 14 Likert items resulting in two factors:
  - TA Impact on Academic Success (10 items, α = .95)
  - TA Rapport Building Skills (4 items, α = .77)
- Comparison of factor means and linear regression of factors to explore predictors
- Phenomenological descriptions for each UTA from reflections and observations

Conclusions

CHEMISTRY STUDENT PERCEPTION

Mutually Reinforcing Elements of UTA Program

- Greater student perceived UTA impact on academic achievement
- Stronger UTA rapport with students

UTA PERCEPTION

Learning Preparation + Content Support = Effective Student Assistance

- Teaching skills can be learned and continually improved
- Content knowledge is necessary but not sufficient for learning assistance

Implications

- Preliminary positive evidence of impact on undergraduates
  - Grades
  - Persistence in STEM programs of study
- Potential for transforming chemistry teaching & learning if UTAs become future chemistry faculty (P-16)
- Potential long-range impacts for UTAs' future career effectiveness, particularly careers which require strong communication skills

Results

CHEMISTRY STUDENT PERCEPTION of UTA PEER ASSISTANCE SKILLS

- UTAs were rated significantly higher on both TA Impact [t(399) = 5.36, $p < .001$; $d = .53$]and TA Rapport [t(410) = 3.86 , $p < .001$; $d = .38$] than GTAs were.
- TA Impact on Academic Success: Significant Predictors
  - TA Rapport rating (β= .683, $p < .001$)
  - Having a UTA (β = .160, $p < .001$)
  - Being a female student (β= - .137, $p = .001$)
  - Number of AP STEM courses taken (β= .099, $p = .012$)
- TA Rapport Building Skills: Significant Predictors
  - Recognized as a "science person" by self and others (β = .207, $p < .001$)
  - Having a UTA (β = .178, $p = .001$)

UTA PERCEPTION of OWN PEER ASSISTANCE SKILLS

- Used strategies learned in seminar with varying self-reported skill
- Reported commitment to increasing student learning and engaging students in the concepts and processes required for success in CHEM 201
- Strategies used with students include divergent questioning, increased wait time, think-alouds, problem sets formatted for student self-assessment, student whiteboards, and formative assessments such as 'Muddiest Point 'and 'Commit and Toss'