A Review of Research on the Professional Development of Statistics Graduate Teaching Assistants

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Overview

• Graduate Teaching Assistants (GTAs) and their role teaching statistics
• Statistics GTAs’ Preparation for Teaching
• Research related to GTA professional development
• Discussion and Recommendations
Graduate Teaching Assistants (GTAs)

Typically serve in four roles:

• Instructors of a (usually small) section of a course
• Lab facilitators
• Discussion section leaders
• Clerical workers / paper graders
Statistics GTAs

…are responsible for the instruction of 25% of introductory statistics courses in United States Ph.D.-granting statistics departments

(Blair, Kirkman & Maxwell, 2013)
Statistics GTA Preparation for Teaching

- Descriptive articles
- Rumsey (1998); Garfield & Everson (2009)
- Special section of *The American Statistician* (2005)
  - Courses & Seminars
  - Weekly meetings
  - “Immersion in a departmental culture”
  - Gradual assignment of responsibilities
David Moore’s Recommendations (2005)

- Assign responsibilities appropriately
- Observe and provide feedback
- Offer mentoring
- Foster relationships between GTAs
- Prepare international GTAs for cultural norms
Empirical Studies of Statistics GTAs

Statistics GTAs

• lack important content knowledge for teaching (Noll, 2011)
• feel unprepared for teaching (Green, 2010)
• sense a lack of faculty support for teaching (Green, 2010)
• are not familiar with current recommendations for teaching introductory statistics (Parker et al., 2014)
• often hold beliefs unaligned with their teaching practices (Parker et al., 2014)
Empirical Studies of Statistics GTAs

Teaching practices are NOT aligned with GAISE recommendations (Parker et al., 2014)

- 92% use lecture (primarily) to present content
- 67% do NOT encourage students to discover ideas on their own.
- 53% do NOT frequently require students to work in small groups
- 76% require students to do a lot of practice of procedures using formulas (do NOT stress concepts)
Empirical Studies of GTAs in Other Disciplines: Mentoring

Associated with

• changes in teaching beliefs (Gilmore, Maher, Feldon, & Timmerman, 2013; Volkmann & Zgagacz, 2004)

• reduction in teaching anxiety & improved self efficacy (Williams, 1991, when coupled with observations…)

Doesn’t need to be faculty (Williams, 1991)

High GTA satisfaction (Jones, 1993)
Teaching Observations

Associated with

• changes in teaching behaviors (Bray & Howard, 1980)
• reduction in GTA teaching anxiety (Williams, 1991)

Use video or microteaching (Boman, 2013; Dalgaard, 1982)

Can be conducted by senior GTAs; doesn’t need to be faculty (Williams, 1991)

High GTA satisfaction (Dalgaard, 1982)
Peer Interactions

• Rated as most helpful by GTAs (Darling & Dewey, 1990; Myers, 1994)
• Rated as most accessible by GTAs (Darling & Dewey, 1990)
• In K-12 education, teacher professional development groups are associated with:
  - Successful adoption of reformed curriculae (e.g., Blumenfeld et al., 2000)
  - More student-centered teaching * (Vescio, Ross, & Adams, 2008)
  - Higher percentages of students achieving proficiency on standardized tests * (Vescio, Ross, & Adams, 2008)
  * when discussion is focused on “student–learning”
International GTAs (ITAs)

• ITAs are more likely to use “authoritarian” teaching styles (Luo, Grady, and Bellows, 2001)

• Culturally relevant teaching styles have been shown to ameliorate linguistic insufficiency, but not vice versa (Hoekje & Williams, 1992)

• Authoritarian styles can have more negative effects than lack of English proficiency (Hoekje & Williams, 1992)
Courses and Seminars

• Large Variation in Courses and Seminars Offered
• Variables:
  – Duration (1-2 day workshop vs. semester– or year–long course)
  – Clientele (many disciplines vs. single department)
  – Scope (teaching, generally vs. preparation for a specific course)
  – Components (lectures vs. discussion & microteaching)
  – Teacher-centered vs. Student-centered focus
Courses and Seminars

- Typical goals:
  - changed teaching beliefs
  - changed teaching practices
  - greater self-efficacy
  - reduced anxiety

- Some studies suggest they can be effective (e.g., Boman 2011)
- Other studies suggest they aren’t effective (e.g., Luft et al., 2004)
Courses and Seminars

Gilmore et al., (2013)

• Studied correlations between GTAs’ beliefs about teaching and four factors, including training programs.

• Training program experience (often weekly meetings) had no significant relationship with increase in student-centered teaching beliefs ($p=.341$)

• Mentoring experience had far stronger associations with student-centered beliefs than all other factors.
Bray and Howard (1980)

- Conducted a controlled randomized study
- Found no significant differences between
  - GTAs who received video consultations
  - GTAs who received video consultations in addition to seminar on teaching ($p = .589$)

The authors conclude that the video consultation was the key component of the training program
Courses and Seminars

Wyse (2010)

• Studied changes in GTAs’ beliefs
• GTAs participated in a rigorous training program
• After 1 semester: no significant changes in beliefs
• After 2 semesters: significant changes detectable
Recommendations for GTA Professional Development Related to Teaching

• **Offer Mentoring** (Moore, 2005; Gilmore et al., 2013; Williams, 1991)
  Use senior GTAs if necessary

• **Conduct Teaching Observations** (Williams, 1991)
  Use peers & senior GTAs if necessary

• **Encourage Peer Interactions** (Myers, 1994)
  Promote opportunities to discuss “student learning.”

• **Focus on Cultural Norms** (for International GTAs)
  English Proficiency is not as important (Hoekje & Williams, 1992)
Recommendations for GTA Professional Development Related to Teaching Courses & Seminars should:

• Include reflection on GAISE recommendations (Garfield & Everson, 2009; Parker et al., 2014)

• Include research on how students learn statistics (Garfield & Everson, 2009; Parker et al., 2014)

• Include microteaching / Observations with feedback (Bray & Howard, 1980)

• Capitalize on rich opportunities for discussions among GTAs about student learning (Moore, 2005; Vescio et al., 2008)

• Have duration longer than one semester (Wyse, 2010)
Key References


Wyse, S. (2010). *Breaking the Mold: Preparing Graduate Teaching Assistants to Teach as they are Taught to Teach*. Michigan State University.

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More References


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