Self regulation of mathematics learning in the college classroom

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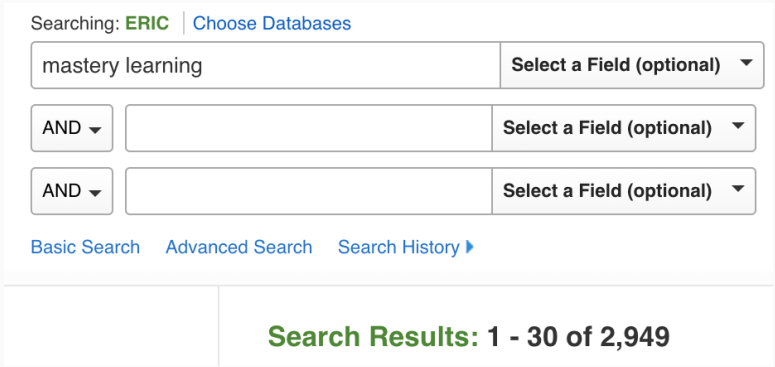
Recap

- Mastery based learning and its history
  - Problems and challenges
  - Success in the classroom
- Self-paced assessment based learning (SPABL)
  - Modifications and adjustments to mastery based learning
- Self-paced assessment in the setting of Math 40

The Revised Plan

1. Narrowing the scope of research
2. Constructing an annotated bibliography / literature review
3. Analyzing results of the Math 40 experiment and conducting further follow up research

Narrowing the scope



- Instruction has evolved and changed in many ways in the last century
- Much larger task to examine what has been / what hasn't been studied
- Necessary to find a subtopic related to the initial SPABL ideas

Annotated Bibliography - Greg Martin on Gender in Science

AN ANNOTATED BIBLIOGRAPHY OF WORK RELATED TO GENDER IN SCIENCE

GREG MARTIN
DRAFT: SEPTEMBER 17, 2014

The purpose of this manuscript is to gather together a large amount of source material pertaining to women in mathematics, from studies of girls in elementary school through data on females winning prizes for mathematical research. Along the way, we have also gathered a large amount of material from the psychology and sociology literature on implicit biases more generally, particularly pertaining to gender. This source material was then used to support the writing of the article [52]. We have tried to refer to primary research literature whenever possible, although we have also included well-written blog posts, organizational web sites, self-published articles by research organizations, and even a YouTube video.

Each bibliography entry is accompanied by some remarks summarizing its content (these will be cleaned up in the final version of this manuscript) and representative quotes from the articles themselves. We have followed standard practice when including these quotes, with the following exception: where the original quote has included citations to other work, or supporting statistics such as p-values, we have omitted these annotations to enhance the clarity of the quote. Nevertheless, much of the work in this bibliography contains a large number of further references to the relevant research literature.

The annotated bibliography is thus reasonable for browsing; but for those looking to find source material for particular aspects of this issue, we hope the following categories will be of some use:

- Hypotheses on biological science differences: [7], [23], [34], [46], [51], [80]
- Declining gender gap: [4], [23], [34], [40], [41], [46], [62]
- Overemphasis of/problems with standardized tests: [1], [23], [40], [60]
- Extremely high math achievement in children: [4], [34], [40], [41], [60]
- Role of culture's gender equity: [23], [34], [41], [46]
- Biases in primary school classrooms: [1], [8], [51], [60], [85]
- Fixed trait vs. malleable quality: [32], [57], [82]
- Explicit sexism: [7], [28], [39], [80], [87]
- Implicit biases: [6], [9], [12], [19], [20], [30], [31], [33], [38], [54], [55], [65], [70], [77], [79], [81], [87], [88]
- Incognizance of biases/illusion of meritocracy: [6], [30], [33], [49], [64], [68], [81], [83]
- Broader societal gender-based problems: [1], [4], [6], [7], [9], [16], [22], [35], [38], [39], [49], [51], [67]
- Gender-based personality expectations: [5], [10], [16], [19], [22], [24], [38], [59], [66], [74]
- Gender-based differential in self-concept: [60], [65], [73], [81]
- Effect of parenting, childcare, flexible schedule on career: [11], [18], [19], [25], [50], [56], [70], [71]
- Impostor phenomenon: [16], [47]
- Stereotype threat: [26], [32], [51], [60], [75]
- Leadership, persuasion, and negotation: [5], [10], [12], [13], [19], [22], [24], [37], [66]
- Female speakers at conferences: [2], [3], [15], [19], [25], [26], [27], [28], [30], [36], [43], [45], [61], [63], [68], [69], [76], [78], [83]
- Teaching evaluations: [48], [59], [73]
- Award winners, grants, promotion and tenure: [14], [17], [38], [49], [72], [77], [87]
- Biases in evaluation/selection processes: [11], [14], [21], [31], [36], [37], [43], [48], [49], [54], [55], [56], [65], [72], [73], [74], [79], [84], [86], [88]
- Action items and recommendations: [1], [4], [14], [15], [19], [25], [26], [28], [29], [42], [43], [45], [50], [58] [61], [69], [76], [83], [85], [87], [88]
- Further references: [1], [4], [19], [21], [23], [24], [26], [32], [34], [46], [49], [59], [64], [66], [85], [87]

The final version of this manuscript will include an appendix containing tables of data from the 2014 ICM and the 2014 Joint Meetings of the AMS and MAA, listing the various sessions and the numbers of female speakers and total speakers (and the same for organizers, where given). Some data from mathematics prizes will also be included.

We have made the conscious choice to include only initials and last names in the bibliography and in both manuscripts. We have observed a tendency to be curious about the gender of the authors of the research referred to herein, and perhaps to involuntarily wonder how the authors' gender should affect our evaluation of their conclusions. These reflexive speculations, we believe, tellingly illuminate the depth to which these implicit biases about gender are ingrained in us, even though we rationally know that possessing one gender or another does not affect a person's objectivity. Being socialized to have biases is not our fault; but preventing our biases from negatively affecting the world around us is nonetheless our responsibility.

ACKNOWLEDGMENTS

We thank W. Miao for gathering the data that will appear in the appendix, as well as for locating copies of several of the papers in this bibliography.

REFERENCES

[1] American Association of University Women, How schools shortchange girls: executive summary, The AAUW Report, 1992. http://www.aauw.org/files/2013/02/how-schools-shortchange-girls-executive-summary.pdf (accessed September 15, 2014)

"Girls receive significantly less attention from classroom teachers than do boys."

"African American girls have fewer interactions with teachers than do white girls, despite evidence that they attempt to initiate interactions more frequently."

"The contributions and experiences of girls and women are still marginalized or ignored in many of the textbooks used in our nation's schools."

"Incest, rape, and other physical violence severely compromise the lives of girls and women all across the country. These realities are rarely, if ever, discussed in schools."

"Test scores can provide an inaccurate picture of girls' and boys' abilities. Other factors such as grades, portfolios of student work, and out-of-school achievements must be considered in addition to test scores when making judgments about girls' and boys' skills and abilities."

40 Recommendations: Actions for Change

references to the AAUW Gender Equity Library

Annotated Bibliography - Greg Martin on Gender in Science

- Categorization of studies and papers written about gender in science
- Annotations consist of direct quotes and abstracts, as well as keywords
- Goal: Create a reference document easily readable and useful for further studies

Self-regulation and self-paced assessment

Definition:

self-managing environmental contingencies, but also the knowledge and the sense of personal agency to enact this skill in relevant contexts. Self-regulation refers to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals. This definition, in terms of actions and covert processes whose presence

Zeidner, M., Pintrich, P. R., & Boekaerts, M. (2005). Handbook of Self-Regulation. Burlington, MA: Academic Press.

Self-regulation and self-paced assessment

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- Mastery learning has evolved and split into many variations
  - IBL (inquiry based learning), flipped classrooms, POGIL (process oriented guided inquiry learning), group learning, online, and many, many more.

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  - IBL (inquiry based learning), flipped classrooms, POGIL (process oriented guided inquiry learning), group learning, online, and many, many more.
- Major overlap occurs in fostering independent thought
  - Includes developing critical thought (problem solving skills) and forming feelings of self-efficacy (metacognition)

Conducting a meta analysis

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- Restrictions: Mathematics at college/university level institutions
  - Empowering minorities and marginalized groups in typically "neutral" subject areas
  - Maturity enables co-creation of knowledge
  - Specificity calls for tenable solutions

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- Within last 20 years

Keywords in categorization process

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- "One variable shy" from ideal study (stretch)

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- What influence and/or interaction does this have with other disciplines or settings?
- Does it lead to a more equitable practice?

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- Currently in post-processing stage of pre- and post-surveys
  - Data includes student demographics, prior math knowledge, qualitative feedback, etc.
  - Thank you, Laura!

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- Currently in post-processing stage of pre- and post-surveys
  - Data includes student demographics, prior math knowledge, qualitative feedback, etc.
  - Thank you, Laura!
- Conducting a "post-post" survey after completion of Math 65 (ideally summer math for logistical reasons)
  - Significance of having "no negative effect"

Thank you!

Questions?