

# Storytelling in Engineering Education

Center for the Advancement of  
Engineering Education

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# Let me tell you a story...

- What is storytelling?
- What can you gain from stories?
- How can you use storytelling in engineering education?

# What's in a story?

- A way of making meaning and sharing transformative experiences
  - Developmental models of learning, identity formation, communities of practice
- A way of investigating knowledge
  - Oral histories, narrative inquiry, etc.
- A way of facilitating innovation and change

# Engineering Education Research

- Lots of stories...but we don't share them
  - How did you get started?
  - What do you do if you don't have "the numbers"?
  - How can I get tenure or promoted from doing this?
- Storytelling often happens in private or informal settings
  - Hallway, the water cooler, etc.
- Although some public spaces
  - Annals of Research on Engineering Education (AREE)
  - FIE 2005 Interactive session "Communities in Practice – What are We Learning?"

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# FIE 2005: A story-poster interactive forum

- We used stories to:
  - Create collaborative knowledge
  - Foster learning and professional development
  - Strengthen social networks
  - Provide strategies for reflective practice
- 6 ISEE Scholars shared their stories and modeled the storytelling process
  - Then engaged others to share their stories

# The “story” process

- Posters included
  - Driving passions and goals
  - How they got started and moved forward
  - Difficulties experienced, ways to overcome them

*All the “dirty details” of designing and conducting engineering education research*

# the secret life of engineering education researchers

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## my research ...or "what do I do for a living?"

My research interests revolve around the pedagogical practices of engineering education research. I am particularly interested in the field of design education.



How do we teach design education? I am interested in the pedagogical practices of engineering education research. I am particularly interested in the field of design education. I am interested in the pedagogical practices of engineering education research. I am particularly interested in the field of design education.

## risk-taking ...or "what is the pressure to publish?"

There is an unspoken rule in engineering education research: publish or perish. The pressure to publish is a constant in the field. I am interested in the pedagogical practices of engineering education research. I am particularly interested in the field of design education.

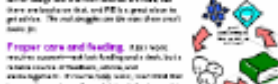
What strategies do they employ to survive? What joys motivate them to persist?

## life before the institute ...or "how do my research interests never happen?"

- 1988 Completed a Bachelor's degree in computer science and was recruited to work for the Department of Computing Science at the University of Waterloo.
- 1990 Moved to France's north coast, and worked as a software engineer. I was involved in teaching and learning. Teaching technology became a focus. It was a big career change.
- 1992 This group became interested in design education. I was recruited to work for the Department of Computing Science at the University of Waterloo.
- 1994 A number of circumstances resulted in a move to the University of Washington. I was recruited to work for the Department of Computing Science at the University of Waterloo.
- 1994 Became an Institute Scholar with the CDRI Institute for Design Education and got a chance to focus on my research. I am interested in the pedagogical practices of engineering education research. I am particularly interested in the field of design education.

## the struggles...and strategies

For me a social scientist, suggesting an assignment I need to read something new. I am interested in the pedagogical practices of engineering education research. I am particularly interested in the field of design education.



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## the joys

Learning across disciplinary boundaries. Research in new methods, theories, and practices from other fields and from the border of the field is one of the joys of teaching and learning.

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# Finding My Research Home: Being Free to do Research My Way

David Socha, PhD

What is software design?  
 How can software design be taught?



July 18, 1984 - end of day 2 of IEEE workshop

I am unhappy. My mood had been sinking for two days. I don't want to do the qualitative research methods being taught here. "Why and how?" I wonder. "Why going IEEE is a mistake?"

I find Robin Adams and express my concerns. She listens. "Well," she said, "what are you are doing?"

That's one. I open my journal. It's full of notes, diagrams, questions from many conversations and readings about software design. Then doing and teaching software design.

"That's your research," says Robin.

"What?", I reply. I don't use any data sets. I am primarily focused and involved experiments in interviews.

"Right then," she says, "so your journal. These conversations are your research."

U.S.!

That's when it dawned on me that I was already doing my research. And had been for years. Suddenly I was free to continue doing what I was doing well. What a relief!

Before this day, I would tell people that "I am not a researcher."

So I know differently. I do applied design research. It is more concrete than analytical. More observable than experimental. More iterative than planned. And it is research. This was IEEE's gift to me.



# IS MY WRITING THAT BAD?

## Understanding Technical Writing Challenges in Civil Engineering

Tori D. Rhoads, Ph.D. \* Department of Civil Engineering \* Howard University

### WRITING CHALLENGES

An engineering student is asked to write a report for the civil engineering department. The student is asked to write a report for the civil engineering department. The student is asked to write a report for the civil engineering department.

Students in the Civil Engineering department often find technical writing a challenging task. This is because technical writing is a form of communication that is often used in the workplace. It is a form of communication that is often used in the workplace. It is a form of communication that is often used in the workplace.

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# Story poster “walk”

- Audience invited to comment on posters with sticky notes, e.g.:
  - Questions: what do you mean by this?
  - Affirmations: I did this, too!
  - New knowledge: I tried this another way...

# IS MY WRITING THAT BAD?

Understanding Technical Writing Challenges in Civil Engineering  
 Tori D. Rhoulac, Ph.D. \* Department of Civil Engineering \* Howard University

**ABSTRACT**

An engineering student who is not writing as they are able to do is not writing as they should. This paper discusses the challenges of writing technical reports for students who are not writing as they should. The author discusses the challenges of writing technical reports for students who are not writing as they should. The author discusses the challenges of writing technical reports for students who are not writing as they should.

**At the 2004 Summer Summit, I...**

- ...attended with only one year of experience in academia.
- ...had no interest, but no experience in engineering education research.
- ...proposed research topics based on my experiences in the classroom.
- ...selected one topic on which to focus.
- ...received invaluable feedback from others.
- ...formulated the topic into a formidable research question.

**Immediately After the Summit, I...**

- ...was motivated and went right to work.
- ...had my Traffic Engineering I students anonymously review 2 of the technical reports submitted for normal class requirements.
- ...collected 15 total reports for inclusion in the research project.

**Between the Summer and Fall of 2005, I...**

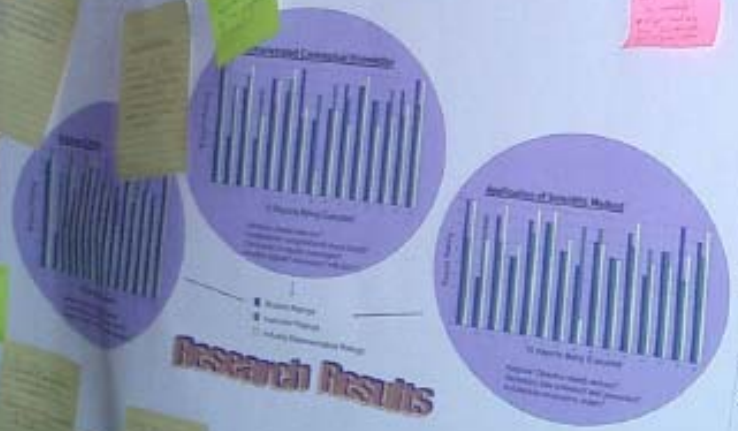
- ...overlaid active planning to complete the research.
- ...employed my evaluations of the reports as instructor.
- ...served an industry representative to evaluate the reports.
- ...analyzed the data from the student, instructor, and industry evaluations.
- ...prepared for preliminary dissemination of results.

**By the End of 2004, I...**

- ...had to juggle other duties that the research "lost some steam."
- ...stopped taking advantage of the opportunities for discussion of projects with other ESEE scholars.

**CONCLUSIONS/ LESSONS LEARNED:**

- Concerning Engineering Education Research...**
- ◆ Select A Topic Of Personal Interest (provides motivation)
  - ◆ Be Sure Data Can Be Relatively Easily Collected (provides encouragement through feasibility)
  - ◆ Form A Community Of Similar Scholars (such as ISEE)
    - Regular meetings keep you on track.
    - Opportunities for collaboration on other projects result.
    - Expertise of others can be invaluable for:
      - Anticipating stumbling blocks in your research question
      - Suspending "trial and error" methodologies.
      - Providing useful resources (like effective survey questions).
      - Welcoming and related literature for review.
  - ◆ Develop A Personal Schedule With Deliverables (provides structure to ensure project is actually completed)
- Concerning Technical Writing Research...**
- ◆ Lack of proficiency for student writing may be due more to lack of conceptual knowledge than to lack of skill in writing mechanics.
  - ◆ Instructors may need to "grade harder" where grammar and syntax are concerned.
  - ◆ Many students are prepared by their graduating year to meet workplace writing expectations.



**Research Results**

Handwritten sticky notes in various colors (yellow, pink, green) are scattered across the page, providing additional context and feedback on the research findings and conclusions.

# Conversations around posters

- Discussing stories in the poster
- Eliciting new stories
  - How did you get started – what are you passionate about?
  - What are your experiences (good and bad)?
  - What advice would you give?
  - What are you learning?

# Going public

- Each table asked to report out, e.g.:
  - Confusing engineering education research with doing more teaching or teaching better
  - The real struggles are the ones that aren't in the books
  - Choosing research questions that MATTER
  - Ways of motivating engineering departments to value this kind of research
  - The importance of finding a “home” (community)
  - “At play” in the space between teaching and research
  - Learning how to frame your work so its relatable to others
  - Research process  $\leftarrow \rightarrow$  learning process
  - Formulating questions “is” research
  - Doing this is like going through a second PhD process

# So what's in a story

- 39 evaluation forms
- Closed ended questions
  - “Very high” ratings: quality of session, importance of topic, good use of time
- Open ended questions
  - “building knowledge through sharing stories and constructing new knowledge”
  - “opportunity to benefit from the experiences of others through small group discussions”
  - “good way to network with others in the field”
  - “talking about community and also building it”
  - “affirming process...promoted critical thinking and reflection”
- Observations – volume of conversations and interaction

# For new engineering education researchers...

- Storytelling can provide important pathways into a community of practice, access to community knowledge, and opportunities to co-construct knowledge
- Storytelling posters – provide a mechanism for scholarly discourse around topics that are not often made public

# What do we learn by telling stories?

- How to listen and understand different points of view
- How to communicate across perspectives
- How to look for connections across perspectives
- How to elicit someone else's story
  - How did you get started? What difficulties have you experienced and how did you deal with them? What did you find rewarding? What surprised you? What advice might you give?
- How to tell your own story
  - Start with someone you trust who is a generous listener
  - Reflect on your own experiences (use questions above)

# Summary

- Storytelling is one way of creating and sustaining community
- We've provided one example of how this can work
- We hope to see more storytelling in the engineering education community



*To be continued...*

FIE 2007

*Special Session:* Communities of Practice in Engineering Education: How Do We Investigate Diversity and Global Engineering?

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We would like to particularly acknowledge our 2004 Scholars (and honorary 2004 Scholars Skip Walter and Lisa Hansen) for their participation and feedback in developing the ISEE model (those marked with a “\*” in the following list presented their story posters at the FIE session). *2004 ISEE Scholars include* (in alphabetical order): Joe Cannon (Howard University), \*Russ Caspe (U Washington), Eric Cheek (NCA&T), \*Brian Flinn (U Washington), Brian Fabien (U Washington), Scott Eberhardt (U Washington), \*PK Imbrie (Purdue University), Linda Lee (U Washington), Maisy McGaughey (U Washington), Lawrence Neeley (Stanford University), \*Tori Rhoulac Smith (Howard University), Louis Rosenberg (California Polytechnic State University, San Luis Obispo), Jeremy Sabol (Stanford University), \*David Socha (U Washington), Tom Williams (U Washington), \*Denise Wilson (U Washington), and \*Ken Yasuhara (U Washington).