

Standards of Education Research: The Basic Requirements of Classroom Research

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10 November 2011

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Outline

- Me
- You
- Education Research Standards
- Description of Scholarship Standards
- Study Results
- Take-Aways



Me

- D-CME
- BS – RIT, MS – Colorado, PhD – Purdue
- 10 years of professional practice
- Engineering Education
- Educational research is my area of technical research
 - Applied ethics
 - Identity development
 - Non-verbal communication



You

- Master Teacher Program – yes/no
- What is your area of technical research?
- Exercise
 - What is your area of technical research?
 - How would you go about conducting a research project?
 - Develop a list of 5-10 steps that you would use.
 - Start at the beginning...research question



You

- Exercise Results
 - What are those steps?
 - Anything common across multiple areas of technical research?
 - Where does it always begin?
 - Where does it always end?



Standards for Education Research

- National Research Council (NRC)
 - Pose significant questions that can be answered empirically
 - Link research to relevant theory
 - Use methods that permit direct investigation of the question
 - Provide a coherent and explicit chain of reasoning
 - Replicate and generalize across studies
 - Disclose research to encourage professional scrutiny and critique
- *Scientific Research in Education*
Shavelson & Towne, 2002



Standards for Education Research

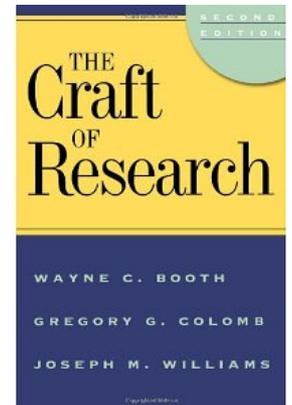
- Journal of Engineering Education (guidelines for peer-reviewers)
 - State clearly the questions or propositions addressed and the significance...
 - Situate the research within relevant bodies of knowledge...
 - Employ research designs, methods, theories, and/or practices...
 - Present original ideas or results of general significance supported by clear reasoning and compelling evidence...
 - Exhibit clear, concise, and precise exposition...
 - Provide tables and figures, as needed, that meaningfully add to the narrative...

- *Journal of Engineering Education*
Society for Engineering Education



Standards for Education Research

- The Craft of Research
 - Pose a research question
 - Review the literature
 - Define methods
 - Execute
 - Evaluate
 - State your claims
 - Provide evidence
 - Situate back in the body of knowledge
- *The Craft of Research*
Booth, Colomb, & Williams, 2003

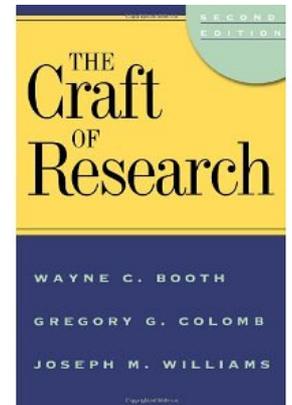


Description of Scholarship Standards

■ *The Craft of Research*

1. Research question
2. Literature review
3. Define methods
4. Execute
5. Evaluate
6. State your claims
7. Provide evidence
8. Situate back in the body of knowledge

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



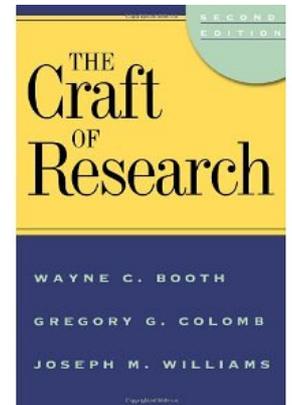
Description of Scholarship Standards

■ *The Craft of Research*

1. Research question

- It all starts here
- Hypothesis or conjecture that can be tested and refuted
- Logical first step, not an afterthought
- Arguably the most important step in the process
- All subsequent steps are influenced by the research question

- *The Craft of Research*
Booth, Colomb, & Williams, 2003

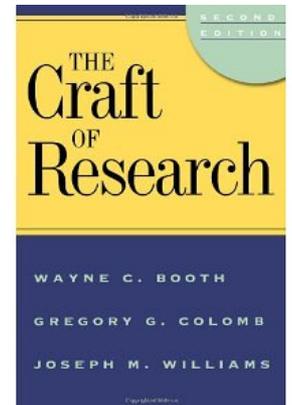


Description of Scholarship Standards

■ *The Craft of Research*

2. Literature review

- What prior studies have been done that relate
- Depth and breadth of investigation
- Literature review tools (Google Scholar, library search engines)
- Self-educating
- Synthesis of the findings
- Consideration of how findings inform the study
- Help avoid mistakes, wasted resources, and inadequate foundations for future efforts
 - *The Craft of Research*
Booth, Colomb, & Williams, 2003



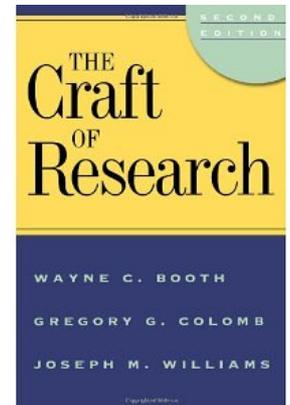
Description of Scholarship Standards

■ *The Craft of Research*

3. Define methods

- Research question refines the methods
- Literature review informs the methods
- Plan for collecting data and the measurement and analysis of variables
- Often overlooked or rushed

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



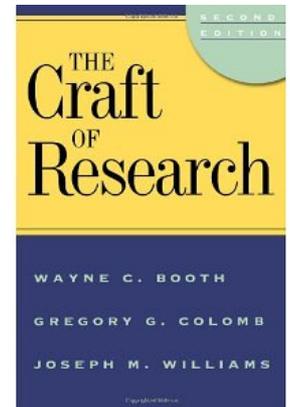
Description of Scholarship Standards

■ *The Craft of Research*

4. Execute

- Stick to the plan (methods)
- Deviation from the plan must be identified in subsequent dissemination of findings
- Transparency is critical to replication

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



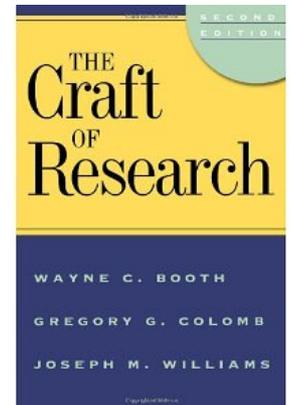
Description of Scholarship Standards

- *The Craft of Research*

- 5. Evaluate

- Unambiguous presentation of results
 - Clear summary – tables, figures, photographs
 - Remove any extraneous information

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



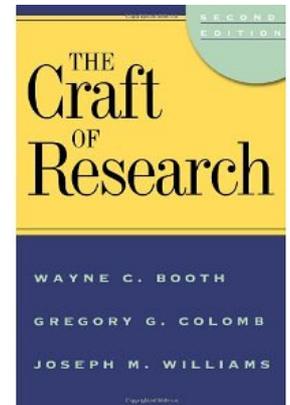
Description of Scholarship Standards

■ *The Craft of Research*

6. State your claims

- A direct response to the research question posed
 - How do you make claims with no research question?
- Strength depends on methods used to collect and analyze data
- Triangulation – confirmation of data using multiple data-gathering procedures or multiple sources of data

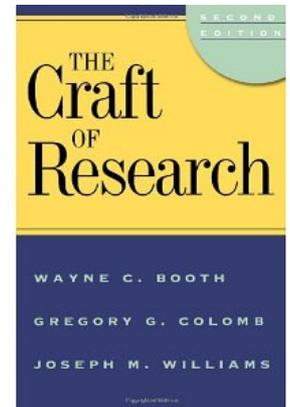
- *The Craft of Research*
Booth, Colomb, & Williams, 2003



Description of Scholarship Standards

- *The Craft of Research*
 - 7. Provide evidence
 - Clear evidence cited to support claims

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



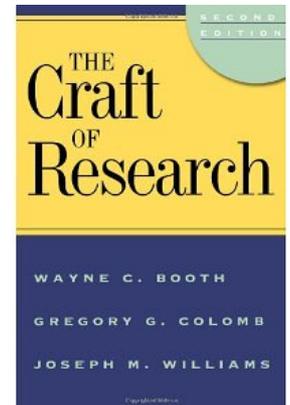
Description of Scholarship Standards

■ *The Craft of Research*

8. Situate back in the body of knowledge

- Second major reason for conducting the literature review
- Used literature to inform your study
- How do your findings fit or not fit with prior literature?

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



Description of Scholarship Standards

- Dissemination of Findings
 - Only through dissemination of findings can we expect change to occur
 - Conference presentations, conference papers, seminars, journals, books
 - Intent is to invite scrutiny and critique (peer review)



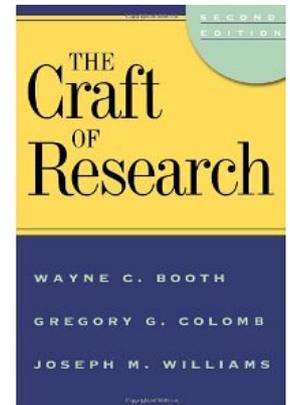
Description of Scholarship Standards

■ *The Craft of Research*

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+ Dissemination

- *The Craft of Research*
Booth, Colomb, & Williams, 2003



A Quick Study of Education Research

- A study of how well a particular population of educators conducts research in education
- At the same time...a demonstration of adherence to scholarship standards



A Quick Study of Education Research

- Research Question
 - What level of rigorous educational research is represented in the ASEE Civil Engineering Division papers accepted to the annual conference over the past four years?
- Population
 - PhD in discipline, interest in education research
 - Fairly representative



A Quick Study of Education Research

- Literature Review
 - Self evaluation not unusual
 - Multiple standards for “good” scholarship
 - Description of scholarship standards



A Quick Study of Education Research

- Methods
 - Establish standards to evaluate against
 - Obtain and divide CE division conference papers for the past four years (2007 – 2010)
 - Review all papers in entirety and record findings
 - Second review to ensure consistency
 - Summarize results and consider implications



A Quick Study of Education Research

- **Methods**
- **Scholarship Standards Utilized**

Scholarship Standard (as used in this study)	Description of Scholarship Standard
Research Question	A clear and testable statement of the intent the study. Could be explicitly identified as the research question or hypothesis. Could also be implied by description of intent. Credit not provided to papers that only included statements such as “This paper presents...” without a clear question or hypothesis.
Literature Review	Properly cited review of literature related to the topic. No minimum number or type of citations required. Although a complete literature review would go in depth on prior studies and theory, credit for literature review provided for even basic connections with the topic.
Methods	A minimum discussion of the methods used to plan the study, perform the study, collect evidence, and/or evaluate results.
Assessment	Any form of assessment to include, but not limited to, survey(s), interview(s), grade(s), and course/instructor evaluation(s).
Claims	Commonly, but not always, stated as a conclusion. Claims associated with and unrelated to the original research question (if present) were considered.
Evidence	Any form of reported findings. Credit provided only for evidence in support of claims. Defined as “strong” or “weak” based on the degree of connection with claims and triangulation of data.
Situated Back in Literature	Consideration of literature findings when discussing evidence and claims. Identification of contributions to the knowledge base.



A Quick Study of Education Research

■ Results

	2007	2008	2009	2010	Total
DATA SET					
Total Number of Papers	73	56	69	53	251
RESEARCH QUESTION					
Percentage of Papers with Research Question	19.4%	13.5%	27.9%	26.2%	21.7%
LITERATURE REVIEW					
Percentage of Papers with Literature Review	80.6%	82.7%	60.7%	85.7%	76.5%
DISCUSSION OF METHODS					
Percentage of Papers with Discussion of Methods	96.8%	71.2%	93.4%	76.2%	85.7%
ASSESSMENT					
Percentage of Papers with Assessment Reported	74.2%	57.7%	78.7%	76.2%	71.9%
Percentage of Papers with Survey(s) as Assessment	27.4%	36.5%	27.9%	52.4%	34.6%
Percentage of Papers with Interview(s) as Assessment	1.6%	1.9%	11.5%	7.1%	5.5%
Percentage of Papers with Grades as Assessment	17.7%	17.3%	27.9%	26.2%	22.1%
Percentage of Papers with Course/Instructor Evaluation(s) as Assessment	17.7%	17.3%	18.0%	19.0%	18.0%
Percentage of Papers with Multiple Forms of Assessment	11.3%	23.1%	21.3%	35.7%	21.7%
CLEAR CLAIMS					
Percentage of Papers with Clear Claims	91.9%	82.7%	93.4%	78.6%	87.6%
Percentage Papers with Clear Claims but No Research Question	72.6%	69.2%	65.6%	52.4%	65.9%
Percentage Papers with Clear Claims but No Evidence in Support of Claims	25.8%	25.0%	23.0%	4.8%	20.7%
EVIDENCE					
Percentage Papers with Strong Evidence	6.5%	25.0%	13.1%	21.4%	15.7%
Percentage Papers with Weak Evidence	64.5%	32.7%	57.4%	54.8%	53.0%
SITUATE BACK IN LITERATURE					
Percentage Papers that Situate Back in Literature	12.9%	5.8%	21.3%	11.9%	13.4%



A Quick Study of Education Research

- Claims & Evidence
 - Claim – Self evaluation of scholarship is not usual
 - Evidence – Findings of literature review

- Claim – Standards for conducting education research exist
 - Evidence – Findings of literature review



A Quick Study of Education Research

- Claims & Evidence
 - Claim – The population studied conducts reasonably rigorous education research.
 - Evidence – Comparison of results to results from prior studies (situated back in the literature)



A Quick Study of Education Research

- Claims & Evidence
 - Claim – ...but there is always room for improvement
 - Evidence – Looking at the numbers.
 - Total number of papers = 251
 - Research questions = 21.7%
 - Literature Review = 76.5%



A Quick Study of Education Research

■ Claims & Evidence

■ Evidence – Looking at the numbers, continued.

- Methods Reported = 85.7%

- Discussion of Assessment = 71.9%

- Survey (34.6%), Grades (22.1%),
Instructor Evaluations (18%), Interviews (5.5%)

Course/

- Triangulation (30.1%)

■ Claims = 87.6%

- Claims with no research question = 65.9%

- Claims with no supporting evidence = 20.7%

Situated Back in Literature = 13.4%



A Quick Study of Education Research

- Dissemination of Findings from this Study
 - Conference paper/presentation
 - Vancouver, 2011
 - D-CME Professional Development Seminar
 - November, 2011
 - USMA Center for Faculty Excellence Seminar
 - November, 2011



Take-Aways

- What we can learn from this presentation and the embedded study?
 - Scholarship standards exist for all fields of research
 - Those standards do not differ greatly
 - You adhere to standards when conducting research in your area of technical expertise...why not adhere to those standards outside of your area of technical expertise?
 - The “average” education conference paper could be vastly improved with small improvements.



Open Discussion

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*I am always willing to discuss your ideas/plans
for education research.*