Educational Scholarship: A step by step guide to implement and publish your classroom research

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For a summary, see:


* http://advan.physiology.org/cgi/reprint/30/2/83 (open access)
Step 1: Develop a Clear Research Question or Hypothesis

- A clear research question or hypothesis should:
  - Describe the setting for the classroom research (e.g., the size of the class, student demographics, etc.)
  - Avoid using ambiguous and vague terms
  - Define realistic and achievable objectives that can be examined using appropriate methods of assessment
Compare a **vague** versus a **more clearly defined** research question:

**Vague question**

- What is the optimum number of homework assignments to give to an intro level A&P class?

**Clearly defined question**

- Will the use of interactive learning activities in Anatomy A215 lecture improve class performance measures, such as mean lecture exam performances and final grades?¹

Suggestions for framing your research question:

- Is there a particularly effective method you’ve used to increase student learning? Can you document this effectiveness?
- Are there things that prevent you from fully achieving your teaching goals?
- What more would you like to know about the effects of your course design and teaching on student learning?
- Are there challenges you have encountered, such as poor classroom attendance, classroom incivility, or general poor class performance that you would like to improve?
Pause and reflect

* Write down one or two research questions you would like to examine in your classroom/learning environment.
Step 2: Review the Educational Research Literature

- Why is this necessary?
  - Become more knowledgeable about the research topic
  - Allows you to place your research within a broader educational research context
    - Compare your results to others
  - Possibly develop contacts and collaborators on larger educational research issues
Review the Table of Contents of educational research journals

Medical/A&P Education Journals

* Anatomical Sciences Education
* Advances in Physiology Education
* CBE-Life Sciences Education
* Clinical Anatomy
* Medical Education
* Medical Teacher

Other SoTL/Educational Research Journals

* Journal on Excellence in College Teaching
* Innovative Higher Education
* Journal on Excellence in College Teaching
* Journal of Research in Science Teaching
Select articles of interest, use their “References cited” sections to find more articles:
Meet with a librarian and ask for guidance with an educational research literature search

* Use electronic databases, such as ERIC or Education Abstracts Full Text
* Keyword help
Don’t forget about Google scholar!

https://scholar.google.com/
Step 3: Determine your methods of Assessment

- Classroom research may utilize multiple forms of assessment
  - Formative and/or Summative forms of assessment
  - Qualitative and/or Quantitative forms of assessment
Compare Formative vs. Summative Assessments

**Formative**
* Performed during a program or unit (not at the end)
* Provide immediate/quick feedback
* Typically designed to improve quality of learning during a unit (vs grading students)
* Exs: classroom assessment techniques, homework exercises, discussion responses, journal entries, pretests

**Summative**
* Performed at the end of a program or unit
* Comprehensive, checks learning at the end of a unit
* Exs: unit exams, final papers, lab write-ups, journals (when completed for a course)
Anatomy A215 Memory Matrix
(a type of formative assessment)

<table>
<thead>
<tr>
<th></th>
<th>Mitosis</th>
<th>Meiosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>What type of cells (somatic cells vs. sex cells) use this type of cell division?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the daughter cells genetically identical to the parent cell?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the daughter cells haploid or diploid?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many chromosomes does each daughter cell have?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does crossing over occur in this type of cell division?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare examples of **quantitative** vs. **qualitative** assessments

### Quantitative

- Exam/homework scores
- Web usage data
- Class demographics (e.g., majors, prior GPA, previous exposure to material)
- Percentage of students participating in an assignment
- Grades (unit exam, homework, final grades)

### Qualitative

- Survey comments
- Teacher evaluation comments
- Writing analysis – did complexity increase?
- Analysis of discussions and student-generated questions
- Analysis of student journal entries
- Interviews of students, TAs, instructors
A good assessment must be both reliable and valid

**Reliability**

- **Reliability** = repeatability
- Ex: a *reliable* multiple choice exam will give consistent, or a similar range of, test scores for two or more different groups of students

**Valid**

- **Validity** = a TRUE or ACCURATE explanation/measurement of an event
- Validity must be evaluated with multiple methods

O'Loughlin, Educ Scholarship
A good assessment must be both **reliable** and **valid**

Utilize as many methods of assessment that will help answer your research questions:

- Formative and/or summative
- Quantitative and/or qualitative

When you perform your research, examine whether the assessments used were reliable and valid, and if they adequately support the hypotheses presented.
Now it is your turn:

* List the methods of assessment of student performance you have used (e.g., exams, homework assignments, PBLs, TBLs, journal entries, informal interviews)

* Are there assessments you have used consistently over the years, that could be used to compare student performance among semesters?

* Can you think of new assessments you could start using to answer your research questions?
Step 4: Obtain Human Subjects (IRB) approval *prior* to conducting your research!

- Per The Federal Policy for the Protection of Human Subjects (45 CFR 46), any study involving human subjects should be reviewed by a **Human Subjects committee** via their **Institutional Review Board (IRB)**
  - IRB typically located in Dean of Faculties office, Office of Research Compliance, Vice Provost office
  - **Educational research** needs IRB review, because your students are **human subjects**!
Not all IRBs are alike:

* Most academic institutions have their own subregulations for their Human Subjects/IRB
* Not all institutions may have their own specific IRB:
  * e.g., multiple community colleges may have a single IRB
  * e.g., some Canadian schools may not have their own IRB, may have to use centralized service (e.g., [www.irbservices.com](http://www.irbservices.com), [www.veritasirb.com](http://www.veritasirb.com))
* Check with your institution for its specific guidelines regarding IRB and Human subjects research
Three types of Human Subjects reviews:

1. **Exempt**
   * (the research is considered ‘exempt’ from a full committee review)

2. **Expedited**
   * (there is only minimal risk to participants)

3. **Full**
   * (typically performed if there is greater than minimal risk or if other criteria are met)

Paperwork must be submitted to IRB for all reviews
Most educational research is exempt or expedited
Not sure which category your study falls under?

- Contact your IRB and discuss
- Discuss with colleagues performing educational research
- Use IU’s Protocol Decision-tree:

http://researchcompliance.iu.edu/hso/hs_pdt.html
Review your educational research question(s). Do you think your study would fall under exempt, expedited, or full review?
Step 5: Perform your classroom research and collect your data

- Note: you may have to modify your assessment methods as semester progresses
- See instructional consultants at your Center for Teaching and Learning if you need help
Pause and Reflect

* Set a specific date/timeline for when you plan to perform your classroom research
Step 6: Analyze your data

- Best done after the class ends and final grades assigned
- Analysis will depend on methods of assessment you’ve chosen
Step 7: Present your educational research

- Contribute to the generalizable body of knowledge about teaching and learning
- Potential to develop collaborators on larger research issues
- Promotion and tenure decisions

HAPS 2015 regional conference in Cincinnati
Where to begin?

- Departmental colloquium series
- Institution-based poster or workshop presentation
- Regional meetings
- National/international meetings
Meetings with a medical or A&P education focus

- Experimental Biology (EB) meetings:
  - American Association of Anatomists (AAA)
  - American Physiological Society (APS)
- Human Anatomy & Physiology Society (HAPS)
- National Association of Biology Teachers (NABT)
- International Association of Medical Science Educators (IAMSE)
Multidisciplinary Scholarship of Teaching and Learning (SOTL) meeting venues

http://www.issotl.com

http://lillyconferences.com/

http://www.stlhe.ca/

https://saber-biologyeducationresearch.wikispaces.com/
Pause and Reflect

- Set a specific date/timeline for when you plan to **present** your classroom research
Step 8: Publish your Educational Research

*Mislabeled as ‘step 9’ in the “how to SOTL” article*
Prepare the educational research manuscript

- In manuscript, discuss how your study contributes to the general body of knowledge
- Your manuscript should have:
  - Sound methodology
  - Use valid and reliable measures of assessment
Review author guidelines and TOCs to determine if your manuscript is appropriate for the journal.
Journals that publish A&P educational research include:

- Advances in Physiology Education
- Anatomical Sciences Education
- HAPS-EDucator
- Journal on Excellence in College Teaching
- Journal of Nursing Education
- Medical Education
- Medical Science Educator
Pause and Reflect

Map out a timeline for when you will develop, implement, present and publish your future educational research project.
Thank you!

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