

Research Project

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1. It's like a science fair project, but much more extensive.
2. Goal is to establish or refute a fact, in this case something like "Does doing this in the class affect student comprehension." However, it can also be purely exploratory, such as "This is what I have observed that students assume when we start this subject."

LITERATURE REVIEW

1. You are not allowed to reinvent the wheel. You will need to read the existing literature to know what has already been studied. While you read the literature, two things should be in your mind: "What did they learn?" and "What did they not learn?". Sometimes, as an external reader, you can see that what they thought they learned they, in fact, did not.
2. When my students write a research paper, their introduction describes (1) one paragraph explaining why the problem is interesting (2) several paragraphs reviewing the other work that has been done (3) explaining what you are going to do and how that has not yet been answered and (4) provide a brief outline of the rest of the paper. Notice how (1) and (2) come from reading the literature.
3. Some people think they are so smart that no one has ever thought of studying their particular idea before. Wrong.
4. While reading the literature, carefully note how they went about doing their work. If you are thinking of doing a project some way that is different from theirs, perhaps they learned that your method is flawed. That is good information to have. Or, perhaps you have invented a much better way to do it. Either is possible.
5. The literature search will give you ideas on how to set up your procedure. Since you will likely be doing statistical testing, you need to know the pitfalls of trying to do statistical testing. Suppose you want to test "Doing activity A affects result B." Your data can indicate "Yes it does affect it," "No, it definitely does not affect it," "Possibly it does", or "Possibly it doesn't." Your data may well end up saying "I don't know".
6. If you see a study that is interesting, but uses a different group of students than you have, it is perfectly acceptable to redo their study with your students. I would write to the authors of the study and tell them what you are doing, and ask to use their assessment tools. Most people will be flattered. They may ask you to share your results when you are done, since they may be trying to conduct a larger study.
7. Your literature review will be an important part of your thesis. It demonstrates that you have read enough of the literature to know what has been done, and that you are able to make a new contribution to the field.

PROCEDURE

The procedure you use is very important. It shows what you did, and also what you did not do. This can indicate future studies. It is also the way that we keep science honest and open. When you document your procedure, you must give enough detail that someone else could reproduce your study. Please, don't give more detail than that. You may assume that the person trying to reproduce your work is actually skilled in it.

This is one place where a lab notebook becomes extremely important in recording what you did and what you were thinking. This is the original 'blog', but intended to be an accurate record of what you did and what you found.

RESULTS

These are often mixed up with the procedure. This part is usually filled with graphs and tables, along with discussion of the graphs and tables. Here you present all your accumulated information. It is very important in this section to discuss errors in your work. Errors come in random form and systematic form. Both are often present. Graphs usually reflect errors with the use of error bars.

CONCLUSIONS

This is often a summary of what you learned, just in case they did not figure it out from the results section. In a research article the conclusion is often one paragraph.

REFERENCES

You want to cite every important fact that you mentioned in the article with a reference to where that fact is first presented. I would build a bibliography as I go, often with a stack of papers in a manila folder. Most of your references will show up in the literature review and in the procedure section. If you are contrasting with other people's data or results, then references to that work will show up in the results section. Rarely do you see a reference in the conclusion.