Scientific standards - How to meet scientific standards in a study and/or publication -

Common problems of beginners and experienced researchers while setting up a study or publishing a paper

List far from being complete:

- No clear research question or problem stated
- No coverage of state-of-the-art, outdated literature, no reference to international debate
- No theoretical frame or theoretical frame only roughly described

Recommendation: Develop clear research question, make an extensive research of literature

Common problems of beginners and experienced researchers while setting up a study or publishing a paper

- Methodological part insufficient (very common): no description of evaluation of data, of potential to generalise
- No connection between ambitious theoretical frame and results of study
- No intensive interpretation of results

Main scientific standard

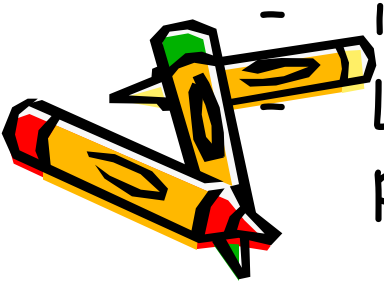
In general: Research Study and referring paper needs to be based on scientific research (not anecdotal evidence) and that needs to be recognisable.

Publication only: Discussion or commentary paper can be less research-based, can be controversial, reflections only on normative basis ....

Scientific standards

Clear structure of study/paper necessary

- Concise title and convincing abstract
- Introduction (paper only)
- research question,
- state-of-the-art on research question,
- theoretical framework or theoretical conceptualisations or constructs,
- methodology,
- results,
- interpretation,
- Limitations of the study, conclusions, prospects



Scientific standards

- Clarify the research question to be dealt with;
- Concerning state-of-the-art: literature quite often outdated, too narrow, only focused on own country or culture

Methodology

- Methodological parts often not satisfying, needs to be worked out:
  - Reference to research paradigm necessary, i.e. qualitatively or quantitatively oriented or design research, mixed method paradigm or other theoretical references
  - Explanations of chosen methodology and/or methodical approach necessary, reflection of adequacy of methods
  - Description of chosen sample and sampling procedure

Methodology

- Description of data evaluation process in detail; mostly **heart** of methodological chapter;
- Short reference to big theory such as Grounded Theory not sufficient; in contrast: description of coding structure, development of codes and so on necessary, coding manual in appendix and worked out example.
- The evaluation process needs to be transparent enough, so that critical reader can follow it.

Methodology

- Careful translation of verbatim transcripts in interpretative design.
- In quantitative design: give necessary quality indicators.
- Description of potential to generalise or transfer necessary.
- PhD-studies mostly small-scale case studies with only little potential to generalise. However this aspect is highly important and needs to be treated.
- Sometimes aim of the qualitative study is the description of the variability, describe that, if applicable.

Scientific standards

- Clear description of results necessary: display of results, interpretations referring to original theoretical framework and state-of-the-art of the scientific discussion.
- Connection of results and their interpretation to theoretical framework indispensable; common mistake: ambitious framework, small results

Publication process
- How to publish a paper -

Review process

- Each high-standard journal has established a peer review process
- Recommendation: Do not aim for a high-standard journal at the beginning
- Review criteria:

Concerning the scientific quality of the paper

- Is the paper a meaningful contribution to mathematics education research?
- Is the approach or the argumentation original and does the paper develop new insights into relevant research questions on mathematics education?
- Does the paper review previous studies and does it consider the relevant literature in the field?

Concerning the scientific quality of the paper

- Is the theoretical frame adequate, is there an appropriate alignment between the theoretical framework and the questions asked or the problems tackled?
- Is the methodological approach adequate, i.e. do the research methods and analyses match the problem or question?
- Are the argumentations consistent, are the claims and conclusions justified in an acceptable way, do they follow logically from the data or other information presented?

Concerning the quality of the presentation

- Is the title suitable and is the abstract distinct and adequate?
- Is the writing lucid, clear, and well-organised?
- Is the quality of the figures and tables adequate?

Decision process

Recommendations of reviewers:

- Accept without changes
- Accept with minor changes
- Accept with significant changes
- Rewrite the paper
- Reject the paper

Decision process

- Decision letter to author
- Decision made by EiC, based on reviews
- Decision letter includes: Decision, summary of necessary changes, reviews
- Reviews often contradictory, recommendation: refer to explanations of EiC.
- Take reviewer's comments seriously, as a help and measure for improvement, not as „punishment"

Decision process

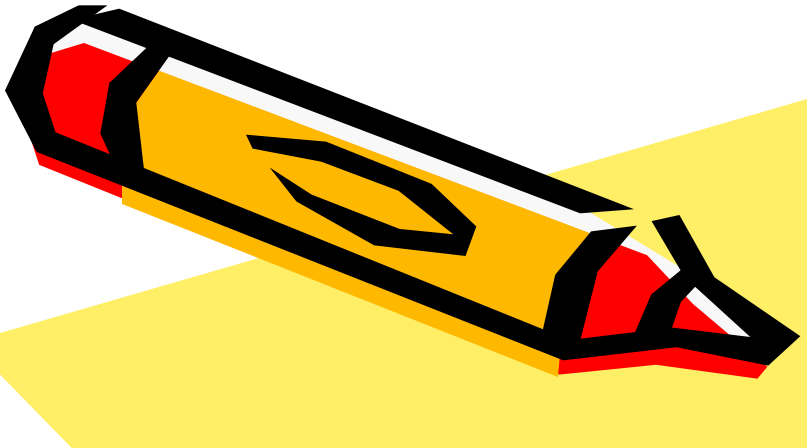
- As true researcher develop a constructive attitude towards reviews, ask your supervisor for support and ask him/her for help to read the reviews and understand them.
- Not all aspects can be done in a revision or must be done.
- But small changes only on the surface will be recognised.

Further development

- Second revision quite usual, especially when major revisions are needed.
- Write a letter, in which you explain, what you have changed in your revised paper, enter it together with revised version of paper.
- If clear changes are recognisable, the review process will likely be positive, surface changes might lead to final rejection.

Main recommendation

- Ask your supervisor for support, publish jointly, if adequate.



Thank you very much
for your attention