Wie schreibe ich eine Einleitung?

Lukas Baumanns

Disclaimer

Wichtige Vorarbeiten:

GDM Nachwuchsvertretung

Maike Schindler

Arthur Bakker

Gabriele Kaiser

Aufwärmen und Kennenlernen

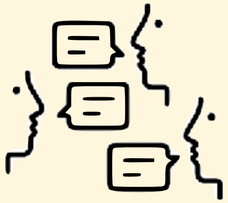
Aktivität

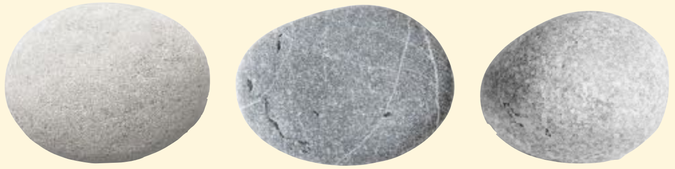
Denkmoment

Wo steht ihr gerade?

- Schreibt ihr an einem Journalartikel für eure kumulative Dissertation?
- Macht ihr aus eurer monografischen Dissertation einen Journalartikel?
- Habt ihr einen Konferenzbeitrag geschrieben (PME), aus dem ein größerer Artikel werden könnte?
- Habt ihr mit Journalartikeln noch überhaupt nichts am Hut, wollt euch aber informieren?
- ...

Tauscht euch mit den Personen neben euch aus, die ihr am wenigsten gut kennt.





Hintergrund des Workshops

Ablehnungen der Journale

Journal of Mathematical Behavior <em@editoria... 29. November 2020, 21:01
Decision on submission to Journal of Mathematical Behavior
An: Lukas Baumanns <lbauman8@uni-koeln.de>,
Antwort an:
Journal of Mathematical Behavior <mathematical.behavior@elsevier.com>

Manuscript Number: MATBEH-D-20-00215

The process of problem posing: Development of a descriptive phas

Dear Mr. Baumanns,

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evaluation, I regret to inform you that your manuscript does not fit
and I must therefore reject it. We are interested in research that s
mathematical ideas are learned.

I hope you are successful in finding an alternative publication for yo
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for giving us the opportunity to consider your work

Kind Regards,

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Editor in Chief
Journal of Mathematical Behavior

Lyn D. English <em@editorialmanager.com>
(Mathematical Thinking and Learning) A decision has been m
An: Lukas Baumanns <lukas.baumanns@uni-koeln.de>,
Antwort an: Lyn D. English <l.english@qut.edu.au>

Ref.: Ms. No. MTL-D-19-00041
Review of problem-posing situations: The attempt of a clarification of term
Mathematical Thinking and Learning

Dear Lukas and Benjamin

Thank you for submitting Review of problem-posing situations: The attem
terms to Mathematical Thinking and Learning. I have received three revie
your paper myself. Although your topic is important and very interesting,
weaknesses to consider your paper for publication. My concerns resonat
comments of the reviewers, in particular, it is difficult seeing how the artic
literature. The reviewers provide detailed feedback so I will not elaborate
These include the procedures for the selection of sources, problems with
for your analysis, and other issues associated with your analysis. Other p
significance of your paper and what it adds to the field that we don't already know, and evidence to
support your claims. Reviewer 2 provides many suggestions for addressing these concerns.

I know you have done a lot of research in preparing this paper, and I hope the feedback will help
you in your future work on this topic.

Again, thank you for your interest in MTL.

Yours sincerely

Lyn D. English,
Editor
Mathematical Thinking and Learning

Garlen Rafael (IJMA) <em@editorialmanager.com> 17. Februar 2021, 04:08
IJMA-D-21-00088: Your manuscript submitted to International Journal... Details
An: Lukas Baumanns <lukas.baumanns@uni-koeln.de>,
Antwort an:
Garlen Rafael (IJMA) <garlen.rafael@springernature.com>

Submission ID: IJMA-D-21-00088

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authors for correction before being considered and submitte

1. Please re-adjust the line-space to fit the requirements of I
"Manuscripts should not exceed 30 pages. The 30 pages inc
be double-spaced), references (could be single-spaced), tab
spacec), and appendices (cculd be single spaced)."

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information as ESM (Please refer to IFA section 3.) The man
processing until it is under the page limitation.

Research in Mathematics Education <onbehalfof@ma... 18. Juli 2019, 10:40
Research in Mathematics Education - Decision on Manuscript ID RRME-...
An: Lukas Baumanns <lukas.baumanns@uni-koeln.de>, & 2 weitere Details
Antwort an: rme@bsrlm.org.uk

18-Jul-2019

Dear Mr Baumanns,

Thank you for submitting your manuscript to Research in Mathematics Education.

I regret to say that it has not been accepted for publication.

I have attached the Editors' decision letter, together with two reviews of your paper and a summary overview from one of the Editors.

With best wishes,

Elizabeth Lake
Editorial Assistant, Research in Mathematics Education
rme@bsrlm.org.uk
[on behalf of the Editors, Laura Black, Alf Coles and Keith Jones]

Hintergrund des Workshops

Warum ich den Workshop trotzdem gebe

- Journalartikel und peer-reviewed Konferenzbeiträge gewinnen an Relevanz
- Bekannte Fallstricke gibt es insbesondere in der Einleitung, die man ohne Frustration vermeiden kann und die bei Nichtbeachtung häufig zur Ablehnung führen
- Durch Ablehnungen frühe Erfahrungen als Reviewer
  - *Educational Studies in Mathematics, ZDM – Mathematics Education, International Journal of Science and Mathematics Education, Journal of Mathematical Behavior, Mathematical Thinking and Learning, Journal of Mathematics Teacher Education, Mathematics Education Research Journal, Research in Mathematics Education, mathematica didactica, Investigations in Mathematics Learning, PME, CERME, ICME, Frontiers in Psychology, Frontiers in Education, Education Sciences, CEPS Journal*
  - Seit 05/2022 Associate Editor bei *School Science and Mathematics*

Arten wissenschaftlicher Beiträge

Input

Educational Studies in Mathematics (2022) 110:251–269
https://doi.org/10.1007/s10649-021-10136-y

The process of problem posing: development of a descriptive phase model of problem posing

Lukas Baumanns[1] · Benjamin Rott[1]

Accepted: 29 November 2021 / Published online: 27 December 2021
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Abstract
The aim of this study is to develop a descriptive phase model for problem-posing activities based on structured situations. For this purpose, 36 task-based interviews with pre-service primary and secondary mathematics teachers working in pairs who were given two structured problem-posing situations were conducted. Through an inductive-deductive category development, five types of activities (situation analysis, variation, generation, problem-solving, evaluation) were identified. These activities were coded in so-called episodes, allowing time-covering analyses of the observed processes, describing transitions between these episodes. Moreover, transition probabilities between episodes were derived. In addition, [illegible] Implications for [illegible] research are discussed.

Keywords Problem posing · Phase model · Cognitive processes · Problem solving

1 Introduction

In re mathematica ars proponendi quaestionem pluris facienda est quam solvendi. (Cantor, 1867, p. 26)
Transl.: In mathematics, the art of posing a question is of greater value than solving it.

In his statement, Cantor emphasizes the importance of the ability to pose substantial questions within mathematics. In fact, problem posing is considered a central activity of mathematics (Hadamard, 1945; Halmos, 1980), and at the latest since the 1980s (Brown & Walter, 1983; Butts, 1980; Kilpatrick, 1987), it is being investigated with growing interest by mathematics education researchers. Since the 1990s, it has been widely used to identify or assess mathematical creativity and abilities (Silver, 1994, 1997; Singer & Voica, 2015; Van Harpen & Sriraman, 2013; Yuan & Sriraman, 2011). Silver (1997, p. 76) emphasizes that to grasp such constructs, both products and processes of problem-posing activities can be considered. However, a strong product orientation within research on problem posing is noticeable (Bonotto, 2013; Singer et al., 2017; Van Harpen & Sriraman, 2013); that is,

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Journalartikel

Four Mathematical Miniatures on Problem Posing

Lukas Baumanns

1 Introduction

Posing questions has always been a central [illegible] for scientific progress but also the individual learning process. Already Einstein and Infeld (1938) state:

> "Galileo formulated the problem of determining the velocity of light, but did not solve it. The formulation of a problem is often more essential than its solution, which may be merely a matter of mathematical or experimental skill. To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science." (p. 95)

Also in mathematics, posing problems in itself represents a central value. Cantor (1867) already stated as the third thesis of his dissertation: "In re mathematica ars proponendi quaestionem pluris facienda est quam solvendi." (p. 26). This translates as: In mathematics, the art of posing a question is of greater value than solving it. We find similar statements from Lang (1989, p. 70), Poincaré (1973, p. 246), or Hilbert (1900, p. 262) who emphasize the importance of posing problems in the field of mathematics. For example, Erdős is considered to be one of the most prolific

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D. Sarikaya et al. (eds.), *Problem Posing and Solving for Mathematically Gifted and Interested Students*, https://doi.org/10.1007/978-3-658-41061-2_1

Buchkapitel

ADAPTIVE STRATEGY USE IN PATTERN-RECOGNITION OF FIRST GRADERS WITH AND WITHOUT RISK OF DEVELOPING MATHEMATICAL DIFFICULTIES: AN EYE-TRACKING STUDY

Lukas Baumanns[1], Demetra Pitta-Pantazi[2], Constantinos Christou[2], Achim J. Lilienthal[3], Anna Lisa Simon[1], Maike Schindler[1]
[1]University of Cologne, [2]University of Cyprus, [3]TU Munich and Örebro University

For early mathematics learning, adaptive strategy use by students at different levels of mathematical achievement is of central importance. For several mathematical tasks, there is evidence that high-achieving students are more able to use strategies adaptively, but not yet for pattern-recognition tasks. This paper presents results from an empirical study investigating whether students with and without risk of developing mathematical difficulties use pattern-recognition strategies adaptively for patterns with different units of repeat. Pattern-recognition strategies of 74 first-grade students were analyzed using eye-tracking. The results reveal that predominantly the first graders without risk of developing mathematical difficulties show an adaptive use of pattern-recognition strategies.

INTRODUCTION

The ability to use strategy adaptively, that is, consciously or unconsciously selecting the most appropriate strategy on a given task (Verschaffel et al. 2007), enables learners to solve mathematical tasks efficiently and correctly and is a key component of mathematical achievement (Heinze et al., 2009). Research on primary school students indicated that higher achieving students, in contrast to weaker students, are able to adapt their strategies, for example, for number line estimation (Van't Noordende et al., 2016) or arithmetic sums such as 8 + 7 (Torbeyns et al., 2005).

Another mathematical area that has become a focus of early mathematics learning research in the past decade is awareness of structures and patterns (Mulligan et al., 2020). This includes, for example, the ability to expand repeating patterns such as ● ● ● ● ● ● ● ●. While there is research on strategies first graders use in extending such repeating-pattern tasks (Baumanns et al., 2022; Lüken & Sauzet, 2021; Papic et al., 2011), there is lack of research on whether first graders show adaptive strategy use and whether students with and without risk of developing mathematical difficulties differ in adaptive strategy use in solving repeating-pattern tasks.

The aim of this study is to investigate whether first graders show adaptive strategy use and whether students with and without risk of developing mathematical difficulties differ in adaptive strategy use. To analyze the pattern-recognition strategies, we use eye-tracking which has been shown to be useful for investigating pattern-recognition strategies of children at early primary level (Baumanns et al., 2022).

2023. In M. Ayalon, B. Koichu, R. Leikin, L. Rubel & M. Tabach (Eds.). *Proceedings of the 46th Conference of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 75-82). PME 46.

Konferenzbeitrag

Arten von Journalartikeln

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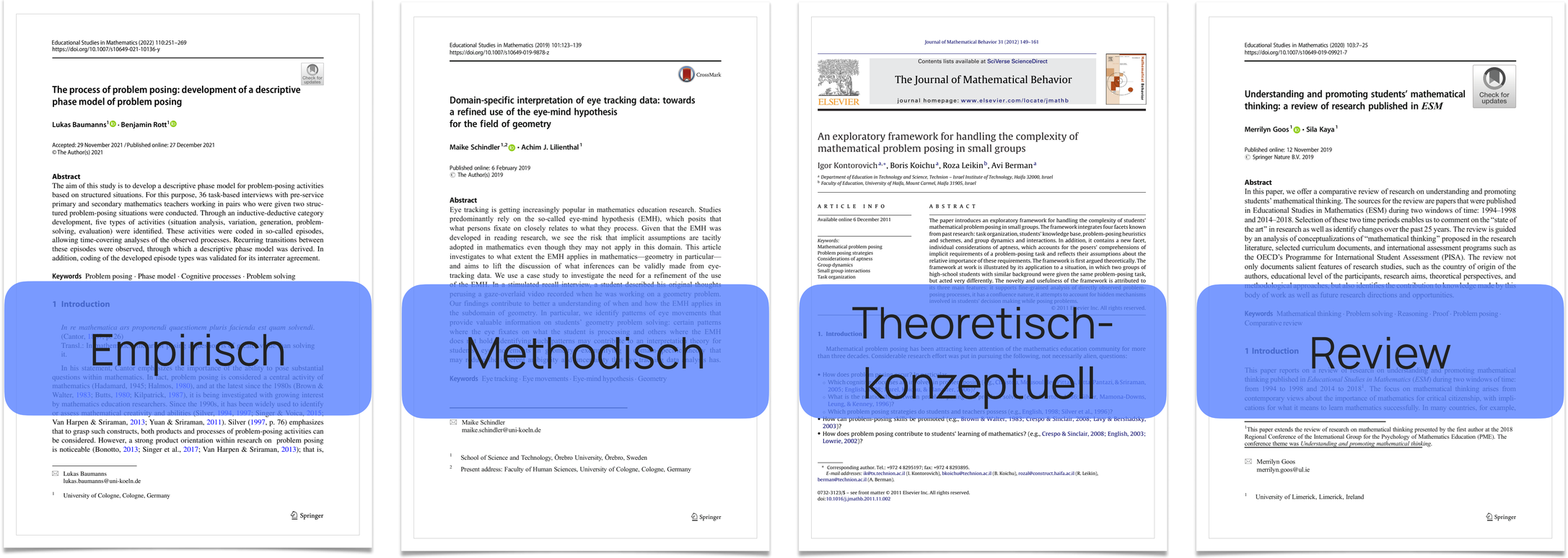

Educational Studies in Mathematics (2022) 110:251–269
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The process of problem posing: development of a descriptive phase model of problem posing

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Keywords Problem posing · Phase model · Cognitive processes · Problem solving

1 Introduction

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Educational Studies in Mathematics (2019) 101:123–139
https://doi.org/10.1007/s10649-019-9878-z

Domain-specific interpretation of eye tracking data: towards a refined use of the eye-mind hypothesis for the field of geometry

Maike Schindler[1,2] · Achim J. Lilienthal[1]

Published online: 6 February 2019
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Abstract
Eye tracking is getting increasingly popular in mathematics education research. Studies predominantly rely on the so-called eye-mind hypothesis (EMH), which posits that what persons fixate on closely relates to what they process. Given that the EMH was developed in reading research, we see the risk that implicit assumptions are tacitly adopted in mathematics even though they may not apply in this domain. This article investigates to what extent the EMH applies in mathematics—geometry in particular—and aims to lift the discussion of what inferences can be validly made from eye-tracking data. We use a case study to investigate the need for a refinement of the use of the EMH. In a stimulated recall interview, a student described his original thoughts perusing a gaze-overlaid video recorded when he was working on a geometry problem. Our findings contribute to better a understanding of when and how the EMH applies in the subdomain of geometry. In particular, we identify patterns of eye movements that provide valuable information on students' geometry problem solving: certain patterns where the eye fixates on what the student is processing and others where the EMH does [illegible] hold. Identifying such patterns may contribute to an interpretation theory for studen[illegible] that may r[illegible] has.

Keywords Eye tracking · Eye movements · Eye-mind hypothesis · Geometry

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Journal of Mathematical Behavior 31 (2012) 149–161

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The Journal of Mathematical Behavior
journal homepage: www.elsevier.com/locate/jmathb

An exploratory framework for handling the complexity of mathematical problem posing in small groups

Igor Kontorovich[a,*], Boris Koichu[a], Roza Leikin[b], Avi Berman[a]
[a] Department of Education in Technology and Science, Technion – Israel Institute of Technology, Haifa 32000, Israel
[b] Faculty of Education, University of Haifa, Mount Carmel, Haifa 31905, Israel

ARTICLE INFO
Available online 6 December 2011
Keywords:
Mathematical problem posing
Problem posing strategies
Considerations of aptness
Group dynamics
Small group interactions
Task organization

ABSTRACT
The paper introduces an exploratory framework for handling the complexity of students' mathematical problem posing in small groups. The framework integrates four facets known from past research: task organization, students' knowledge base, problem-posing heuristics and schemes, and group dynamics and interactions. In addition, it contains a new facet, individual considerations of aptness, which accounts for the posers' comprehensions of implicit requirements of a problem-posing task and reflects their assumptions about the relative importance of these requirements. The framework is first argued theoretically. The framework at work is illustrated by its application to a situation, in which two groups of high-school students with similar background were given the same problem-posing task, but acted very differently. The novelty and usefulness of the framework is attributed to its three main features: it supports fine-grained analysis of directly observed problem-posing processes; it has a confluence nature; it attempts to account for hidden mechanisms involved in students' decision making while posing problems.
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1. Introduction

Mathematical problem posing has been attracting keen attention of the mathematics education community for more than three decades. Considerable research effort was put in pursuing the following, not necessarily alien, questions:

- How does prob[illegible] (e.g., [illegible] Pantazi, & Sriraman, 2005; English, [illegible])
  - What is the [illegible] Mamona-Downs, Leung, & Kenney, 1996)?
  - Which problem posing strategies do students and teachers possess (e.g., English, 1998; Silver et al., 1996)?
- How can problem-posing skills be promoted (e.g., Brown & Walter, 1983; Crespo & Sinclair, 2008; Lavy & Bershadsky, 2003)?
- How does problem posing contribute to students' learning of mathematics? (e.g., Crespo & Sinclair, 2008; English, 2003; Lowrie, 2002)?

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E-mail addresses: ik@tx.technion.ac.il (I. Kontorovich), bkoichu@technion.ac.il (B. Koichu), rozal@construct.haifa.ac.il (R. Leikin), berman@technion.ac.il (A. Berman).

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https://doi.org/10.1007/s10649-019-09921-7

Understanding and promoting students' mathematical thinking: a review of research published in *ESM*

Merrilyn Goos[1] · Sila Kaya[1]

Published online: 12 November 2019
© Springer Nature B.V. 2019

Abstract
In this paper, we offer a comparative review of research on understanding and promoting students' mathematical thinking. The sources for the review are papers that were published in Educational Studies in Mathematics (ESM) during two windows of time: 1994–1998 and 2014–2018. Selection of these two time periods enables us to comment on the "state of the art" in research as well as identify changes over the past 25 years. The review is guided by an analysis of conceptualizations of "mathematical thinking" proposed in the research literature, selected curriculum documents, and international assessment programs such as the OECD's Programme for International Student Assessment (PISA). The review not only documents salient features of research studies, such as the country of origin of the authors, educational level of the participants, research aims, theoretical perspectives, and methodological approaches, but also identifies the contribution to knowledge made by this body of work as well as future research directions and opportunities.

Keywords Mathematical thinking · Problem solving · Reasoning · Proof · Problem posing · Comparative review

1 Introduction

This paper reports on a review of research on understanding and promoting mathematical thinking published in *Educational Studies in Mathematics* (*ESM*) during two windows of time: from 1994 to 1998 and 2014 to 2018[1]. The focus on mathematical thinking arises from contemporary views about the importance of mathematics for critical citizenship, with implications for what it means to learn mathematics successfully. In many countries, for example,

[1] This paper extends the review of research on mathematical thinking presented by the first author at the 2018 Regional Conference of the International Group for the Psychology of Mathematics Education (PME). The conference theme was *Understanding and promoting mathematical thinking*.

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Empirisch

Methodisch

Theoretisch-konzeptuell

Review

Arten von Journalartikeln

Empirisch | Methodisch | Theoretisch-konzeptuell | Review

Aktivität

1. This paper aims to compare the opportunities that eye tracking and thinking aloud hold for analyzing student strategies in number line estimation tasks. (Simon & Schindler, 2020)
2. How was problem posing researched in the articles on mathematical problem posing of these journals? (Lee, 2021)
3. What cognitive characteristics of the problem-solving approach might help teachers to better design learning tasks for students in mathematics school contexts? (Singer & Voica, 2013)
4. The goal of the paper is to present a theoretical framework that suggests a way to handle the complexity of mathematical problem posing? (Kontorovich et al., 2012)

Aktivität

Die nebenstehenden Auszüge sind aus den Einleitungen von Journalartikeln

Welche Art von Journalartikel würdet ihr den Auszug jeweils zuordnen?

Arten von Journalartikeln

Empirisch | Methodisch | Theoretisch-konzeptuell | Review

1. This paper aims to compare the opportunities that eye tracking and thinking aloud hold for analyzing student strategies in number line estimation tasks. (Simon & Schindler, 2020)
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Aktivität

Die nebenstehenden Auszüge sind aus den Einleitungen von Journalartikeln

Welche Art von Journalartikel würdet ihr den Auszug jeweils zuordnen?

Austausch

Fragen?

Aufbau eines Journalartikels

Aufbau eines Journalartikels

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IMRAD

10 languages

Article Talk | Read Edit View history Tools

From Wikipedia, the free encyclopedia

In scientific writing, **IMRAD** or **IMRaD** (/ˈɪmræd/) (**Introduction, Methods, Results, and Discussion**)[1] is a common organizational structure (a document format). IMRaD is the most prominent norm for the structure of a scientific journal article of the original research type.[2]

Contents hide

(Top)
Overview
As the standard format of academic journals
Benefits
Caveats
Abstract considerations
Heading style variations
Other elements that are typical although not part of the acronym
Additional standardization (reporting guidelines)
See also
References

Overview [edit]

Original research articles are typically structured in this basic order[3][4][5]

- Introduction – Why was the study undertaken? What was the research question, the tested hypothesis or the purpose of the research?
- Methods – When, where, and how was the study done? What materials were used or who was included in the study groups (patients, etc.)?
- Results – What answer was found to the research question; what did the study find? Was the tested hypothesis true?
- Discussion – What might the answer imply and why does it matter? How does it fit in with what other researchers have found? What are the perspectives for future research?

The plot and the flow of the story of the IMRaD style of writing are explained by a 'wine glass model'[4] or hourglass model.[3]

Writing, compliant with IMRaD format (IMRaD writing) typically first presents "(a) the subject that positions the study from the wide perspective", "(b) outline of the study", develops through "(c) study method", and "(d) the results", and concludes with "(e) outline and conclusion of the fruit of each topics", and "(f) the meaning of the study from the wide and general point of view".[4] Here, (a) and (b) are mentioned in the section of the "Introduction", (c) and (d) are mentioned in the section of the "Method" and "Result" respectively, and (e) and (f) are mentioned in the section of the "Discussion" or "Conclusion".

In this sense, to explain how to line up the information in IMRaD writing, the 'wine glass model' (see the pattern diagram shown in Fig.1) will be helpful (see pp 2–3 of the Hilary Glasman-deal [4]). As mentioned in

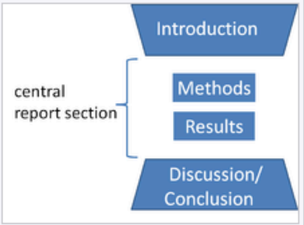
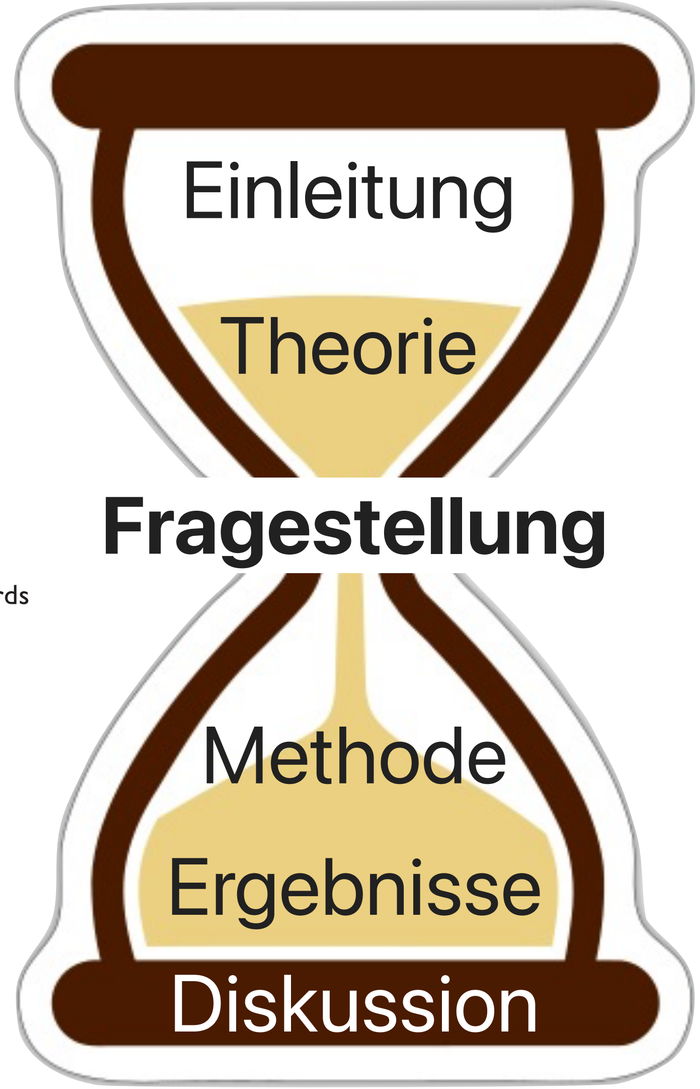


Fig.1: Wineglass model for IMRaD structure. The above scheme shows how to line up the information in IMRaD writing. It has two characteristics: the first is its top-bottom symmetric shape; the second is its change of width, meaning the top is wide, and it narrows towards the middle, and then widens again as it goes down toward the bottom. The first characteristic, the top-bottom symmetric shape, represents the symmetry of the story development. The second one, the change of width, represents the change in generality of the viewpoint.

Aufbau eines Journalartikels

Input

APA Style JARS
Journal Article Reporting Standards



Alles, was im oberen Teil der Sanduhr ist, muss „durch die Engstelle passen“.

Alles, was im unteren Teil der Sanduhr ist, muss „die Engstelle durchlaufen haben“.

Aufbau eines Journalartikels

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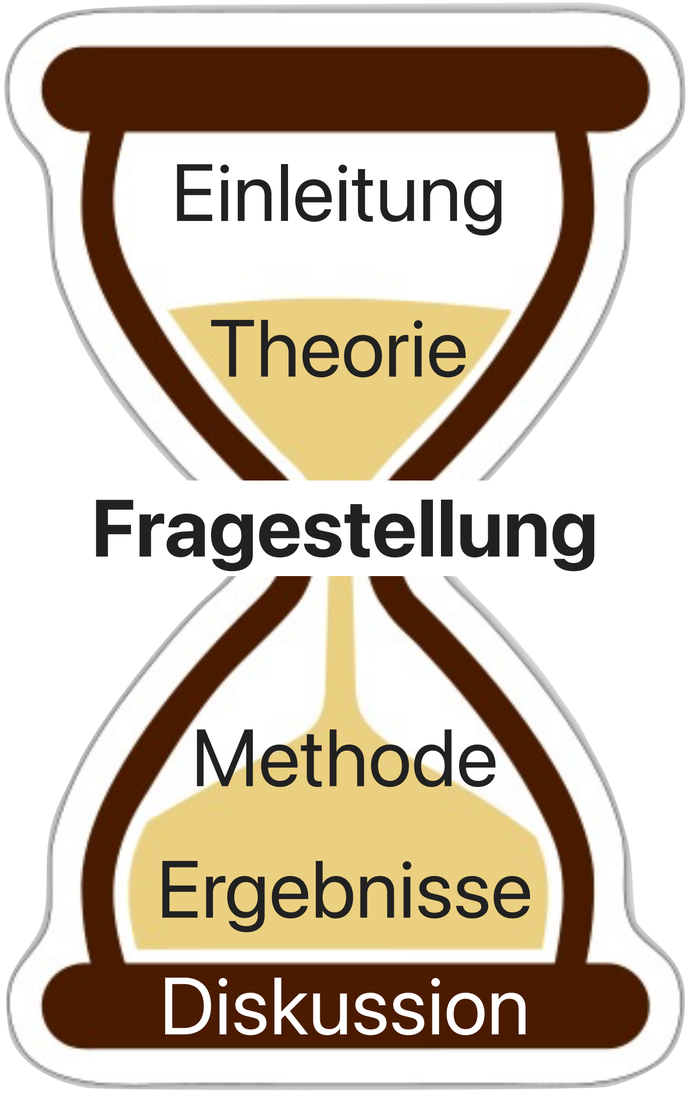
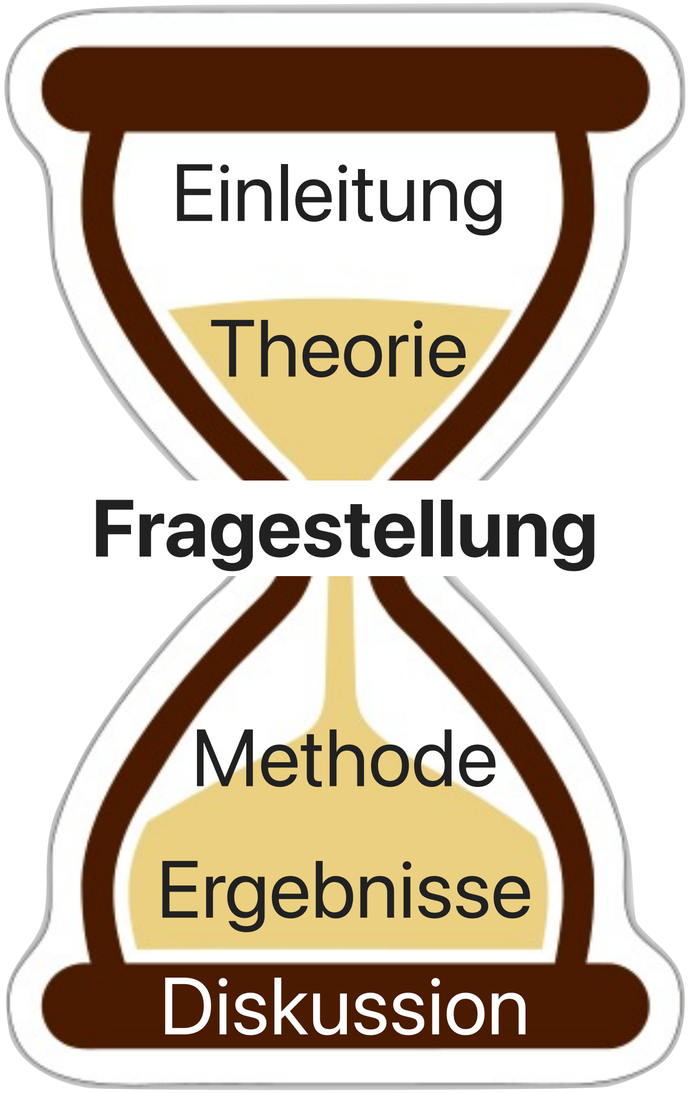


Einleitung

- Einführung in und Relevanz des Themas (allgemeine Relevanz, Bedeutung, wachsendes Interesse)
- Eingrenzung auf einen spezifischen Aspekt oder ein Problem (Herausforderung, Ziele in der Bildung, ungenutztes Potenzial)
- Identifizierung der Wissenslücke (was ist noch unbekannt; überzeugen, dass es notwendig ist, Forschung auf diesem Gebiet zu betreiben)
- Forschungsziel und was die Leser*innen erwarten können

Aufbau eines Journalartikels

Input

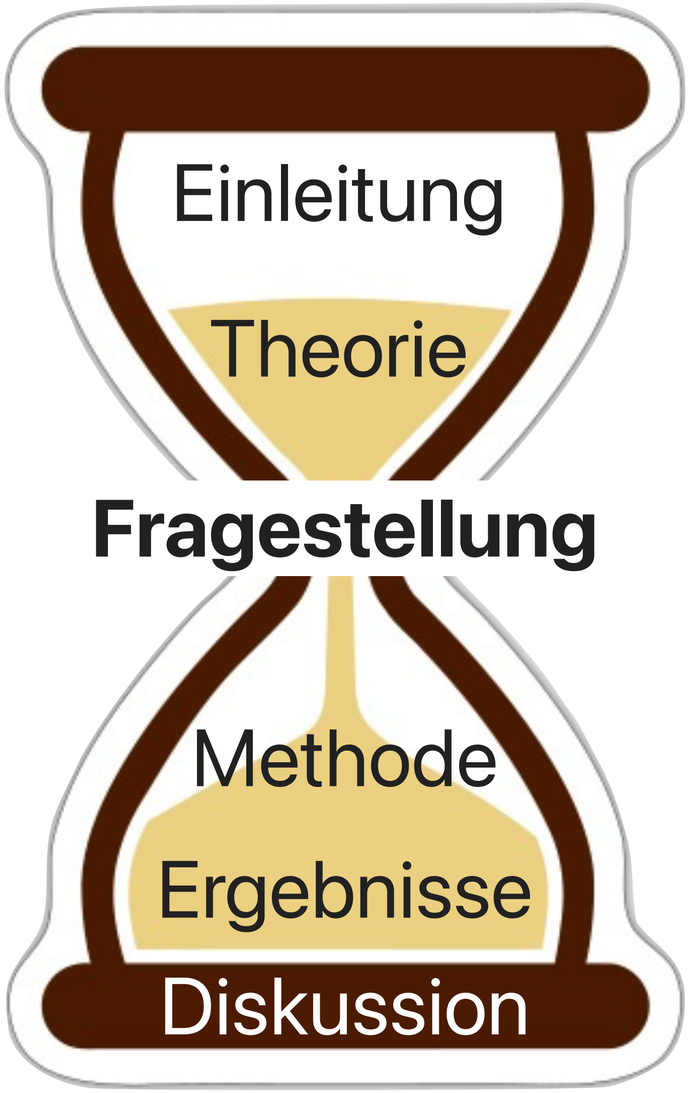


Theorie

- Klärung der theoretischen Konstrukte, die zu verstehen notwendig sind
- Darstellung des Theorierahmens (z. B. Kompetenztheorien, Experten-Novizen-Paradigma)
  - Kaiser: Klassischer Fehler: Verwendung verschiedener theoretischer Perspektiven, die nicht mehr ausreichend dargestellt werden können, ggf. miteinander unverträglich sind (Beispiel: kompetenztheoretischer Ansatz versus strukturtheoretischer Ansatz auf globaler Ebene, Theorierahmen von COACTIV versus Theorierahmen von TEDS-M-Forschungsprogramm auf lokaler Ebene)
  - Notwendigkeit der eigenen Positionierung im Feld
- Zusammenfassung des Forschungsstands zu genau dieser Thematik
- Unterschiede zwischen deiner und früheren Studien
- Angabe spezifischer Hypothesen, Ziele und Forschungsfragen, die sich direkt aus dem Forschungsstand ergeben

Aufbau eines Journalartikels

Input

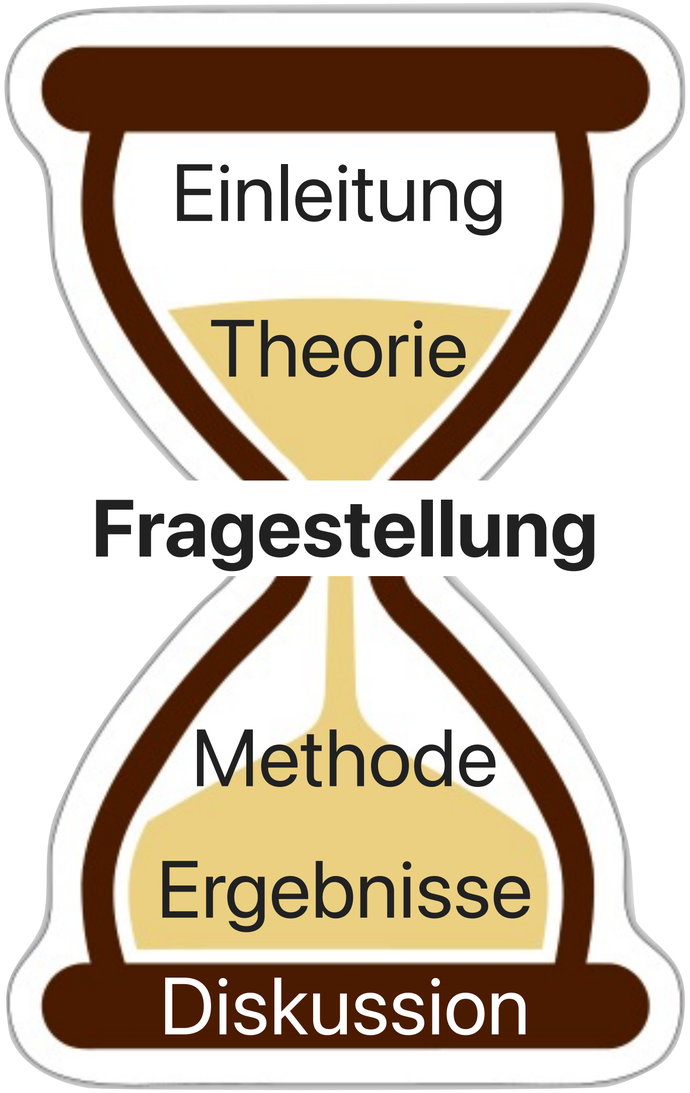


Methode

- Oft unzureichend dargestellt!
- Forschungsparadigma: qualitativ, quantitativ, mixed methods, machine learning
- Datenerhebung
  - Teilnehmende und deren Demographie (Ein- und Ausschluskriterien)
  - Design: Instrumente, Ablauf der Studie (genaue Beschreibung)
- Datenauswertung
  - Methodisches Vorgehen
    - Qualitativ: deskriptiv, interpretativ, inhaltsanalystisch, Grounded Theory ...; Kodiermanual, Auswertungsbeispiel
    - Quantitativ: Statistisches Vorgehen (ANOVA, Logistische Regression,...), Voraussetzungen, Qualitätsindikatoren, “Measures” und Kovariaten, Statistische Power
  - Detaillierte Beschreibung der Auswertung der Daten nötig als Herz des methodologischen Kapitels; kurzer Verweis auf zugrunde liegende Theorie wie Grounded Theory nicht ausreichend
- Reflexion der Angemessenheit der Methoden
- Kurz: Der Analyseprozess muss transparent genug sein, dass kritische Leser:innen folgen können

Aufbau eines Journalartikels

Input



Ergebnisse

- Strukturiert nach den Forschungsfragen
- Zwischenzusammenfassungen möglich
- Geeignet visualisiert
- Qualitativ
  - Darstellung des Analyseprozesses
  - Passung zum Studiendesign
- Quantitativ
  - Informationen zu den statistischen und datenanalystischen Methoden
  - Deskriptive Statistik (Mittelwerte, Standardabweichungen, ...)
  - Inferenzstatistik (*p*-Werte, Effektstärken, Konfidenzintervalle, Freiheitsgrade, ...)
- Interpretationen in Bezug zu dem ursprünglichen theoretischen Rahmen
- Typischer Fehler: ambitionierter theoretischer Rahmen, häufig weniger ambitionierte Resultate

Aufbau eines Journalartikels

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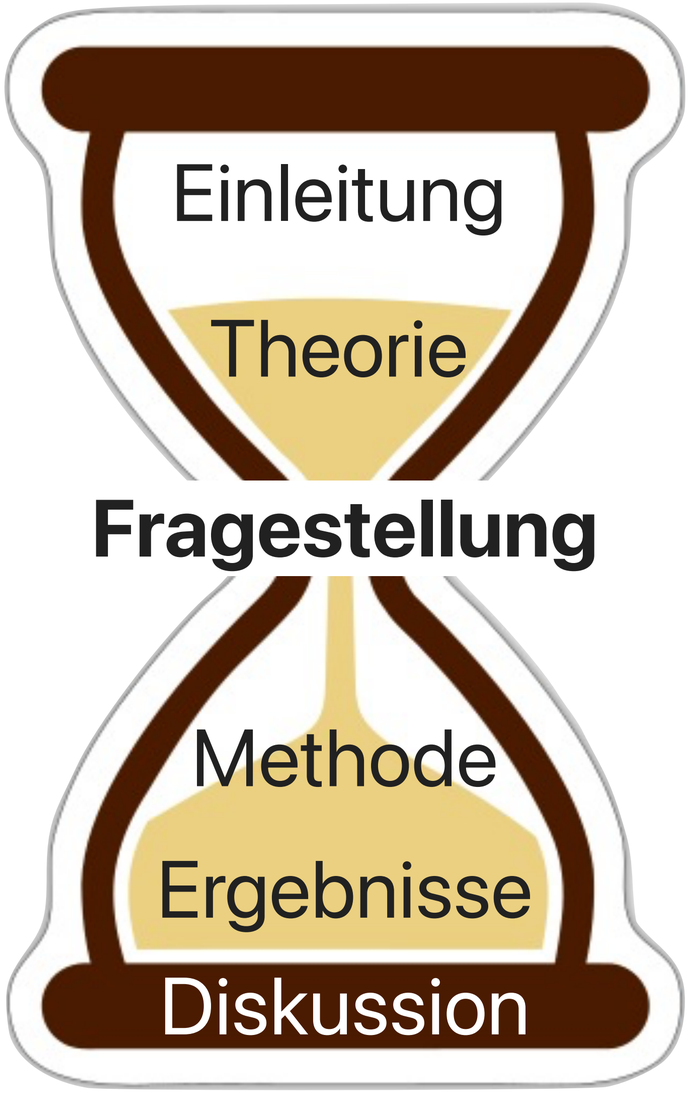
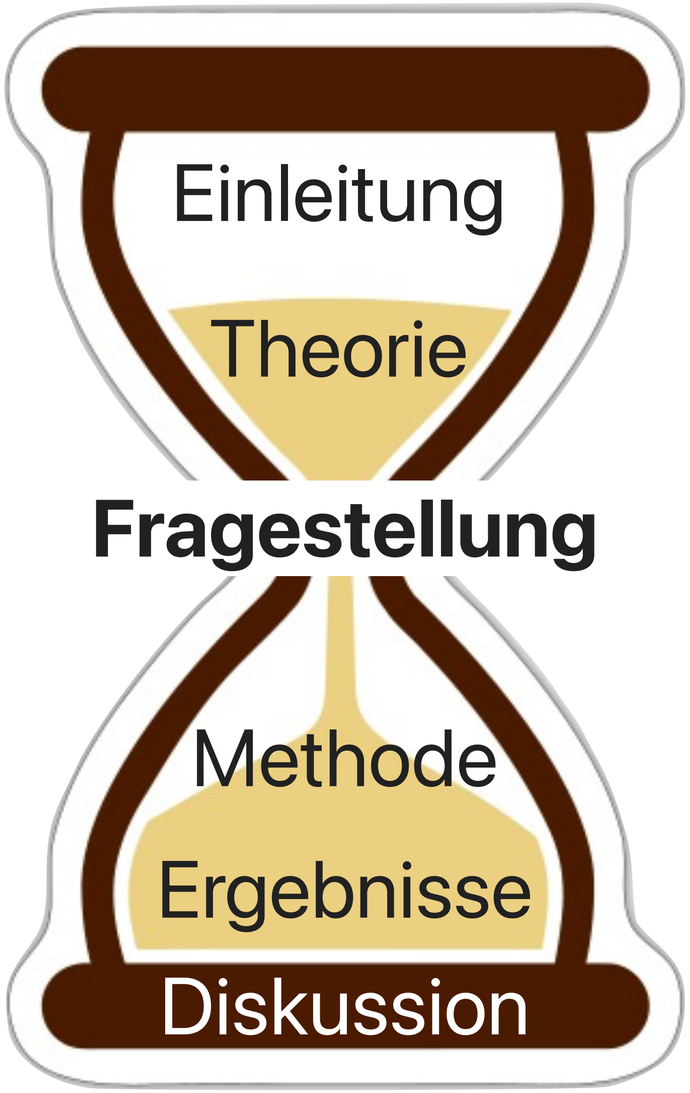


Diskussion

- Gesamtschau der Ergebnisse
- Einordnung in die bestehende Literatur
- Grenzen/Einschränkungen der Studie
- Implikationen für die Forschung und Praxis
- Ausblick auf zukünftige Forschung

Aufbau eines Journalartikels

Anwendung



1. Abstract
2. Introduction
3. Theoretical Background
   - 3.1. Patterns in Early Mathematics Education
   - 3.2. Research on Pattern Recognition in Early Mathematics Learning
   - 3.3. Mathematical Difficulties and Risk of Developing Mathematical Difficulties in Early Age
4. Research Questions
5. Methods
   - 5.1. Participants
   - 5.2. Procedure and Tasks
   - 5.3. Eye-Tracking System
   - 5.4. Qualitative Analysis of Eye-Tracking Data
   - 5.5. Quantitative Statistical Analysis
6. Results
   - 6.1. First-Grade Students' Pattern-Recognition Processes
   - 6.2. Differences in Pattern-Recognition Processes Between Patterns with Different Units of Repeat
   - 6.3. Differences in Pattern-Recognition Processes for Patterns with Different Units of Repeat Between Students with RMD and with RMD
7. Discussion
   - 7.1. Pattern-Recognition Processes
   - 7.2. Differences in Pattern-Recognition Processes
8. Conclusion

International Journal of Science and Mathematics Education
https://doi.org/10.1007/s10763-024-10441-x

Check for updates

Pattern-Recognition Processes of First-Grade Students: An Explorative Eye-Tracking Study

Lukas Baumanns[1] · Demetra Pitta-Pantazi[2] · Eleni Demosthenous[2] · Achim J. Lilienthal[3] · Constantinos Christou[2] · Maike Schindler[4]

Received: 20 December 2022 / Accepted: 29 December 2023
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Aufbau eines Journalartikels

Input

JARS (Journal Article Reporting Standards)

Journal Article Reporting Standards (JARS)

APA Style Journal Article Reporting Standards offer guidance on what information should be included in all manuscript sections for quantitative, qualitative, and mixed methods research and include how to best discuss race, ethnicity, and culture.

Highlights

Introducing Journal Article Reporting Standards for Race, Ethnicity, and Culture (JARS–REC)
JARS–REC were created to develop best practices related to the manner in which race, ethnicity, and culture are discussed within scientific manuscripts in psychological science.

Guidelines

JARS–Quant

Quantitative research
Use JARS–Quant when you collect your study data in numerical form or report them through statistical analyses.

JARS–Qual

Qualitative research
Use JARS–Qual when you collect your study data in the form of natural language and expression.

JARS–Mixed

Mixed methods research
Use JARS–Mixed when your study combines both quantitative and qualitative methods.

JARS resources

- History of APA's journal article reporting standards
- APA Style JARS supplemental glossary
- Supplemental resource on the ethic of transparency in JARS
- Frequently asked questions
- JARS-Quant Decision Flowchart (PDF, 98KB)
- JARS-Quant Participant Flowchart (PDF, 98KB)

JARS articles

- JARS–Quant article
- JARS–Qual / Mixed article
- JARS–REC executive summary

Aufbau eines Journalartikels

Input

JARS (Journal Article Reporting Standards)

AMERICAN PSYCHOLOGICAL ASSOCIATION

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APA STYLE

STYLE AND GRAMMAR GUIDELINES | PRODUCTS | INSTRUCTIONAL AIDS | BLOG

Home > Journal Article Reporting Standards >

Quantitative Research Design (JARS–Quant)

The current JARS–Quant standards, released in 2018, expand and revise the types of research methodologies covered in the original JARS, which were published in 2008.

JARS–Quant include guidance for manuscripts that report

- Primary quantitative research
- Experimental designs
- Nonexperimental designs
- Special designs
- Analytic methods
- Meta-analyses

In addition, JARS–Quant now divides hypotheses, analyses, and conclusions into primary, secondary, and exploratory groups. This should enhance the readability and replicability of the research.

Providing the information specified in JARS–Quant should become routine and minimally burdensome, thereby increasing the transparency of reporting in psychological research.

For more information on how the revised standards were created, read Journal Article Reporting Standards for Quantitative Research in Psychology.

JARS resources

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Standards

General quantitative reporting standards

- Quantitative Design Reporting Standards (JARS-Quant) (PDF, 130KB)
  Information recommended for inclusion in manuscripts that report new data collections regardless of research design

Experimental and nonexperimental designs

- Experimental Designs (PDF, 109KB)
  Reporting standards for studies with an experimental manipulation
- Random Assignment (PDF, 101KB)
  Reporting standards for studies using random assignment
- Nonrandom Assignment (PDF, 92KB)
  Reporting standards for studies using nonrandom assignment
- Clinical Trials (PDF, 106KB)
  Reporting standards for studies involving clinical trials
- Nonexperimental Designs (PDF, 103KB)
  Reporting standards for studies using no experimental manipulation

Special designs

- Longitudinal Studies (PDF, 103KB)
  Reporting standards for longitudinal studies
- *N*-of-1 Studies (PDF, 102KB)
  Reporting standards for *N*-of-1 studies
- Replication Studies (PDF, 95KB)
  Reporting standards for replication studies

Analytic methods

- Structural Equation Modeling (PDF, 111KB)
  Reporting standards for studies using structural equation modeling
- Bayesian Statistics (PDF, 104KB)
  Reporting standards for studies using Bayesian techniques

Meta-analyses

- Quantitative Meta-Analysis Reporting Standards (PDF, 116KB)
  Information recommended for inclusion in manuscripts that report quantitative meta-analyses

- JARS–REC executive summary

Questions / feedback

Email an APA Style Expert if you have questions, feedback, or suggestions for modules to be included in future JARS updates.

APA resources

- APA Databases and Electronic Resources
- APA Journals
- Journal Author Resource Center
- Education and Career
- Psychological Science
- Open Science at APA
- How to Review a Manuscript

Fragen?

Wie schreibe ich ein Abstract?

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Mögliche Struktur

1. **A statement of the research problem/focus**
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Forgasz (2019)

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Pattern-Recognition Processes of First-Grade Students: An Explorative Eye-Tracking Study

1. *Recognizing patterns is an essential skill in early mathematics education. Yet, first graders tend to have difficulties with tasks such as extending patterns of the form ABCABC. Identifying different approaches of first-grade students' pattern recognition can help address these difficulties. Unfortunately, few studies investigate different approaches to recognize patterns and how first-graders differ between them.*
2. *This paper presents the results of an empirical study investigating different approaches of 22 first-grade students in recognizing patterns using eye-tracking technology.*
3. *The eye movements reveal that students use four different approaches to recognize patterns. In addition, first-grade students show significant differences in their processes for patterns with different units of repeat.*
4. *The findings of this paper can help identify individual difficulties of primary students with patterns in order to provide support for under-achieving students.*

Forgasz (2019)

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Jiang, C., Hwang, S., & Cai, J. (2014). Chinese and Singaporean sixth-grade students' strategies for solving problems about speed. *Educational Studies in Mathematics*, *87*(1), 27–50.

This study examined 361 Chinese and 345 Singaporean sixth-grade students' performance and problem-solving strategies for solving 14 problems about speed. By focusing on students from two distinct high-performing countries in East Asia, we provide a useful perspective on the differences that exist in the preparation and problem-solving strategies of these groups of students. The strategy analysis indicates that the Chinese sample used algebraic strategies more frequently and more successfully than the Singaporean sample, although the Chinese sample used a limited variety of strategies. The Singaporean sample's use of model-drawing produced a performance advantage on one problem by converting multiplication/division of fractions into multiplication/division of whole numbers. Several suggestions regarding teaching and learning of mathematical problem solving, algebra, and problems about speed and its related concepts of ratio and proportion are made.

Denkmoment

Identifiziert die vier Abschnitte des Abstracts im abgebildeten Abstract.

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Austausch

Denkmoment

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Fragen?

Wie schreibe ich eine Einleitung?

Wie schreibe ich eine Einleitung?

Input

- Höchstrelevant bei Einreichung! Das erste, was Reviewer*innen lesen.
- Kann meist in 3–5 Absätzen abgehandelt werden
- Bleibt allgemein, damit der theoretische Hintergrund reinzoomen kann.
- Definitionen von Begriffen und Konstrukten nur falls erforderlich
- Ausnahme: Längere Einleitungen mit Zwischenüberschriften, die schon den theoretischen Hintergrund inkludiert haben (IMRAD-Struktur)

The function of an introduction is to convince your readers of the relevance of your topic, the need to fill a knowledge gap, and to narrow down to the aim of your paper. The aim of your paper is typically the end of the funnel but could also be the very first sentence. (Bakker, 2019)

Wie schreibe ich eine Einleitung?

Input

Trichter

Umgekehrte Birne

Bakker (2019)

Wie schreibe ich eine Einleitung?

Input

1. **Allgemeine Einführung**
   - Vorstellung eines relevanten Themas (low interest in STEM subjects, need for teacher professional development).
   - Betonung der praktischen und/oder theoretischen Bedeutung.
2. **Eingrenzung auf eine spezifische Fragestellung**
   - Reinzoomen zu einem spezifischen Aspekt des Themas
   - Beschreibung bestehender Antworten zur Bewältigung des Problems.
3. **Identifikation einer Forschungslücke**
   - Aufzeigen, warum bestehende Forschung nicht ausreicht.
   - Argumentation für die Notwendigkeit neuer Erkenntnisse (nur weil etwas noch nicht erforscht wurde, ist noch kein guter Grund für eine Studie).
4. **Formulierung der Forschungsfrage und Zielsetzung**
   - Klare Definition des Forschungsziels.
   - Oft wird die Forschungsfrage am Ende der Einleitung platziert.

📌 Ziel: Die Leserschaft wird schrittweise von einem breiten Thema zu einer klaren Forschungsfrage geführt.

Trichter

Bakker (2019)

Wie schreibe ich eine Einleitung?

Input

1. **Direkter Start mit dem Ziel der Studie**
   - Die Forschungsfrage oder das Hauptziel steht an erster Stelle.
   - Besonders hilfreich für schnelle Leser*innen oder Online-Artikel.
2. **Kontext und theoretische Einordnung**
   - Nach der Zielsetzung folgt die breitere Einordnung in den Forschungsstand.
   - Erklärung relevanter Konzepte oder notwendiger Grundlagen.
3. **Identifikation einer Forschungslücke**
   - Argumentation für die Notwendigkeit der Untersuchung.
   - Bezug zu bestehenden Problemen oder ungelösten Fragen.
4. **Formulierung der Forschungsfrage und Zielsetzung**
   - Wiederholung und Verfeinerung des Ziels, falls nötig.

📌 Ziel: Lesende erhalten sofort Klarheit über das Forschungsvorhaben und dessen Bedeutung.

Umgekehrte Birne

Bakker (2019)

Analyse einer Einleitung

Aktivität

Aktivität

Lest die Einleitung, die hinter dem QR-Code zu finden ist.

1. **Struktur:** Wie ist die Einleitung aufgebaut? Welche Elemente der Trichter-Struktur (allgemeines Thema → spezifisches Problem → Forschungslücke → Ziel/ Forschungsfrage) könnt ihr erkennen?
2. **Klarheit:** Wird das Forschungsthema verständlich eingeführt? Wie präzise sind Begriffe und Argumente formuliert?
3. **Logik:** Gibt es eine klare Entwicklung der Argumentation oder gibt es Sprünge, Unklarheiten oder überflüssige Informationen?
4. **Überzeugungskraft:** Wird die Notwendigkeit der Studie überzeugend dargelegt? Ist die Forschungsfrage klar formuliert und passend zum Aufbau der Einleitung?

Aktivität

- Tauscht euch in Kleingruppen (3–4 Personen) über eure Eindrücke aus.
- Welche Stärken und Schwächen seht ihr in der Einleitung?

Notiert kritische Aspekte im GoogleDoc.

Analyse einer Einleitung

Eingebaute Schwächen

1. **Unklarer Fokus:**
   - Der Text springt zwischen verschiedenen Themen (z. B. allgemeine Bedeutung von Mustern, Fehler in Mathe-Aufgaben, verschiedene Studien) hin und her, ohne klar auf die Forschungsfrage hinzuarbeiten.
2. **Fehlende logische Verknüpfungen:**
   - Die Einleitung erwähnt viele Studien, aber es wird nicht klar, wie sie sich aufeinander beziehen oder zur Forschungsfrage führen.
3. **Zu vage Formulierungen:**
   - Begriffe wie “einige Studien haben gezeigt”, “manche Forschungen deuten darauf hin”, oder “dies bleibt ein Thema der Diskussion” lassen die Argumentation schwammig wirken.
4. **Unklare Forschungslücke:**
   - Die Notwendigkeit der Studie wird nicht überzeugend dargestellt. Es wird eher gesagt, dass “mehr Forschung nötig ist”, aber nicht klar dargelegt, warum genau diese Studie notwendig ist.
5. **Schwache Forschungsfrage:**
   - Die Forschungsfrage wird nicht präzise formuliert, sondern nur vage umschrieben („Wir sind daran interessiert, zu untersuchen…“).

Austausch

Analyse einer Einleitung

Aktivität

Aktivität

Lest nun die eigentliche Einleitung, die hinter dem QR-Code rechts zu finden ist.

1. **Struktur:** Wie führt sie die Lesenden vom allgemeinen Thema zur konkreten Forschungsfrage?
2. **Klarheit:** Welche sprachlichen Mittel sorgen für eine verständliche Argumentation?
3. **Überzeugungskraft:** Was macht die Forschungslücke und Forschungsfrage überzeugend?

Was macht eine gute Einleitung aus?

Wichtige Erkenntnisse aus der Analyse

- ✅ **Klare Struktur** → Vom allgemeinen Thema zur spezifischen Forschungsfrage (Trichter-Modell)
- ✅ **Forschungslücke deutlich machen** → Nicht nur „Es gibt wenig Forschung“, sondern warum ist die Forschung notwendig?
- ✅ **Logische Argumentation** → Jeder Abschnitt baut auf dem vorherigen auf, keine abrupten Sprünge
- ✅ **Präzise Sprache & Klarheit** → Keine vagen Aussagen wie „Einige Studien zeigen…“, sondern konkret belegen

Austausch

Was macht eine gute Einleitung aus?

Typische Fehler in Einleitungen

- ❌ Unklare oder unstrukturierte Argumentation
- ❌ Fehlende oder schwach begründete Forschungslücke
- ❌ Unpräzise oder allgemeine Sprache („Es ist wichtig…“ ohne Erklärung, warum)
- ❌ Keine klare Forschungsfrage am Ende

Austausch

Was macht eine gute Einleitung aus?

Take-Home-Messages

- Beginne breit, aber verliere das Ziel nicht aus den Augen
- Zeige, warum deine Studie wichtig ist und welche Forschungslücke sie schließt
- Vermeide überflüssige oder irrelevante Infos – alles muss auf die Forschungsfrage hinarbeiten
- Achte auf eine flüssige, logische Argumentation ohne Sprünge
- Deine Forschungsfrage sollte klar, präzise und am Ende der Einleitung stehen

Austausch

Fragen?

Die Auswahl des Journals

Die Auswahl des Journals

Input

1. **Journal for Research in Mathematics Education (JRME)**: 5 Hefte pro Jahr, ca. 5 Beiträge pro Heft, stark US-zentriert
2. **Educational Studies in Mathematics (ESM)**: Gegründet von Freudenthal (EiC: Susanne Prediger und David Wagner); ursprünglich europäische Orientierung, breite Thematik, 6 Hefte im Jahr, 6-8 Beiträge pro Heft. Springer (DEAL)
3. **For the Learning of Mathematics (FLM)**: „The journal aims to stimulate reflection on mathematics education at all levels"
4. **Journal of Mathematical Behavior (JMB)**: Starke psychologische Orientierung, Fokus auf amerikanische Diskussion
5. **ZDM – Mathematics Education (ZDM)**: Ausschließlich special issues mit Autor*inneneinladung, 7 pro Jahr, 15–18 Beiträge (EiC: Gabriele Kaiser)

Die Auswahl des Journals

Input

6. **Journal of Mathematics Teacher Education (JMTE)**: Ausrichtung auf Lehrerbildung, 6 Hefte im Jahr, 5-6 Beiträge pro Heft
7. **Mathematical Thinking and Learning (MTL)**: psychologische Orientierung, publiziert von Taylor and Francis. 4 Hefte im Jahr, 3–4 Beiträge pro Heft
8. **Research in Mathematics Education (RME)**: reports of studies involving empirical investigation and theoretical argumentation
9. **Mathematics Education Research Journal (MERJ)**: promote research from the Australasian region either as research conducted in the region
10. **International Journal of Science and Mathematics Education (IJSME)**: breite Thematik, gewisse ostasiatische Dominanz, 8 Hefte pro Jahr, ca. 10 Beiträge. Springer (DEAL)
11. **Journal für Mathematik-Didaktik (JMD)**: Flaggschiff der deutschsprachigen Mathematikdidaktik, aktuell zwei Hefte pro Jahr, strenger Reviewprozess, (Editor*innen: Gasteiger, Brunner, Leiss, Obersteiner), gedrucktes Exemplar für alle GDM-Mitglieder

Die Auswahl des Journals

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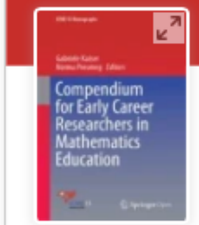

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Compendium for Early Career Researchers in Mathematics Education

Academic Writing and Academic Publishing: Description of Major Journals in Mathematics Education

Front Matter — PDF
Pages 375-375

Educational Studies in Mathematics: Shaping the Field — PDF
Merrilyn Goos
Pages 377-391 | Open Access

For the Learning of Mathematics: An Introduction to the Journal and the Writing Within It — PDF
Richard Barwell, David A. Reid
Pages 393-405 | Open Access

The International Journal of Science and Mathematics Education: A Beginner's Guide to Writing for Publication — PDF
Peter Liljedahl
Pages 407-424 | Open Access

Journal for Research in Mathematics Education: Practical Guides for Promoting and Disseminating Significant Research in Mathematics Education — PDF
Jinfa Cai, Stephen Hwang, Victoria Robison
Pages 425-442 | Open Access

Die Auswahl des Journals

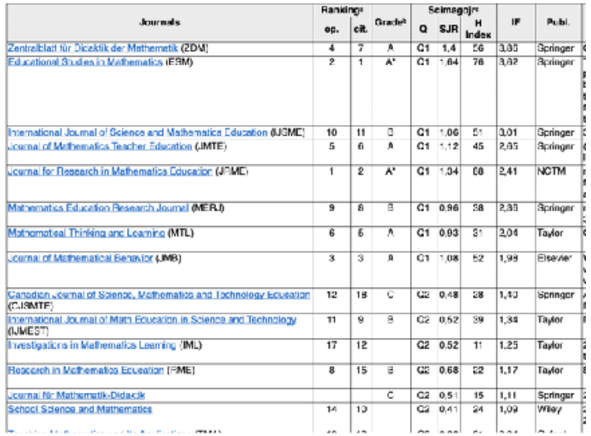
Input

Journals	Ranking[a] op.	Ranking[a] cit.	Grade[b]	Scimagojr[c] Q	Scimagojr[c] SJR	Scimagojr[c] H Index	IF	Publ.	Requirement
Zentralblatt für Didaktik der Mathematik (ZDM)	4	7	A	Q1	1.4	56	3.86	Springer	Only for invited researchers
Educational Studies in Mathematics (ESM)	2	1	A*	Q1	1.64	76	3.62	Springer	The body text of a manuscript can be up to 7,000 words. Appendices are part of the body text. The following parts of a manuscript do not count as body text: title, abstract, key words, acknowledgments, references, figures, tables, and electronic supplementary materials. Transcripts and quotations from data in the original language other than English can be excluded from the word count.
International Journal of Science and Mathematics Education (IJSME)	10	11	B	Q1	1.06	51	3.01	Springer	30 pages (text [double space], references [single space])
Journal of Mathematics Teacher Education (JMTE)	5	6	A	Q1	1.12	45	2.65	Springer	(1) 10,000 words; (2) 5,000 words; (3) 3,000 words. Maximum word lengths exclude references, figures, appendices, etc.
Journal for Research in Mathematics Education (JRME)	1	2	A*	Q1	1.34	88	2.41	NCTM	research reports: 13,000 words including abstract, references, tables, and figures; Brief report: 5,000 words including abstract, references, tables, and figures.
Mathematics Education Research Journal (MERJ)	9	8	B	Q1	0.96	38	2.36	Springer	research report: 9.000 words excluding references; brief reports (up to 3.000 words), abstract 150-205 words
Mathematical Thinking and Learning (MTL)	6	5	A	Q1	0.93	31	2.04	Taylor	Own template, research reports (40 pages), brief reports (6-14 pages)
Journal of Mathematical Behavior (JMB)	3	3	A	Q1	1.08	52	1.98	Elsevier	While The Journal of Mathematical Behavior does not have a mandatory word limit, we strongly recommend that submissions do not exceed 10,000 words.
Canadian Journal of Science, Mathematics and Technology Education (CJSMTE)	12	18	C	Q2	0.48	28	1.40	Springer	Abstract (150-250 words); length (6000 words, excluding references, figures, tables)
International Journal of Math Education in Science and Technology (IJMEST)	11	9	B	Q2	0.52	39	1.34	Taylor	No limit words (own template)
Investigations in Mathematics Learning (IML)	17	12		Q2	0.52	11	1.25	Taylor	25 double spaced pages (including references), and 5 additional pages for tables and figures.

[a]Williams & Leatham. (2017). Journal Quality in Mathematics Education
[b]Törner & Azarello (2012)
[c]from https://www.scimagojr.com/ (2021)

Materialien

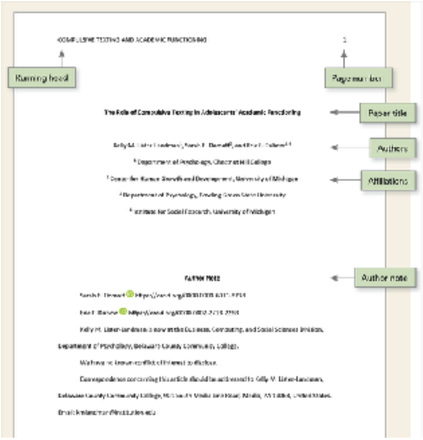
Journalliste



Journals	Rankings[a] op.	cit.	Grade[b]	Scimagojr[c] Q	SJR	H Index	IF	Publ.
Zentralblatt für Didaktik der Mathematik (ZDM)	4	7	A	Q1	1,4	56	3,03	Springer
Educational Studies in Mathematics (ESM)	2	1	A*	Q1	1,64	78	3,02	Springer
International Journal of Science and Mathematics Education (IJSME)	10	11	C	Q1	1,06	51	3,01	Springer
Journal of Mathematics Teacher Education (JMTE)	5	6	A	Q1	1,12	45	2,83	Springer
Journal for Research in Mathematics Education (JRME)	1	2	A*	Q1	1,04	68	2,41	NCTM
Mathematics Education Research Journal (MERJ)	9	8	B	Q1	0,96	38	2,33	Springer
Mathematical Thinking and Learning (MTL)	6	5	A	Q1	0,93	31	2,04	Taylor
Journal of Mathematical Behavior (JMB)	3	3	A	Q1	1,08	52	1,98	Elsevier
Canadian Journal of Science, Mathematics and Technology Education (CJSMTE)	12	18	C	Q2	0,48	28	1,43	Springer
International Journal of Math Education in Science and Technology (IJMEST)	11	9	B	Q2	0,52	39	1,34	Taylor
Investigations in Mathematics Learning (IML)	17	12		Q2	0,52	11	1,25	Taylor
Research in Mathematics Education (RME)	8	15	B	Q2	0,68	22	1,17	Taylor
Journal für Mathematik-Didaktik			C	Q2	0,51	15	1,11	Springer
School Science and Mathematics	14	10		Q2	0,41	24	1,09	Wiley

APA Style **JARS**
Journal Article Reporting Standards

APA7-Template



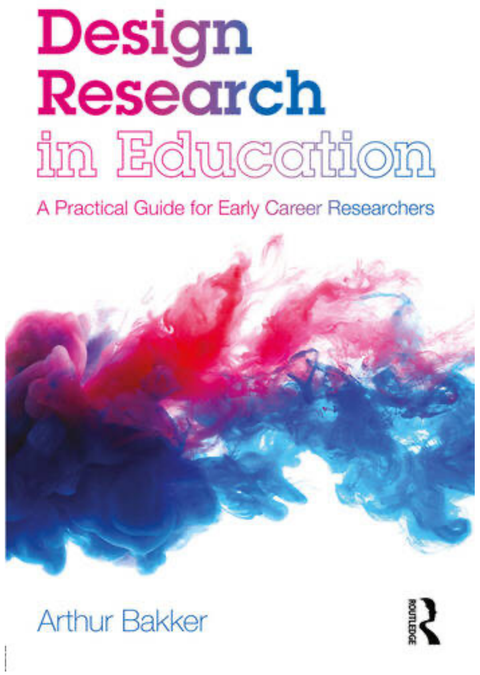
Workshop-Folien

https://lukasbaumanns.de/Dateien/DoFoKo.zip

Materialien zum Download

Weiterführende Links

- Arthur Bakker: Writing a journal article. 1st YERME Webinar: https://www.youtube.com/watch?v=-t2XmP_O6CA



Vielen Dank für die Aufmerksamkeit!