

Workshop on introductions

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Setting the stage

Writing is a powerful epistemic process. Even when authors begin with a clear plan for reporting and discussing their research, that plan inevitably evolves as they learn through the act of writing. Accordingly, it was fitting to hold a workshop on introductions as the final plenary workshop at IRMEC-1, after the workshops on reporting implementation and replication research and on writing discussions. Indeed, in any reasonable strategy of writing an academic article – writing the introduction first, or the last, or in parallel with writing the discussion to assure that these two sections mirror each other – the introduction is revisited many times, the last time being just after finalizing the findings and the discussion (Belcher, 2019), and just before pushing the “submit” button.

Given the epistemic nature of academic writing, the last workshop of the conference was designed to jointly engage with the challenge of writing informative and appealing introductions in general and in implementation and replication studies in particular. The workshop’s first goal was to collectively reflect on different types of introductions while focusing on their various functions and styles, as reflected in several purposefully selected examples from the literature. The second goal was to facilitate sharing of introduction-writing ideas based on the participants’ previous, ongoing and provisional writing projects. The workshop consisted of three parts: a five-part introduction game for all the participants, small-group work on four introduction-related activities, and a summarizing discussion.

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Introduction game

The introduction game was a game of guessing based on five examples from the professional literature chosen for their diversity. On five occasions, participants were invited to read the opening sentence(s) of some research article and think of the following questions: (1) After reading the opening sentence(s), are you interested in seeing some more sentences? (2) Based on the opening sentences, can you guess what the paper is about? The former question intended to create opportunities to discuss the introductions' appeal, and the latter one – their informativeness. For each example, the next sentences were shown to the participants only when the discussion of questions 1–2 for the previous sentences had run its course, and the title and authors of the scrutinized article were revealed at the end. Three out of five examples used at the workshop are presented below.

Example 1: Straight-to-the-point introduction to an empirical article

In some article – the reference is revealed below – the first sentence was:

Most regions/countries of East Asia rank high in international comparative studies of mathematics achievement, such as the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA).

(Readers interested in approximating the experience of the workshop participants are invited to think about questions 1–2 prior to continuing the reading.)

The second sentence:

However, their education systems are also known for students' low learning motivation, confidence, and valuation of mathematics learning.

Last sentence of the introduction:

The following research questions were formulated: 1. How was the JDM program designed, executed, and evaluated in terms of the essential implementation components, and how do the design, execution, and the evaluation contribute to the factors supporting its successful scaling up implementation? 2. What were the changes initiated by the JDM program in terms of the essential implementation outcomes, and how do the changes reflect the factors supporting its successful scaling up implementation?

These quotes are from an article by Wang et al. (2021) that was part of a *ZDM – Mathematics Education* special issue on implementation-related research (Koichu et al., 2021). The introduction to this article has been written in the style that the conference participants later named as “straight to the point”. Such an introduction begins with a *consensus statement* as a starting point, continues with a *however statement* that lays the groundwork for an argument that there is an important knowledge gap or that a

particular issue of importance is underexplored. The introduction ends with an explicit statement of a research goal or research questions.

The main function of the straight-to-the-point introduction is to provide motivation for a study presented in the rest of the article. As a rule, the argument consists of a purposeful overview of the relevant state-of-the-art literature, which can later be unfolded in the article's Theoretical Background section and reflected upon in the Discussion section. In articles reporting implementation or replication research, part of the literature used in the introduction is frequently about implementation or replication as a research genre.

Example 2: Mysterious introduction to a theoretical article

The first two sentences:

My problem is that I have been persecuted by an integer. For seven years, this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals.

(Once more, the readers are invited to think of the above questions 1–2 prior to continuing reading.)

The third sentence:

The persistence with which this number plagues me is far more than a random accident.

The last sentence:

Since these experiments would not have been done without the appearance of information theory on the psychological scene, and since the results are analyzed in terms of the concepts of information theory, I shall have to preface my discussion with a few remarks about this theory.

The acute reader may have recognized that these quotes are from a seminal article by Miller (1956) entitled “The magical number seven, plus or minus two: Some limits on our capacity for processing information.” The workshop participants found the introduction highly appealing and appreciated its personal tone and humor. Those who were familiar with the article recalled that the rest of the article was in fact very serious and very dense. Participants unfamiliar with the article observed that, in contrast to Example 1, the exact topic of the article was difficult to guess based on the chosen quotes. However, it was possible to guess that the article appeared likely to be theoretical rather than empirical and that uncertainty about the exact topic was curiosity-evoking.

Example 3: Announcement of a study and its contribution

First sentence:

While there has been increasing consensus about what characterizes high quality mathematics teaching..., school systems all over the world still work

hard to develop strategies and structures to implement instructional approaches for high-quality teaching into large numbers of classrooms.

Second sentence:

A recent review on implementation research in mathematics education outlined that current publications have been dominated by qualitative case studies on teachers' reform enactment or effectiveness studies, whereas "planning and design aspects of such projects were rarely reported" (Ahl et al., 2023, p. 2).

The last sentence:

Even though the 10-year project has just started, the presentation of its strategies, structures, and planned research may already be able to contribute to the discourse on implementation research, even in countries beyond Germany.

The above quotes are from the article by Prediger and Selter (2024) published in *IRME – Implementation and Replication Studies in Mathematics Education*. An initial observation is that the introduction has elements parallel to those discussed in Example 1: it begins with a consensus-statement, indicates an underexplored issue of importance, and ends with a goal-statement. However, the two introductions are different in several respects. To begin with, Wang et al.'s (2021) introduction is much shorter than Prediger and Selter's (2024) introduction. Whereas the former introduction is indeed straight-to-the-point in the sense that its main function is to provide motivation for the research questions, the latter one has additional functions.

Unlike Wang et al.'s (2021) introduction, Prediger and Selter's (2024) introduction leads the reader to the realization that even though the project in question is in its early stages, its aspects are worth learning about. Indeed, part of the introduction explains a theoretical model underlying the project, and the entire article elaborates on the project's aims, organizational and support structures and timetable. Much of the project description and analysis is written in the future tense, and this is in sharp contrast with Wang et al. (2021) who reported outcomes of a project at its mature stage of life. Of note is that both approaches are well-recognized in the literature on implementation research. For instance, Century and Cassata (2016) identify exploring early questions about what an innovation can or should be as one important reason for conducting implementation research (cf. Prediger & Selter, 2024) and exploring questions of how and why innovation achieves the desired outcomes (cf. Wang et al., 2021) as another one. An additional difference is that Prediger and Selter (2024) present in their introduction a section-wise outline of the article and then announce their contribution, whereas Wang et al. (2021) do not.

Example 2 is a contrasting case: the goal of Miller (1956) was to introduce and discuss a cognitive phenomenon, and therefore the article

cannot be qualified as implementation research¹. However, the appealing style and personal tone of Miller's introduction was taken by some of the participants as "something to think about" in the future. More generally, this example reminded us that one of the functions of a good introduction is to develop in the potential readers curiosity and desire to keep reading. It also reminded us that academic writing cannot be fully put into standard templates.

Small-group activities

For small-group work, the workshop participants were invited to choose one or more of the following activities.

Activity 1: Out of the many papers you read last year, recall ONE that you particularly liked. Why did you like it, and what did its introduction look like?

Activity 2: Based on the five examples and your experience, try to give names to different types of introductions (e.g., "straight to the point"; "mysterious"; etc.)

Activity 3: Sometimes, the introductions have the following structure: (1) Consensus-statement: A statement that it is difficult to argue against; (2) However-statement: argument for what is missing in our knowledge and why it is important to know; (3) Achievement-statement: announcement of what will be achieved in the paper (e.g., research questions to be addressed; central argument to be supported; hypothesis to be tested; outline of the article). What is specific for 1–3 in the field of implementation and replication research in mathematics education?

Activity 4: In your own writing project, what are YOUR consensus-statement, however-statement and achievement-statement?

Summarizing discussion

The discussion was lively as it put forward personal experiences of the participants. For example, it so happened that one of the authors of the articles used in the introduction game (but not in this paper) was in the audience. She shared her experience and strongly emphasized the role of collaboration with the other authors and the iterative nature of writing the introduction. Other participants recalled the evolution of their introductions following comments from journal reviewers. Yet others observed a connection between this workshop and a workshop on writing

¹ To recall, Century and Cassata (2016) refer to *implementation research* as "a systematic inquiry regarding innovations enacted in controlled settings or in ordinary practice, the factors that influence innovation enactment, and the relationships between innovations, influential factors, and outcomes" (p. 170).

discussions. Less experienced participants wondered how reviewers' comments might be anticipated and if different journals have different expectations for introductions, in terms of length, style and content. The participants shared their thoughts on whether and when it is appropriate to end the introduction with research questions, or goal, or an overview of the findings or an outline of the entire article. Not surprisingly, this part of the discussion converged on the conclusion that *it depends*.

The discussion also addressed the distinctive features of introductions to implementation and replication studies. Although these features appeared somewhat elusive – all good academic introductions serve similar functions, even though they may differ in structure and style – the participants observed that introductions to articles in journals such as *IRME* situate studies not only within the literature related to the specific project but also within the broader literature on implementation or replication research. While focusing on an individual project with its own theoretical and practical underpinnings and goals, the authors also consider how their research can contribute to addressing broader challenges, such as scaling-up quandaries, the transferability of innovations across contexts, or the methodological complexity of replication studies.

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