Writing a research paper

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Summary The aim of this article is to help those embarking on research to communicate effectively through writing, and to improve their chances of getting a paper published. The quality of a paper’s research content is judged by originality, importance and scientific validity. Advice should be sought on a project’s potential for high-quality research content before taking up the research. When readers have difficulties in understanding a paper, the problem more often lies with presentation and structure than with its scientific content. Readers expect information to be presented in a certain way and when this does not happen they may misinterpret what the writer intended.

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Practice points

Preparing the first draft

• Agree early on who are the contributors to the paper
• Choose a lead writer
• Choose a working title before commencing the first draft
• Follow precisely the journal’s ‘instructions for authors’
• Aim to complete the first draft in one sitting

Getting the message across

• Emphasize information by placing it at the end of the sentence or clause
• Do not provide lengthy information between subject and verb
• Provide the reader with context and perspective by appropriate use of topic positions
• Move the reader on by verbs that have a sense of action

Introduction

Science cannot advance unless research findings are effectively and widely communicated. The purpose of this article is to help those embarking
on research to communicate effectively through writing, and to improve their chances of getting a paper published.

Decide who are the contributors to the proposed paper early on, as this may avoid conflict later. Although not every contributor need play a part in the writing, each is nonetheless accountable for the paper and must be able to justify the part they played in the research. Some journals request this information when the paper is submitted.

Select a lead writer who will be responsible for drafting most of the paper and for circulating it to the other contributors for their comments. Certain sections may have to be written by contributors with special knowledge, but the lead writer must retain overall control, collate suggestions and produce further drafts until all contributors are happy with the final product.

Try to complete as much of the first draft as you can in one sitting. Have with you a few copies of the journal you are submitting to, ensure that you follow the instructions to authors, and that tables and figures are styled appropriately. Begin by choosing a working title for the paper, and keep it as short and as simple as possible. Expressing a statement in the title is risky, especially in clinical research. Although ‘Rotavirus causes necrotizing enterocolitis’ looks compelling, if the referee criticizes the scientific validity, the paper is damned through its title. Yet it may contain publishable research findings if interpreted differently. When the final draft of the paper has been completed, always reconsider the title and its appropriateness.

The important qualities of a scientific paper are its research content and its presentation and structure and these are the themes of this article.

**Research content**

The research content of a scientific paper is all the material of the research. It includes what you did; why you did it; how you did it; your results and their interpretation; and what you concluded. The quality of the research content is the most important factor influencing whether a paper is accepted or rejected and is assessed on the basis of originality, importance and scientific validity.

Before undertaking a project, experienced researchers always assess its potential for high quality research content. This assessment is crucial for doctors taking time out to undertake a project. Otherwise a year or more of work may culminate in discovering the research findings are unoriginal, unimportant or scientifically flawed.

**Originality**

Originality in this context means whether the research adds to knowledge in a material way; does it move the subject matter further forward? Research that confirms the findings of others may still be original. For example, the findings of some published research arise outside a tested hypothesis. Here, there is scope for other researchers to pose a hypothesis specifically to test the original results. Differences in laboratory methods may also be relevant in confirming the findings of others while retaining originality. In other words, the same results may stem from different research pathways—and this may be important in conferring originality.

**Importance**

The notion of importance is relative and to some degree subjective. In basic science, most original discoveries are important because they expand the knowledge base regardless of their implications, which at first may be unclear. In clinical research, the implication of an original finding has a crucial role in defining importance. A study on the prevalence of Asperger syndrome in Manchester is original if no one else has done it. However, data may exist for Leeds, Birmingham and many other cities. Originality simply through geography is not important unless the investigators have specifically tested a hypothesis that some social or biological reason explains why the prevalence in Manchester may be different.

**Scientific validity**

When a paper is criticized on the basis of scientific validity, the problem usually lies with the methods or the analysis of the results. While there may be an opportunity to re-analyse the results, perhaps using more appropriate statistical tests, the methods cannot be changed without re-doing the research—what is done is done. That is why it is so important for those embarking on a project to seek advice beforehand.

**Presentation and structure**

The purpose of writing is to communicate precisely to readers. A paper’s presentation and structure
determine whether it will be understood in the way that was intended; so the writer needs to understand how readers expect information to be presented. First, I will discuss the presentation of the main sections of the paper; then I will explain how writers can get their information across with the meaning they intended—writing with structure.

Most scientific papers are presented in sections: introduction, methods, results and discussion. The reader expects the material in each section to serve a distinct purpose. Information from one section is retained as the next section is read, and so the reader also expects a logical and understandable link between the sections.

Introduction

The purpose of the introduction is to help readers understand what the paper is about (context), and where it is going (perspective). An introduction that is brief, coherent, logical and stimulating puts the reader in a receptive mood.

The aims of the study need to be stated with clarity. One reason for this is that a test of a paper’s scientific validity is whether appropriate methodology was used to answer the research questions posed. If referees cannot identify the research questions, the paper has got off to a very bad start. For some papers, the research questions need to be posed as one or more hypotheses. It is helpful to start by drafting the end of the introduction, explaining the aims and hypotheses here, where they are more likely to be retained as the reader progresses to the method section. You are then in a better position to decide what material is needed in the main body of the introduction to provide context for your research questions. This lessens the chance of finishing up with a long-winded, rambling introduction with irrelevant information.

Methods

You may have been doing the research for a year or more, but in the space of a few minutes the reader has to learn what you have done. Explaining what you did is the active part of the paper and readers have a sense of involvement with this section. They imagine they are doing what you have described, and so it is important to present information in a logical order. Usually, this means a chronological order. If many different procedures were used and the chronology is not crucial, then provide order for the reader by explaining each procedure under a separate sub-heading.

Clarity and precision are essential. Use a flow diagram when describing a complex methodology where there are many procedural steps. Descriptions of a study population that have required many exclusions, each for a different reason, can also be difficult to assimilate without a flow diagram.

The statistics used to analyse the results should be stated informatively, not simply by a list of named tests. Show instead how the choice of each statistical test depended on the nature of the data. If a computer statistics program has been used, then give its name, but the statistical tests used must still be shown, rather than simply: 'We analysed the results using Easistat (Altrincham, UK)'.

The ethics of research will continue to have a high profile. Indicate whether the research was considered and approved by a recognized ethics committee. Where a consent procedure was needed, show who sought consent, and in more general terms when it was sought and obtained.

Results

Readers expect to see how the results accord with the aims of the study, and any hypotheses that were posed. They should not have to wade through masses of disorderly information to get to this, and so the way the results are presented needs to be planned thoughtfully. This is not easy when the research has generated numerous results.

One procedure is to write on the top of a sheet of paper the aims of the study and the hypotheses to be tested. Underneath, write all the results, including comparisons you have made between groups, and other analyses. Cluster the results so that they form natural groupings, each with a subheading, e.g. demographic data, serum sodium data, etc. At this stage, you may find certain results belong to more than one group.

Refer to the top of the page, and answer the aims of the study and any hypothesis by ordering the clusters in a logical way. Delete from each cluster any results that do not contribute in any way to answering aims or testing the hypothesis, but remember that certain negative results may still be relevant. If you come across a chance observation, outside the aims of the study, that you feel is important (not simply interesting) then include it. Using this approach you are more likely to produce a concise and logically ordered results section that answers the aims of the study without burdening the readers with extraneous material that distracts from the key findings.
Use tables and figures thoughtfully, with the reader in mind. For example, if you need to show trends with time then a figure is obviously helpful; but there is no point in including a histogram that simply compares the mean (SD) values of two groups when two lines of text will suffice. Authors are often uneasy about the request not to duplicate in the text the material that has appeared in tables or figures. There is no harm in emphasizing one or two key results that have been tabulated, but the onus is on the writer to ensure that whatever form a key result is presented in, its presentational qualities attract the reader’s attention.

Discussion

A summary of the main research findings should appear early in the discussion. The main purpose of the discussion is to interpret the results in a way that allows readers to know whether you have reliably fulfilled the aims of the study and answered the research questions posed. The extent to which your results are supported by other researchers should be indicated, and where differences exist you should try and explain why. The strengths and weaknesses of the study should be alluded to. Instead of putting forward an excuse (e.g. time constraints did not allow us to study more patients) try and clarify the effect of any weaknesses. For example, you may need to explain why a particular result or group of results was probably not influenced by a certain methodological constraint.

Research findings mean little without knowledge of their implications and importance. These should appear towards the end of the discussion, but avoid travelling down a tortuous explanatory path simply to attach importance to your findings. Often the value of the research amounts to ‘another piece in the jigsaw’ and is dependent on further research to move the subject on towards greater implication. This needs to be stated within the context of your study. It provides an opportunity to end the discussion with pointers towards the kind of research that would be helpful. However, simply ending a paper with an isolated statement without context, e.g. ‘We conclude that further research is needed’, is a journalistic hanging offence. Of course, further research is needed—we rarely read: ‘We conclude that our findings are the final say in this matter. No further research is needed.’

The abstract

The abstract is the shop window of the paper. It is reproduced electronically and appears in research databases, making it widely accessible. It is likely to be the only part of the paper that is read by a majority of readers—they want to know the overall thrust of the paper and its message. The abstract should be structured in content, even if the journal does not ask for structured subheadings such as aims, methods, results and conclusions.

The word limitation must be adhered to and it needs discipline to select only the information that is vital to an understanding of the paper. The following sequence may help. First, decide what are the key messages of the paper—these come in the conclusion of the abstract. Then, restrict the results to those that explain the messages, and include sufficient methodology to enable the reader to know how those results were obtained. Finally, decide what information is strictly needed to put the results and the derived messages into context—these will be the opening lines of the abstract.

Writing with structure

When readers have difficulties understanding a paper, the problem more often lies with the way the text is structured than with its scientific content. Nicely structured papers are often found in journals of physics and mathematics. We may not understand the science but we come away knowing what it is that we do not understand. Readers expect information to be presented in a certain way. When this does not happen they are confused because the paper is impenetrable. They may wrongly attribute their confusion to a lack of understanding of the science; worse still they may misinterpret the information.

Readers want to be moved through each piece of information by a series of actions found in the verbs. They expect sequences of tension followed by resolution as they absorb the paper’s factual information. As each new piece of information is presented they need to know who the player is, how it is linked with information in the preceding text, and to feel that it provides perspective for the next piece of text. They need to be able to determine important information quickly and distinguish it from the less important.

Writing with structure is not the same as getting the grammar right, although grammatical construction does play a part in getting the message across in the way the writer intended. In the following account, I have relied heavily on the work of Gopen and Swan, which is essential reading.2
The stress position

A single sentence often contains several pieces of information. The information you wish to emphasize should occupy the end of the sentence or clause. Gopen and Swan⁷ refer to this as the stress position, and it corresponds to the moment of syntactic closure. Stress positions can be occupied by one word, several words or even a lengthy phrase. What matters is that once syntactic closure is reached readers know they have reached the end of that piece of information and they can look forward to something else.

Consider the following text:

"The population was later used to refine the haplotype association using additional probes to ascertain the strongest association within the region, leading to the conclusion that the gene contributing to susceptibility was centromeric to V beta ii, not within the constant, diversity or joining segments, but probably within the variable region itself."

There are many pieces of information jostling with each other, and the reader needs clues to assess their relative importance. I have created stress positions to highlight one interpretation of this information:

"We refined the haplotype association in the same population. The strongest association within the region was ascertained using additional probes. We concluded that the gene contributing to susceptibility was not within the constant, diversity or joining segments. It was centromeric to V beta II and probably within the variable region itself."

We now attach importance to the fact that the same population was used, and that additional probes were used; that the gene was not within the constant, diversity or joining segments, and that it was probably within the variable region. Here is another version with different information in accentuated or stress positions:

"Using additional probes in the same population we refined the haplotype association to ascertain the strongest association within the region. We concluded that the gene contributing to susceptibility was centromeric to V beta II. It was not within the constant, diversity or joining segments but was probably within the variable region."

The important information here is rather different: the strongest association within the region was ascertained; the gene was centromeric to V beta II, and it was probably within the variable region. Only the author knows how the text was meant to be interpreted.

Subject-verb separation: getting to the action

When the subject or topic of a sentence is introduced it creates tension; the reader expects the verb (the action) to arrive quickly and the tension to be resolved through syntactic closure. Lengthy text between the subject and the verb may contain information that the author wants to get across. Yet the reader, searching for the action, may not attach much importance to this intervening text. Consider for example:

"Fetal asphyxia, a combination of acidaemia, hypercapnoea and hypoxaemia, occurring before labour or during delivery itself, especially if complicated, contributes to a significant proportion of brain damage in infants who are born at term."

The text separating the subject (fetal asphyxia) from the verb (contributes to) contains information that may be important. Also, when syntactic closure occurs it is a disappointment because the expression ‘contributes to a significant proportion of brain damage in infants who are born at term’ is weak and hardly worth the time it took to get there. There is not much action in it. The following may be a better interpretation of what the author wanted to get across:

"Fetal asphyxia may be defined as a combination of acidaemia, hypercapnoea and hypoxaemia. It can occur before labour, during labour, or during a complicated delivery. It is responsible for a significant proportion of brain damage in term infants."

The topic position

The subject matter (what the story is about), placed at the beginning of the sentence in what is known as the topic position, gives the reader a sense of direction or perspective. In this position, it also serves as a link backwards to the preceding text to provide context. Readers expect both perspective and context; without them they lose the thread of the text and may not understand it, or may misinterpret what the writer intended. Consider the following:

"There is an association between raised levels of inflammatory mediators in amniotic fluid and
periventricular echodensities observed on ultrasound scans. Experimental models of birth asphyxia in preterm animals have shown that damaged areas of the brain contain raised levels of inflammatory mediators. Although cerebral palsy may evolve in some preterm infants with periventricular echodensities, the relationship between inflammatory mediators and cerebral palsy merits further study.”

It is difficult to pick up the thread of this story because the key player is difficult to identify. Also, there is little in the way of context because topic positions do not comfortably link with preceding text. The following rearrangement is not perfect but the context and perspective are improved:

“There is an association between raised levels of inflammatory mediators in amniotic fluid and periventricular echodensities in preterm infants. These lesions observed on ultrasound brain scans may be markers for the development of cerebral palsy. The relationship between cerebral palsy and prenatal inflammatory mediators merits further study. This is especially relevant because raised levels of inflammatory mediators have been observed in areas of damaged brain in animal models of experimentally induced birth asphyxia.”

When we attach importance to the arrangement of topic positions, it can sometimes reveal gaps in the context of our text where additional information needs to be included to strengthen the thread of the text.

The key message factor

A useful test of the presentation and structure is whether there are clearly discernible key messages. It is good discipline to prepare a key message box, even if the journal does not request it. When a writer critically analyses the text in relation to the key messages, deficiencies in presentation and structure may come to light.

Conclusions

Writing with the reader in mind takes on a special meaning when we consider that the referee is usually the first external reader to critically study your paper. There may be little that can be done to retrieve a paper that is flawed on the basis of its research content, the problems should have come to light before starting the research. It is frustrating however when quality research content is misunderstood or is impenetrable to the referee. This is usually the fault of the writer and not the referee.

References


Further reading

Writing a research paper
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Abstract

The value of research and the career of a university lecturer depend heavily on the success in publishing scientific papers. This article reviews the guidelines for writing and submitting research papers. The three most important success criteria in publishing are as follows: the paper describes a good research, it is written according to the traditions of scientific writing and submitted to the right journal. The “right” journal publishes papers similar to yours. It is effective to follow the usual structure of scientific papers: introduction, methods, results, discussion, and conclusion. Introduction gives the review of the literature studying your problem and leads to the aim and the hypothesis of your research. The methods part contains the description of the research in detail, which enables the reader to do the research over again. Results are usually given in tables and graphs. Discussion includes the analyses of the data received to find support or reject the hypothesis raised in introduction. The inferences are compared with the findings of other researchers and shortcomings and/or tasks for further research are pointed out. It is important to avoid plagiarism in the manuscript and to consider the copyright law. The manuscript is sent to the editor of the selected journal together with a letter explaining why the journal was chosen and who is the contributing author. In about three months, the editor sends the reviews of the manuscript to the contributing author. The reviews are free support and advice in doing research and writing papers. If not rejected, the manuscript will be revised by the authors and published. Even the published papers contain shortcomings, which do not harm their contribution to science. The article has one table and the list of references in ten entries.

Introduction

Teaching in the universities has to be science-based. Therefore lecturers and professors are evaluated according to their success in publishing scientific papers. There is a proverb “publish or perish” in universities and colleges.

The aim of this article is to deliver some essential ideas for writing to scientific journals. The problems of selecting the journal, writing the paper, and submitting it to a journal are discussed. A good research is a basis for successful publishing but the research methodology is not treated in the article.

There are different types of papers:

a) the reports of empirical studies,
b) the description and analysis of a case study,
c) the review articles, which include meta-analysis of previous research,
d) the theoretical articles to develop theory, and
e) the methodological articles to develop research methods (Publication manual … 2003).
The two first types of papers are considered first of all although the ideas below are applicable to the other types of papers as well.

It is difficult for a young researcher to write and submit his/her paper. S/he is thinking that the research or the manuscript is not good enough for publishing. Perfect papers are never published because there are no perfect paper. Good papers are published. These papers put the scientific discussion in the field forward (Day 2006).

You should not be afraid of rejection. Reviewing of your manuscript gives you invaluable information about the research in your field and about writing research papers. Publishing in valued journals and collections is an inevitable part of your career as a university lecturer.

Let us look at some success criteria in publishing.

1. The paper describes a good research. The research uses current ideas and methods appropriately. It is grounded in theory and adds something to it. Good research is rigorous, systematic and very focused (Day 2006). You should discuss one problem in one paper, although there can be different approaches to the problem in your paper. Large samples of subjects facilitate the acceptance of your manuscript.

2. You answer the question why your paper is important. The importance can be in wider principles, which emerged from your research. You can describe how people can use the findings of your research and how other researchers can develop the work further. Papers on popular topics (gender, collectivism, narcotics, etc.) are easier to publish (Toomela 2003). A good paper arouses the interest of readers.

3. You have been reading the best papers in your research field and you give an overview of the contemporary trends in the field. Your paper will be published if it adds something to the international discussion in the field. You can contribute to the discussion if you know the current state of affairs.

4. The paper is written according to the traditions of scientific writing. Scientists are accustomed to read the papers with traditional elements, structure and style. If you violate these traditions, then your paper is difficult to understand and editors are eager to reject such manuscripts. The most thorough presentation of these traditions is published by the American Psychological Association (Publication manual … 2003).

Below we will discuss the writing and submitting of manuscripts. However, we begin with selecting the appropriate journal.

Selecting the journal

Most papers are rejected because they have been sent to the wrong journal. Papers are not badly written and/or the described research is not of low quality but the papers do not suit the objectives of the journal. We need to orient ourselves to the needs of the readers and to the journal policies (Samuels S. J. 1991).

The aims of a journal can be found on its web page or editorials published in the first or last issue in a volume. Journals’ web sites usually give the following information:

a) editors, indexing in databases, forthcoming thematic issues,

b) aims and the content of the journal,

c) recommended style of writing,

d) copyright issues of the papers,
You should decide if your manuscript fits the aims and the content of the journal. In this case you have a good chance to be published.

Indexing of the papers of a journal in scientific databases is an indicator of the quality of the journal. The other indicators are high frequency of citing of the papers in other journals, well known editors and editorial board members, low acceptance rate, etc. (Klingner, Scanlon, and Pressley 2005). Publications in highly valued journals have more weight in your CV but it is more difficult and time-consuming to get published in these journals.

Scientific databases themselves are of various prestige in the scholarly world. The most prestigious is the ISI (Institute for Scientific Information) Web of Knowledge (Current Content). It includes the most valued scientific journals in the world. Every branch of science has its own database, for example the SSCI (Social Science Citation Index) in social sciences, the ERIC (Educational Resource Information Center), the International ERIC and the BEI (British Education Index) in education, PsycARTICLES and PsycINFO in psychology etc. The common searching engines are not the usual tools for finding scientific papers.

The acceptance rate of a journal is the proportion of the number of submitted manuscripts to the number of published manuscripts. The acceptance rate of journals is very different; it varies from one percent to eighty percents (Henson 1999). High quality journals have lower acceptance rate as rule, but some top-quality journals have high acceptance rate as well. Kenneth T. Henson (1999, 780) recommends young researches not to send their manuscripts to the journals with the acceptance rate below 25%. Her paper includes some data about the acceptance rate of journals on education.

Journals have thematic issues that are announced about a year before the composing of the issue. If the topic of the manuscript fits the content of a thematic issue, prefer the issue. The acceptance rate into the thematic issues is about three times higher than the acceptance rate into the general issues of the journal. After the thematic issue is published, the editors tend to reject the manuscripts on this topic (Henson 1999). The topics of the thematic issues can be found in the editorials of the journal and on the journal’s web page.

Different journals value different components of quality and you should have this in mind while selecting the appropriate journal. Some journals value practical implications of the research, the others value the originality of findings and approach, the others emphasize high clarity and readability of presentation, still other editors base their decisions mainly on the rigor of the research methodology, etc (Day 2006). Send your manuscript to the journal which values the aspect well developed in your article!

You have read many papers while preparing your research and manuscript. The journals you have read most are usually the best to submit your manuscript. You know the scientific problems of the journal, the favored research methods and the style of presentation. You have used this knowledge in your paper and therefore it fits the journal. You probably have read some papers from one or two editorial board members. The members can be the blind reviewers of your manuscript.

It is easier to publish papers, which correspond to the world-view of the editor and reviewers (Toomela 2003). You can find something about this world-view if you
read the papers of the editors and editorial board members on your topic or related topics.

Really new knowledge is easier to publish in periphery; it can be published in the leading journals only if there are two competing scientific schools (Toomela 2003).

Most manuscripts are rejected by highly valued journals. Nevertheless, the papers are published in some other journal. You can have more than one journal in your mind as the possible places for the publication of your manuscript but you can send your manuscript only to one journal at once. If you are not sure in the selection of the journal, you can send the abstract of your paper to the editor and ask if this paper might be of interest for the journal (Klingner, Scanlon & Pressley 2005; Murray 2005, 63 - 64).

Writing the abstract and introduction

Robert Hauptman (2005, 115) writes: “Perhaps the single most important point is to have the desire to discover something new and share it with readership”. It is time to begin the writing of a paper when you have something to say to your colleagues in the scientific world (Klingner, Scanlon & Pressley 2005). You have an evidence-based new conclusion. The conclusion makes some contribution to theory and it can be applied to develop practice. The new idea can be developed on data, which you have used earlier in another paper to base the conclusion in another area.

Usually the question is to be answered are you the single author of the paper or somebody is your co-author. It is always easier to write in cooperation, the quality of the paper will be higher and you learn something from your co-authors (Hauptman 2005; Murray 2005). It is useful to work in-groups and speak about the idea of a paper to colleagues and if they add something essential to the framework of the paper, they have the right to be the co-authors. All the persons who have added creatively to the research or writing are the authors.

Further we will treat the traditions of scientific writing according to the usual structure of a research paper. The structure is as follows:

a) abstract,
b) introduction,
c) methods,
d) results,
e) discussion,
f) conclusion,
g) references,
h) appendices.

The structure has been developed for the papers describing empirical studies but it is used for other types of papers with some modifications as well. In the papers about case studies, the discussion and the results parts may be joined. If the conclusion is short, then it can be given at the end of the discussion without a special heading, etc.

It is useful to start the writing from an outline of the paper (Lester 1990; Neman 1989). The outline organizes any support you can give to your main new idea. The subheadings in your outline should describe their content as fully as possible – then the outline is of real help in writing. I have put concrete ideas into my outlines and references to literature to rely on during writing. In my outline, it is also given how many pages or characters can be devoted to every subheading in the paper.
Composing a good outline constitutes about 20% of the total writing time. It prevents many rewritings, additions or deletions after writing.

The title of paper should clearly describe its main idea. Besides this, ask yourself which words you will use in looking for this kind of information in databases and look if the words are in your title. If not, consider rewriting of the title or include the important words into keywords. A theoretical concept may be more interesting in the title than empirical bases. A good title is up to 12 words. Waste words (study on, a, the,…) should be excluded and verbs are not used. The title does not contain abbreviations (Tirri 2002).

The abstract reflects the main content of the paper. It usually includes the following information:
  a) purpose of the paper,
  b) methodology of the research: subjects, instruments, procedure,
  c) findings and conclusion,
  d) the value of the paper.
The journal editors give the length of the abstract for their journal. Usually it is up to 100 – 250 words. In spite of the small volume, the abstract must be understandable without the paper. The research is described in the past tense.

Introduction is one of the most difficult parts to write. It has several tasks: to develop the background of research, indicate the importance of the problem, and formulate the aim, hypothesis, and rationale of the research.

A weak review of the literature indicates that the author is not competent enough in the area and this may be one of the reasons for the rejection of the manuscript. A good review of the literature demonstrates the logical continuity between previous and present work. It discusses only this literature which is related to the problem. You cannot review all the papers available and give an exhaustive historical review. It is useful to begin from a recent meta-analysis if available, to consider the latest publications in the area and especially in the journal to which you intend to submit your paper. The editors and authors of the journal can be the reviewers of the manuscript (Fradkov 2003). The review should be understandable to a relatively wide audience. Nonessential details, statements, and concepts intelligible only to the specialists might be avoided. A simple statement of controversy is better than an extensive and inconclusive discussion. A good review describes the problem and the solutions proposed by other researchers. It emphasizes the pertinent findings and possibly relevant methodological issues (Publication manual … 2003).

It is very important to formulate the aim of the paper. The aim points to the final conclusion of the paper. The aim and the conclusion are the center of the manuscript where to concentrate all the material. The review of the literature depends on the aim; the research methods depend on the aim, and the discussion. Without a clear aim there can be much information in the paper but it is not understandable why all this material is given. At the same time, the word “aim” is sometimes omitted. For example, “The paper examines…”. The aim can be divided into more concrete research questions. After the aim, restrictions of the research can be described.

Quantitative research is based on the theory about the phenomena investigated. The theory is described in the review of the literature and an untested inference or an unsolved problem is defined. The theory enables the author to ground a hypothesis to solve the problem. Together with the hypothesis, the explanation should be given why this hypothesis is raised.

At the end of the introduction, there is sometimes a short description of the rationale of the investigation described in the paper (Publication manual… 2003, 17).
The rationale gives an overview of the logic and the data used to ground the final conclusion. In the rationale, the variables manipulated are mentioned, the research methods, different parts of the research if available etc. are referred to. The general scheme of the paper prepares the reader for a better understanding of the details in its following parts.

Writing the methods and the results section

The next important part of a scientific paper is the methods part. It usually has subheadings: subjects, instruments, and procedure. The method must be written in detail so that the reader can replicate the research because the replicability of research is the cornerstone of the scientific method. Unusual methods may require a literature citation. If the paper describes a continuation of an earlier study and the method has been soon published in detail, you may refer the reader to your earlier paper and give a brief summary of the method (Publication Manual … 2003, 17). Statistical methods can be named in the results part. Too many details burden the reader with irrelevant information; therefore you should be parsimonious with details and words. On the other side, too brief and vague methods description may cause the rejection of the manuscript (Klingner, Scanlon & Pressley 2005, 16).

In the first subsection of methods, the subjects are described. Usually the numbers of subjects, their age, educational level, ethnicity, division by gender, socio-economic status, etc. are given. It is very important to give the information about the representativity of subjects. As far as the strict methods for ensuring representativity are usually not used in educational research, some comparison of the subjects in the research with the entire population is of big value. For example, “the subjects were from the top third ability group in the Republic of Lithuania” or “an average rural school”. The school names or the students’ names are usually not given; pseudonyms can be used if necessary.

The second subsection of methods is instruments used in research. Describe in detail the basis and the composition of your own questionnaire or test (including the number and the type of questions). Give examples of questions! Sometimes the whole questionnaire is in the appendix or the results part. If you were using the instruments elaborated by other researches, give the exact names and references of these tests and questionnaires! The method for verifying the correctness of the translation of the instrument should be mentioned. It is very important to give the data about the reliability and the validity of your instruments.

The third subsection of methods is procedure. You should explain why you used this procedure and then represent it. Describe the rules followed in the data gathering process: instructions given to students, time for filling in the questionnaire, randomization procedure, the language used, etc.! Describe the coding of the subjects’ answers if unusual or the method for the analysis of the textbook. Sometimes the researcher could not exactly follow the procedure fixed in the research plan. The deviations from the planned procedure can be referred to in this subsection of the paper.

After the methods part, the results of the research are given. In qualitative research the results are the subject’s expressions, data in documents, individual scores in questionnaires or tests, reports of observations, etc. The results of quantitative research are usually given in tables and graphs. These are the average data for groups of subjects, not individual scores. Only these data are presented which are needed for
grounding the final thesis. Tables and graphs are not retold in the text but their main content can be formulated in the results part. A short introduction of the sources and the importance of the tables are added. The tables and graphs are usually given on separate sheets at the end of the manuscript. In the text there is an instruction: “Insert Table 1 here!”

The methods of statistical analysis of the data essentially belong to the methods part however the statistical methods are usually given in the results part. The methods are named and then the results of the analysis are given. Unusual methods need reference to the source where the method is introduced and/or need explanation of the method. To give the reader a better understanding of the research, some data are added even if they are not used in the discussion part. Arithmetical means are given with the sample size and standard deviations. Variable means, reliabilities, and significance levels are added to correlation coefficients. Mean effects and differences are supplied with statistical significance (p value) (Publication manual ... 2003, 21 - 22).

Writing the discussion and the reference list

Discussion is the most important part to write. It explains how the results approve or disapprove your hypothesis (the disapproved hypothesis must have solid bases in the introduction part of your paper). The generalizations should be explained and compared with the findings of other researchers. The conclusions contradicting the mainstream thinking in your area must be very well grounded or omitted.

The structure of the discussion must be in accordance with research questions, hypothesis and results. You have to discuss and not to retell the results. You are not allowed to introduce new data in the discussion part (Klingner, Scanlon & Pressley 2005).

In the discussion part, you are to evaluate and interpret the implications of your results. The shortcomings of the method can be given here as well; sometimes they are at the beginning of the discussion. Many discussion sections are too long and verbose (Tirri 2002). If the discussion is short, then you can join it with the results or the conclusion part.

In the conclusion section you give the main results of your research and the main answer to your research question. This is your contribution to the development of science. It is soon the fourth time you write down your main idea: the first time it was named in the heading, the second time formulated in the abstract, the third time thoroughly explained in the discussion, and the forth time repeated in the conclusion. Implications based on your findings are also very important here and new research questions can be named. But no new ideas are introduced in the conclusion part. Sometimes a mistake in the concluding parts is that a general inference is made although the subjects in the research were not representative to the whole sample.

The most important rule in composing the list of references is that all the sources you have referred to in you text must be included in the reference list and the list should contain only these references which are mentioned in the text. You should follow the journal’s rules for forming the references, which in many cases are the same as in the Publication manual of the APA (2003). If you are using an Internet source, then the address of the source and the date of retrieval must be given in the reference list besides the journal name, volume, etc. (Publication manual ... 2003, 231). All the parts of every reference should be checked in the original publication.
Secondary references should be avoided. The reference list is an important source of information not only for readers but for reviewers as well. It is important to include significant publications of recent years preferably from published journals in it. Look carefully for publications in the journal to which you intend to submit your paper (Tirri 2002)! A poor reference list is a good justification for the rejection of a manuscript (Fradkov 2003, 1647).

Some papers have appendixes. The appendix may include: a list of stimulus materials, or an unpublished test and its validation, a new computer program, a complicated mathematical proof, or a complex piece of experiment, etc. (Publication manual … 2003).

Academic style

To get people to read your paper, it must be interesting in content and style. The content is to some extent new to the readers and the style should be engaging and even exciting. The effect can be reached by indicating on controversies, giving unexpected results, simple writing etc. (Mikk 2000, 243 – 268). The text in the active voice and the first person is more interesting than the text in the passive voice. At the same time, the passive voice suggests objectivity of the material. The scientist must be objective and examine all the arguments pro and contra of his/her thesis. Expressions of surprise, exclamations, apologies, etc should be kept to the minimum in the text (Põldsaar & Türk 1999).

A scientific text is usually difficult to read. It contains a new knowledge and many scientific terms. In spite of that you should try to explain your idea as simply as possible. Editors are not willing to publish papers, which are understandable only to some colleagues of the author. Comprehensible writing is important to the reviewers as well (Samuels 1991).

There are many rules for clear writing (Mikk 2000, 157 – 198). Some of them follow.

1. Avoid long and complicated sentences! Every sentence is to be taken into working memory before it can be understood but the capacity of the memory is restricted. You can look at the words in your text and ask if they are really needed there. Klingner, Scanlon and Pressley (2005) recommend avoiding the passive voice.
2. Prefer simple words! Restrict the usage of complicated terminology! Do not put symbols and descriptors you have developed for yourself into your paper! Words are in the text not to impress readers but to express your concept (Day 2006).
3. Make your text as concrete as possible! Abstract concepts are difficult to understand. Give examples! There can be examples of the questions from your questionnaire, the examples of subjects’ answers, the examples of interpretation of the phenomena studied, etc.
4. Follow the usual structure of a research paper! Relate all the parts of your paper to each other and to your final conclusion! Present your problem and base a solution!

The recommendations for understandable writing should be used to the extent needed by the readership of the journal.

One more aspect in writing is important – your language should not hurt anybody. Usually the papers referred to in the introduction part are not criticized. If
needed, the controversies and unsolved problems are pointed out. You should avoid sexist words: (mankind, he, chairman, etc.), racist words (Negro, wog, etc.), ageist words (crone, geezer, etc.), and homophobic words (queer etc.) (Põldsaar & Türk 1999). Nowadays “he” is replaced by “he/she” or “s/he” if the gender is not important; “chairman” is replaced by chairperson” etc. Discriminative words also decrease the objectivity of the message. They may hurt readers independently of the author’s neutral intentions.

The last aspect in the academic style we consider is plagiarism. Põldsaar and Türk (1999) differentiate two types of plagiarism:
1) taking someone’s text, table, or picture without indicating the source,
2) “documenting the source but paraphrasing its language too closely, that is, lifting whole phrases from the original or using the original’s sentence structure” (Põldsaar & Türk, 1999, 22).

If you lift the whole phrase, quotation marks are needed and the page number of the original text should be indicated. There is however a practical problem. When I make notes from a book or a paper, I may use the phrases from the text because they are so good. If I now put the phrases into my own paper without using the quotation marks, I will violate the rights of the original paper’s author. The only solution is to put all the phrases in my notes, which I have taken from another person’s text into the quotation marks. Nowadays xerocopying is replacing note taking.

Quotations are not recommended to describe your thesis. The thesis should be presented in your own words. Quotations can be used to support your position (Neman 1989, 382).

Before submitting the paper

It is useful to give the manuscript to colleagues for reading and to carry out the last check before submitting it.

Colleagues will see your paper as readers or reviewers and their questions or critical remarks are useful to be considered before submitting. If you have no college in the area at your faculty, you can send the manuscript to an honored scholar. The scholars usually are ready to help young researchers (Klingner, Scanlon & Pressley 2005). Ask the colleague to assess your paper in several aspects (Day 2006; Tirri 2002):

- Is the title appropriate?
- Does the abstract summarize the content of the paper?
- Is the aim of the paper clearly stated on the first page?
- Is the text logically flowing from point to point with subheadings, introductions and conclusions to sections?
- Are the method, results and discussion convincing in grounding the conclusion?
- Are the implications clearly specified?
- Is the text written in reasonably short sentences, without too many scientific terms or jargon?

Most of the scientific work is published in English but the native language of European or Asian researchers is not English. The journals require that your manuscript must be in perfect English, usually American. You can give your native language text for translation but this is not a perfect solution – the translator is not
familiar with your specific terminology and you do not learn English needed in the
contacts with other researchers. It is better to write your paper in English by yourself.
Of course, a good knowledge of English and an intense will is needed but the work
pays back. The English spell-checker in the computer helps you to correct many
spelling and some stylistic errors. It is very good, if you can have a writing coach
who will help you in writing (Klingner, Scanlon & Pressley 2005). In every case, you
should give your manuscript to a native English speaker to make the final language
editing.

While writing, you have followed the instructions to authors found on the
journal web page. Nevertheless, it is useful to carry out the last check before
submitting the manuscript. The Publication manual (2003, 380 - 382) includes the
answers to the following questions in the last check:
- “Is each paragraph longer than a sentence? …
- Do all headings of the same level appear in the same format? …
- Are any unnecessary abbreviations eliminated? …
- Are the references cited both in the text and in the reference list? …
- Are journal titles in the reference list spelled out fully? …
- Is each figure labeled with the correct figure number and a short article
title?”

If the journal is using blind reviewing, then you should remove all the information
that might reveal your identity from the text (Klingner, Scanlon & Pressley 2005).
The usual composition of a manuscript for submitting is as follows (Tirri
2002):
- The first numbered page is for the title, the authors’ names and addresses.
- The second page is for the abstract.
- Introduction starts on the third page and each succeeding section starts on
  a new page.
- Each of the tables and figures is on a separate sheet at the end of the
  manuscript.

The editors are interested in having the number of copies, which is needed for
reviewing, and look at your paper if it is clearly printed and looks nice.

Submitting and resubmitting

You shall include a cover letter to the editor while sending the manuscript. It
creates the first impression of you and your paper. The cover letter includes the
journal name, the heading of the manuscript, and the authors’ names. It briefly
describes the contents of the manuscript and explains why you have chosen the
specific journal. Write about similar publications written by the author. Refer to
previous correspondence if there was any! Indicate the contributing author and give
his/her surface mail address, telephone number, e-mail address, and fax number!

Editors are eager to know that the authors are the owners of the copyright to
the manuscript. Copyright consists of moral rights (to make changes in text, etc.) and
of property (to receive royalties) rights. All the rights belong to the author(s) at first.
However, it can be written in conformity with the labor contract that the property
rights on your paper, book, etc. belong to your university. While sending the
manuscript, you should be ready to sign an agreement for the transfer of copyright. In
the agreement the authors warrant that:

- the article is their original work,
they have written permission to use any table, illustration, text that has been published earlier,
the article has not been assigned or licensed by them to any third party.

According to the written agreement, the authors usually assign all the rights of copyright to the publisher, although they should leave the moral rights themselves. In some countries, the papers are published without signing the copyright agreement.

The researchers are willing to publish their research work in their native language and in English. This is not against the law if publishing in the native language fits one of the following cases:

- there was a license for publishing the paper only once,
- there was a license for publishing the paper during certain time,
- there was a license for publishing the paper only in the native language,
- there was no agreement for the transfer of copyright (Pisuke 2004).

You should inform the editor of the English journal about the publication in your native language in the first letter to him/her and indicate in the agreement that it was not earlier published in English. International journals usually ask the author to transfer the copyright and after that it is not possible to publish the same paper in the native language without including the right in the agreement with the international journal or fitting the agreement to one of the three first cases above.

The manuscripts can be submitted electronically or on paper double-spaced. Study the submission guidelines on the journal’s web-site! Electronic submission is faster and usually it gives the possibility to follow the review process of your manuscript.

After the submission, you will receive an acknowledgement saying that your paper has been received. The editor will send your manuscript to (anonymous) reviewers. It can be sent to editorial board members or to the author you refer to in your reference list (Fradkov 2003, 1644). They will have one to six months for reviewing (Henson 1999). If you have not received the feedback in three months, you can write to the editor and ask about the progress of reviewing.

The reviewers are mostly engaged with the content of the research described not as much with the writing of the paper. The usual questions answered by the reviewers are as follows (Publication manual, 2003):

- Is the research question significant?
- Have the instruments satisfactory reliability?
- Does the research design fully test the hypothesis?
- Is the research advanced enough for publishing?

The reviewers may criticize some parts of your paper and give some suggestions. Be careful with understanding and using the ideas! “Do not believe everything an editor says. Do not disbelieve everything an editor says” (Hauptman 2005, 118).

The editor sends the blind reviews, their summary and a conclusion to the corresponding author. The reviews may be very different. The conclusion depends heavily on the significance of your problem and your contribution to its solution (Fradkov 2003). There are four possible conclusions (Table 1). We have to keep in mind that many published papers have been rejected somewhere before publishing (Klingner, Scanlon & Pressley 2005).
Table 1.
Possible conclusion of the editor
and the author’s actions

<table>
<thead>
<tr>
<th>Editor’s decision</th>
<th>Comments</th>
<th>Author’s actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept as it is</td>
<td>Almost never happens after the first submission</td>
<td>Wait for proofs and sign the agreement for the transfer of copyright</td>
</tr>
<tr>
<td>Needs minor changes</td>
<td>Happens after the second or third submission</td>
<td>Make the recommended changes and resubmit</td>
</tr>
<tr>
<td>Revise and resubmit</td>
<td>Usual decision after the first submission</td>
<td>Make the acceptable changes and resubmit</td>
</tr>
<tr>
<td>Reject</td>
<td>Often the result of choosing a wrong journal</td>
<td>Make the important changes and submit to another journal</td>
</tr>
</tbody>
</table>

It really is a compliment to receive the editor’s decision: “revise and resubmit”. Respond to the editor at once and agree to rework your paper by the date given (Day 2006; Murray 2005).

Critical remarks in the reviews are a free advice and support to your research! Read them carefully and consider possible changes! Agree with the reviewer if your main thesis remains unchanged. The editor is waiting for changes you have made during the revision. Do not agree with the reviewer if your position is correct. You can explain the position using some more details.

Submit the revised paper and the letter of explanations, which describes the changes you have made and explains why some suggested changes were not acceptable (Klingner, Scanlon & Pressley 2005). The editor can send your paper to the same reviewers or new ones and you will receive new reviews together with the editor’s conclusion, which usually is more favorable. If only minor changes were needed, the editor can accept your paper himself or herself.

The accepted paper!

The editor informs you about the acceptance of your paper immediately when s/he takes the decision. S/he also notifies the year and the number of the issue when your paper is published. Publishing can take from one month to two years (Henson 1999).

In some universities, the accepted paper is considered as valuable as a published one. There is no doubt that it will be published at the time noticed. However, the publication itself can take up to two years.

When the layout of your paper is made, you will be asked to read it and sign the text. You have to correct the spelling errors but you are not expected to disagree with the changes, which the editors have made. The only exception is the changes
that contradict your important ideas (Day 2006). It is not the time to add or rewrite anything.

Together with the signed proofs you will be asked to send the agreement for the transfer of copyright. The editor will send you a ready-made agreement and the author usually signs it without discussion. Some journals charge the authors money for printing tables, charts, etc. (Henson 1999). Usually the journals do not pay authors fee.

After the publication of the journal issue with your paper you will receive about ten copies of your paper to send them to your colleagues. Some journals send a pdf copy of published the paper instead of paper copies.

The description above gives an idealized picture of writing a research paper. Very many recommendations were given but it is practically impossible to follow all of them in one paper. You succeed in meeting some requirements to the paper and the others may be met not so good. Nevertheless, your paper may be published if it adds something to the international discussion in your area.

I have been analyzing the research methods in published papers together with my doctoral students in education and we have found shortcomings in them, sometimes serious. It does not mean that you should take the research or writing your paper without proper care. The higher the quality of your paper, the more rapid will be your success in science. It just means that it is impossible to write an ideal paper. There are excellent papers and published papers!

References


