Programme of advanced academic doctoral training – academic year 2021/2022

Scientific research, communication and deontology

Prof. Toma-Leonida Dragomir, Eng. PhD

Lectures delivered based on the materials of

Prof. Alexandru Nichici, Eng. PhD

Tenure professor of transversal disciplines in the programmes of advanced academic doctoral training from 2008/2009 – 2010/2011

Course outline
Communication by means of scientific papers

1. Why “scientific communication” ?

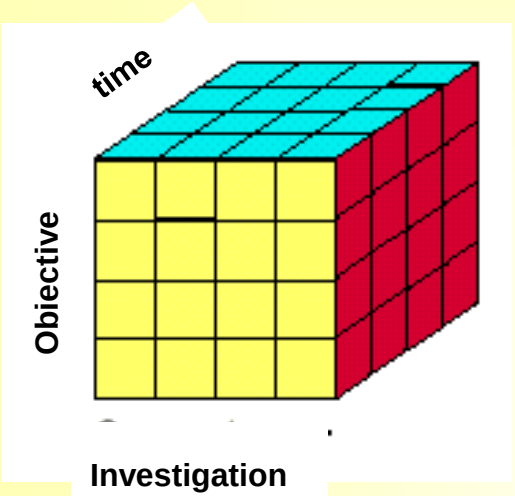
2. The process of communication of a scientific paper (strategic stages)

3. Elaboration (design) of a scientific paper
   - 3.1. Establishing the strategic elements of communication
   - 3.2. Organizing the research findings
   - 3.3. Structuring the scientific paper (follows in lecture 5)

1. Why “scientific communication”?

- to openly validate and make use of scientific research findings;
- to join the international scientific community, to increase personal (and sometimes institutional) prestige, visibility and credibility within the scope of research;
- to meet the requirements of academic, scientific, professional or managerial promotion and recognition;
- to develop new means of cooperation for the investigation of the field of study;
- to attract economic and/or governmental entities in funding future research programmes.

2. The process of communication of a scientific paper (strategic stages)



Decision of elaborating a scientific paper

Design → **Editing** → **Communication**

outline of the scientific paper

final manuscript of the scientific paperal

communicated/published scientific paper

Today, just the first stage, „Design” !

- The presentation focuses on scientific articles, but may well be extrapolated to other types of papers!

3. Elaboration (design) of a scientific paper

Design → **Editing** → **Communication**

- ❖ 3.1. Establishing the strategic elements of communication
- ❖ 3.2. Organizing the research findings
- ❖ 3.3. Structuring the scientific paper

Strategy = totality of objectives and planning elements in the development of an action, in a predefined context.

3.1. Establishing the strategic elements of communication

a. Content of the future scientific paper

b. Research team – authors

c. Main message of the paper

d. Keywords and provisional title

e. Target audience

f. Choosing the communication channel

g. Identification of possible communication restrictions

a. Content of the future scientific paper

The logical essence of any scientific paper presenting research findings consists in evidencing and validating the task undertaken as a possible solution to a given problem.

Types: # according to the nature of the content (the purpose of the paper)

- a1) bibliographical synthesis papers
- a2) mainly theoretical papers
- a3) mainly empirical papers

according to approach followed (features)

- b1) mainly descriptive papers
- b2) mainly comparative papers
- b3) mainly interpretative papers

Type	a1	a2	…	a1&a2&a3
b1				
b2				
…				
b1&b 2&b3				**x**

The ideal paper

integrates, in a rational, harmonious, balanced and convincing manner

- **elements of bibliographical synthesis, theoretical and empirical analysis**
- **the type of approach – descriptive, analytical (be the case), comparative and interpretative**

b. Research team – authors

Scientific research nowadays relies on team work. Consequently, ownership of the scientific papers derived from research belongs to a team of authors. **Initial decisions:**

- team members and responsibilities

  Authors: those actively and significantly involved in the planning, development and completion of research, and possibly, of the scientific paper

  - main author / first author,
  - co-authors;

- authors' participation in paper writing
  - only one author writes the paper,
  - several authors write different individual parts, and the main author puts together all the parts into a coherent final version (final paper),
  - several authors participate together in writing the whole paper;

- ways of solving possible conflicts within the team of authors

Elaboration of a scientific paper

- ordering authors' names in the paper
  - in decreasing order of contribution,
  - alphabetically, when authors' contribution is fairly equal,
  - in case of research performed by young researchers (master dissertations, doctoral theses, research programmes aimed at young researchers):
    - **young researchers shall be first authors of the paper;**
  - researchers holding scientific and management titles/positions, actively and significantly involved in the research process, may be co-opted as co-authors;
  - individuals who facilitated and supported the research, with no direct and significant scientific contribution, may be mentioned in the Acknowledgements section.

Single-author papers – specific to certain situations and domains.

c. Main message of the paper

- **Place in the paper: *Conclusion* (related to the content and results), *Abstract* (compulsory, related to the purpose and the degree of reliability of the paper) and *Introduction* (should state the objectives)**

➢ **Clear, accurate and concise enunciation of the conclusions** derived from the research presented in the paper (the conclusions should not be stated in the Abstract!).

➢ **Sentences should have a syntactic structure** consisting of 2 - 3 clauses, of about 15-25 words.

The main message may be expressed

- by an **affirmation / a negation**, supported by arguments and / or relevant evidence;
- by some **correlation / causality**, tested and validated by experiment.

Elaboration of a scientific paper

Main messages - examples:

❖ There are direct, controllable correlations among the width of laser cuts in metal, the intensity of laser radiation and the cutting speed.

❖ Laser cutting optimization cannot be achieved by simultaneous maximization of production, increase in processing precision and reduction of typical energy consumption.

❖ Adding ZrO_2 in $MoSi_2$ dust laid by Nd:YAG laser plating on a steel underlayer significantly diminishes overlay cracking.

❖ The calculation method proposed allows for real time control calculation.

d. Keywords

- a set of terms /phrases (usually 5), relevant to the scientific content of the future paper;
- minimum necessary information for the indexation and bibliographical research of the article.

Some symposiums, conferences and journals may impose their own keyword list for selection !

***Keyword* – A word of great importance, ..., Any word typed into a search engines in order to get relevant results.**

... and the provisional title of the paper

- a synthetic, extremely concise phrase (NOT a sentence!) reflecting the content of the scientific paper
- "IT card" of a paper, and therefore, the mostly read part of the future paper

The title in scientific papers – main requirements :

- to be original, informative and challenging;
- to summarize, correctly and accurately, the main message and the abstract of the paper;
- to use simple, clear words and phrases;
- to avoid redundant, useless words and phrases;
- to have a maximum of 10-12 words, that is two text lines.

Elaboration of a scientific paper

Provisional titles - examples:

- Significant Developments In The Construction Of Laser Technological Systems For Material Processing;
- Dampers: Military Applications;
- Mechatronic Applications In The Field Of Modern Welding;
- Chattering suppression methods in sliding mode control systems;
- Increases In Levels Of Sediment Transport At Former Glacial-interglacial Transitions

e. Target audience

- **highly specialized scientific research environments**, usually postgraduate, operating with high-level information and knowledge;
- **wider research and R&D environments**, dealing with technical issues, characterized by elevated thinking and action;
- **academic, scientific and technical management environments,** managing financial resources for research activities, with significant power of decision;
- **scientific and technical education environments,** part of bachelor, master and doctoral study programmes.

Choosing the target audience for a scientific paper relies on good knowledge of the expectations of the usual participants in a scientific event / the usual readers of the scientific journal where the paper is expected to be delivered / published.

f. The communication channel

The original scientific paper is to be published within formal communication channels of the type *scientific events* and/or *journals*, with/without peer review. Those "without review" do not typically enjoy international and institutional recognition.

As a rule**,** the following scientific events and journals should preferably prevail:

- the closest to the paper in question in terms of topic and quality,
- the most prestigious scientifically and professionally;
- the most frequent, considering the number of editions and issues;
- the ones with the largest audience and impact.

In reality, the choice should be made according to:

- the quality of the scientific paper;
- the authors' scientific status - beginner or experienced researcher;
- the authors' membership to competitive, top research teams.

The communication channel

A possible strategy for young researchers:

- in the short and medium term
  - publication in mother tongue, in local and regional proceedings and journals (the first scientific papers – up to 5);
  - publication in English, in national and international (foreign) proceedings and journals (the next 10-12 papers);
- in the long term
  - publication mainly in English, in Thomson Reuters-indexed (former ISI), high impact factor international journals;

https://www.thomsonreuters.com/en.html

- The exception proves the rule
  - Talented, motivated, hardworking young researchers, who can take advantage of professional and funding opportunities, can publish highly interesting and valuable papers in international, Thomson Reuters-indexed journals from the very beginning.

f. The communication chanel

A possible strategy for young researchers:

- **In the short and medium term:**

- publication in mother tongue, in local and regional proceedings and journals (the first scientific papers – up to 3);
- publication in English in national and international (foreign) proceedings and journals (the next 10-20 papers);

- **In the long term:**

- pulication mainly in English in WoS-indexed (Web of Science/Clarivate Analytics), high impact factor international journal;

http://apps.webofknowledge.com/WOS_GeneralSearch_input.do?product=WOS&search_mode=GeneralSearch&SID=C45Voc7wLsivnWGVEzd&preferencesSaved

- **The exception proves the rule:**

- Talented, motivated, hardworking young researchers, who can take advantage of professional and funding opportunities, can publish highly interesting and valuable papers in international, WoS-indexed journals from the very beginning.

Elaboration of a scientific paper

A possible dilemma:

- As a rule, a scientific paper should be designed as a distinct, unitary whole, in terms of objectives, logical organization and coherence of presentation.

- According to its complexity, extent and duration, a given research may be completed with the publication of one or more scientific papers.

Which is the best way to accomplish communication?

- Fractioned communication, in several papers, of the research findings is simpler, more efficient and better anchored in the present. It promotes a means of clear, deeper communication, of generalizing certain methods, and of developing certain case studies.
- Comprehensive communication, in one single paper, of the research findings has a stronger, yet delayed, impact. It requires more work and is more difficult.

The artificial multiplication of the number of published papers by arbitrary division of a ‘whole’ paper into ‘fractions’ (parts) is unjustified and unethical.

g. Identification of restrictions that can hinder communication:

- Source of restrictions:

- restrictions imposed by the organizers of scientific events or the editorial board of a journal;
- restrictions imposed by research funders;
- restrictions due to related applications (e.g. patent licensing);
- institutional restrictions (in top universities and institutions, the submission for publication of a paper is preceded by internal scientific approval);
- time restrictions (due to conferences dates, to the duration of the doctoral agreement);
- funding restrictions;

- Obligation to attend conferences where the paper has been accepted.

3.2. Organization of research findings

a. Primary analysis of research findings

b. Organizing and supporting ideas

a. Primary analysis of research findings

...relies on the identification, ordering and primary analysis of ideas, facts and essential data derived from the research and found in the main message created during the stage of establishing the strategic elements of communication.

Elements we operate with:

- ideas, facts and specific methods of reasoning and action;
- numerical data associated to causal quantitative correlations among the physical quantities we have worked with;
- relations, equations and mathematical models specific to the phenomena investigated;
- direct/indirect observations, findings and qualitative estimations of research object behaviour;
- elements similar to the above mentioned, with a referential role, selected from the bibliography.

Elaboration of a scientific paper

Correlation of the elements we operate with in the model adopted for research (see Lecture 2), with the purpose of:

- **ranking the elements relatively,** according to their scientific and technical importance and relevance;
- **identifying some efficient methods of preliminary processing** of research findings **and synthesizing** them in the future paper (tables, graphs, algorithms, drawings, photos, flow charts);
- **assuring consistency,** that is, getting rid of redundancies, thus **increasing consistency**;
- **creating a database** for the details, which allows authors to focus on the essential matters and on communicating them in a simple, clear manner.

b. Organizing and supporting ideas

...relies on structuring the information and knowledge derived from research findings, associated to the main message of the paper, individually and selectively, based on the logical sequencing of ideas (hypotheses) and evidence (facts and arguments).

Steps:

- **organization of** leading and supporting **ideas** expressing, specifying and supporting the main message and the original aspects;
  - Various methods can be used (for example: the conceptual tree of the paper (Nichici, Al. – Scientific Papers – Design, Editing, Communication, Ed. Politehnica, 2010, p. 126).
- **organization of evidence** that verifies, confirms and validates the defining ideas in the main message;
  - Requirements: the evidence should be measurable, accessible and persuasive by simplicity and clarity.
- **sequential, iterative application of logical reasoning,** which allow for the correlation of the available evidence derived from direct research findings with the ideas in the main message and with those throughout the paper.