



UNIVERSITY OF TARTU

Institute of Chemistry

How to learn more from environmental chemistry research papers?

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Activity

Please choose a role:

As a student:

- Remember one experience when you had to read and share scientific papers during the seminar. What you had to do? How exciting and engaging was the experience?

As a lecturer:

- Remember one experience when you gave your students a task to read and share scientific papers in the seminar. What students' had to do? How did you as a lecturer feel: how interested and engaged the students were?

What is traditional format of reading and discussing the research papers?

Rodriguez & Hawley-Molly (2017) describe the learning process as following:

- the teacher chooses the article
- one or two students present the article
- during the seminar/classroom meeting participants are expected to ask questions and discuss the article

The problem with traditional format:

- The main limitation of **traditional format** (Bimczok & Graves, 2019): **lack of students' engagement** in the **learning process** and the **discussion**, especially among those who have not read or do not present the article.
- Therefore, it is vital to **support and guide students in the process of selecting, reading, and discussing the papers.**

Context and research questions

- Two different formats to learn with research papers during the course were developed.
- The number of students for the courses is between 7-15.

Research questions:

1. How did the formats influence students' **engagement** with the subject?
2. How did the formats influence students' **interest** in the subject?

CONTEXT AND METHODS: Format 1

Chemodynamics in the Environment, MA level; 13 students;
7 articles; feedback from 10 answers.

- Learning outcomes:

- the ability to choose a scientific article suitable for the topic
- the ability to summarize and to present an article

- The role of the of the articles:

- to illustrate some environmental problem, knowledge or theory discussed in the lecture

A questionnaire with closed items (5-point Likert scale) and open questions: we asked about the learning experience (among others, we asked about engagement and increase of interest).

CONTEXT AND METHODS: Format 2

Environmental Chemistry, BA level; 7 students; 7 articles; feedback from 3 answers.

- Learning outcomes:
 - searches a research article, analyzes and evaluates it critically
 - writes an article on a professional topic for a reader with more general knowledge
- The role of the of the articles:
 - acquire the skill of in-depth analysing of a scientific article
 - enhance the skill of argumentation based on scientific data

A questionnaire with closed items (5-point Likert scale) and open questions: we asked about the learning experience (among others, we asked about engagement and increase of interest).

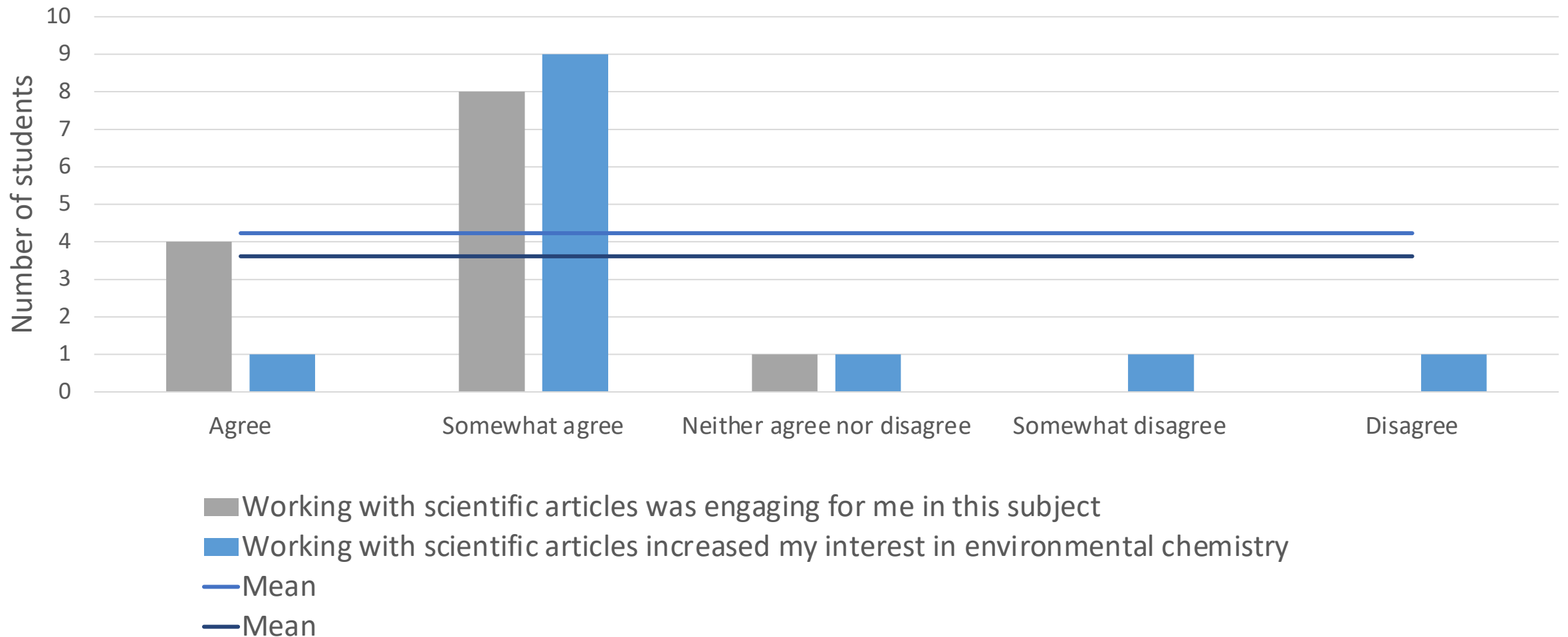
STUDENTS' TASK BEFORE SEMINAR

	TRADITIONAL FORMAT	FORMAT 1/CASE 1/MA LEVEL COURSE	FORMAT 2/CASE 2/BA LEVEL COURSE
1. The article is provided by ...	The teacher	The student	
2. The criteria of "good" article		A research article that has been published within the last five years in a peer-reviewed scientific reputable journal. Reputable databases and keywords were suggested.	
			The article must involve data and analysis from/of chemical measurements.
3. Individual task for reading the article	Review the article	Write a 0.5 A4 summary of the article. Post the summary and the link of the research paper 5 days before the presentation.	Write a 1 A4 summary of the article (the focus; methods; main results; argue why the article is the "best"). Post the summary and article to the forum before the seminar.
4. The task for participants before the seminar/meeting	Read the article	Fellow students read the summary of the article or the entire article and are ready to ask at least 1-2 substantial questions about the given topic.	

STUDENTS' TASK DURING SEMINARS

	TRADITIONAL FORMAT	FORMAT 1/CASE 1/MA LEVEL COURSE	FORMAT 2/CASE 2/BA LEVEL COURSE
5. The task for presenting the article during the meeting /Discussion (meeting)	One or two students present the article; other students are expected to ask the questions	<p>Every student presents his/her article for 10 minutes.</p> <p>After each presentation the discussion will follow.</p> <p>The process is repeated until all the articles are presented and discussed.</p>	<p>1. seminar: Each student argues why her/his article is the "best"</p> <p>Individual work: peer-feedback</p> <p>2. seminar: Choosing the "best" article of the group</p> <p>Individual work: Write a Blog Post of the "best" article (in Estonian)</p> <p>3. Seminar "Party": sharing and reflecting on the experience and the choice of the "best" article and writing the blog post.</p>

RQ 1&2. How did the formats influence students' interest and engagement in the subject?



A word cloud featuring the words 'information' and 'topic' in the largest, darkest font. Other words in various sizes and shades of blue and grey include: 'work', 'getting', 'familiarization', 'depth', 'solve', 'article', 'topics', 'independent', 'choice', 'horizons', 'task', 'opportunity', 'broadenings', 'specific', 'usual', 'area', 'challenge', 'difficult', 'analyzing', 'professional', 'chemistry', and 'fields'.

What makes
the format
engaging?

- Exciting topic: Environmental chemistry is more related to practical issues
- Topics are out of student's usual information area: broadening horizons and gaining new knowledge
- Familiarization with research works in other fields of chemistry
- The format was challenging
- Independent work with professional information
- Possibility of choosing the article

ground work interesting
knowledge
understandable horizons application broadening
findings sharing common new content

What aspects of
the format
increase
interest?

- Understanding how the knowledge from the scientific article can be used/applied
- Noticing that new information shared during the lecture is applied to research
- Gaining new knowledge about methods, and different fields in environmental chemistry
- Understandable and interesting content: Students chose the article that was within their reach
- Finding common ground with the student's thesis
- Sharing and discussing the knowledge

Conclusion

- It is challenging to increase interest in the field!

In both cases, students had already chosen the scientific field of interest (the thesis topic). Therefore, increasing interest in another topic is challenging even when the format is engaging.

- Choosing the article (autonomy!) and guidance on what and where to look for (keywords, databases, and other criteria) support student engagement.

References

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