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# A revisited version of the *disputatio* for pharmacological training: An educational study

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## KEYWORDS

Pharmacology;  
Therapeutics;  
Training program

## Summary

*Objective.* — The *disputatio* is a pedagogical method existing since the Middle-Ages where students had to debate about a question asked by a “master”, exercising their thinking and oratory skills. To move away from traditional vertical teaching methods, the *disputatio* has been revived by pharmacologists. Thus, for almost three successive years, several groups of young French pharmacologists and therapists confronted their ideas concerning a medical question at a therapeutic impasse. The aim here is to describe the initial feedback received from participants.

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**Methods.** – An anonymous questionnaire was sent by email in May 2023 to the participants of the different *disputationes* of 2019, 2022 and 2023. Participants were asked about different aspects of their feelings before, during and after the *disputatio*, using the 5-point Likert scale. They were also asked to describe the event in 2 to 5 words. Finally, participants could leave their comments in a free-field and were asked to give an overall satisfaction score out of 10.

**Results.** – Out of the 39 participants, 27 (69.2%) answered the questionnaire. Although 50% of respondents reported a feeling of anxiety before participating, most enjoyed the expert talks as well as working with people they did not know. Besides, over 66% reported having underestimated the skills they could share with colleagues from different backgrounds. Over 55% of respondents reported progress in methodology, and over 83% in pharmacology and/or therapeutics. Participants reported an overall satisfaction score of 8.6/10, and the main terms used to describe the event were “sharing”, “enriching” and “meeting”.

**Conclusion.** – The *disputatio* is an innovative training program whose pedagogical and human values were underlined by most of the participants. Beyond pharmacology and therapeutics, the principle of *disputatio* could be extended to other disciplines, spanning the centuries.

## Abbreviations

AMEE	Association for Medical Education in Europe
COVID-19	coronavirus disease 2019
GREET	Guideline for Reporting Evidence-based practice Educational interventions and Teaching
MERSQI	Medical Education Research Study Quality Instrument
SFPT	<i>Société française de pharmacologie et de thérapeutique</i> (French Society of Pharmacology and Therapeutics)

## Introduction

As early as the Middle-Ages, the *disputatio* was an established teaching method in universities. It was an oral exercise that was practiced by students who were already experienced. During this exercise, a question was posed by the teacher. A student, the “*respondens*”, first answered this question with coherent and structured reasoning. Then, another student, the “*opponens*”, opposed the first one by bringing contrary arguments. Finally, the teacher gave his “*solution*”, ending with a response to the objections that the “*opponens*” had raised [1,2]. This scholastic method decentralized the capacity for innovation, by avoiding a purely top-down teaching, from master to pupil. Some of this dispute has been published and preserved, such as the one in 1780 concerning the hormonal activity of semen by Gregorius-Josephus Jacquetart, a student who was considered as the first andrologist of the University of Leuven (Belgium) [3].

The French Society of Pharmacology and Therapeutics (*Société française de pharmacologie et de thérapeutique*

-SFPT) promotes the proper use of medicines, and mainly contributes to the national and international spreading of pharmacology and therapeutics. One of their working groups, the “*Avenir Network*” (*Réseau Avenir*) brings together young pharmacologists, therapists, MD, PharmD, MD/PhD and PharmD/PhD students from all over French hospitals and universities. It organizes various events for young professionals providing opportunities for training, networking, and disseminating their work. In 2019, the SFPT, through Régis Bordet, Silvy Laporte and the “*Avenir Network*”, proposed to update these debates to promote peer-learning by organizing the annual pharmacological and therapeutic *disputatio*. During this modern *disputatio*, a dozen of young pharmacologists and therapists in training (pharmacy and medical students, PhD students) gather for 2 days to provide a proposed scientific method on a medical question in a therapeutic “*dead end*”. In groups of 3 to 4 participants coached by a senior member, they develop a pharmacological and therapeutic strategy that might lead to solve this unmet medical need, up to propose an experimental design for conducting a clinical trial. The *disputationes* were presented to participants with a “*welcoming*” approach, emphasizing the playful aspect, in line with Aynsley et al. (2018) who highlighted that students were more confident in handling pharmacological knowledge and increased their skills after using a game-based approach [4]. None of the participants knew the topic of the session in advance.

To date, three sessions of *disputationes* were organized, with the following topics: obesity (2019), cognitive disorders in the elderly (2022) and heart failure with preserved ejection fraction (2023). After these three sessions, we aimed to assess how participants experienced the *disputatio*, from their *a priori* representations to their experiences during and after this event.

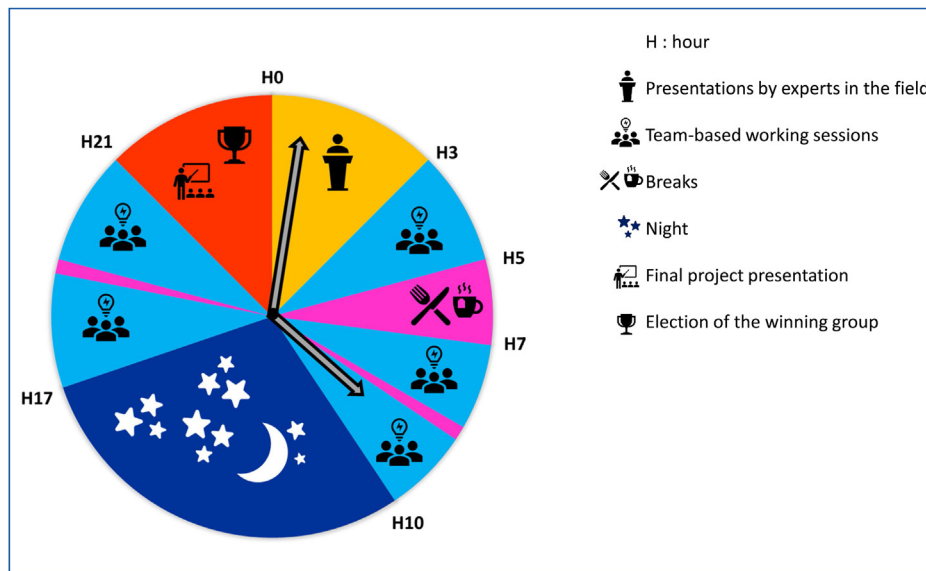


Figure 1. The 24-hours organization of the *disputatio*.

## Methods

We conducted a survey among participants [5], elaborated following the Association for Medical Education in Europe (AMEE) guidelines [6]. This survey provides a first assessment of the acceptability and the feeling of participants regarding the *disputatio*, in terms of anxiety, motivation, satisfaction, skills development, and future involvement in the SFPT. We reported our survey following the Guideline for Reporting Evidence-based practice Educational interventions and Teaching (GREET) [7] (Supplemental Digital Appendix Table S1).

### The educational intervention

The *disputatio* bring clinicians and young researchers together for a time-limited session in a conference room. The schedule of a session is as follows (as represented in Fig. 1): on the first day, for 3 hours (H0-H3, Fig. 1), after the revelation of the question, participants attend four presentations by experts in the field. They are then divided into groups of 3 to 4 participants, each supervised by a coach, a “senior” pharmacologist or therapist, to work in a team-based learning-like situation [8–11]. The coach is in charge of assessing the learner’s attendance, identifying any need for change in the educational intervention and assessing if materials, educational strategies and working sessions were delivered as planned. This session, lasting 19 hours (H3 to H21, Fig. 1), alternates with breaks for diner and sleep. At the end of this session, each group presents their proposals in 20 minutes to a jury of experts in the field and SFPT members and must answer questions from the jury and the other groups to justify its choice. On the criteria of innovation, methodology and feasibility, the jury deliberates to select the most convincing group, which is declared the winner of the *disputatio*.

The GREET checklist requires to state which step of evidence-based practice is targeted by the educational intervention, currently limited to defining a clinical

question, searching for and appraising the evidence, applying and assessing the clinical decision. Our *disputatio* goes beyond by asking the learner to develop a pharmacological strategy to overcome a therapeutic “dead end”. For the equipment, the intervention needs computer and projector, internet access, tables, and space to brainstorm in small groups. So far, no specific adaptations or changes of the process have been needed and the sessions have been delivered as scheduled.

### The actual pilot study

An anonymous questionnaire hosted by Microsoft Forms was sent by email in May 2023 to participants only (not to the coaches) to the 2019, 2022 and 2023 *disputatio* sessions. A reminder was sent one week later to increase the response rate [7]. The survey was finally closed on May 23rd 2023, 3 weeks after the reminder. The participation to the survey was voluntary, free of charges and non-remunerated. No incentives were provided to the participants. The participants were not identifiable from their answers to the survey, to avoid any expression bias. The invitation email briefly presented the survey. The mailing list was built from the participation lists to the previous *disputationes*.

The questionnaire was divided into four parts, to assess the participants feelings before, during and after the *disputatio*, using a 5-point Likert scale (0 = strongly disagree; 5 = strongly agree). In the first part, we assessed their apprehension as participants before the *disputatio*:

- if they knew what a *disputatio* was;
- if they were nervous about it;
- if they had felt the need for revising their courses;
- if they knew what to expect from their participation.

In the second part, we assessed during the *disputatio*:

- if they appreciated the lessons from the experts;
- how they felt about the topic and the question asked;
- their feeling about team-working in this particular context.

- In the third part, we assessed after the *disputatio*:
- their feeling about what they had learned;
  - the impact of the *disputatio* on their representation of pharmacology and their willingness to recommend others to take part.

Finally, they were also asked to describe the event in 2 to 5 words, to leave their comments in a free-field and to give an overall satisfaction score out of 10. The English translation of the survey is available in “Supplemental Digital Appendix - Questionnaire used (translated from French)”.

We assessed the quality of our study using the “Medical Education Research Study Quality Instrument” (MERSQI) [12]. We estimated the response rate using the “maximum response rate”: total number of answers divided by the sample size (“AAPOR RR 6”) [13]. All answers were complete. Statistical analyses were limited to the description of the percentage of the answer, without statistical tests and were conducted using GraphPad Prism version 5.00 for Windows, GraphPad Software, San Diego California USA available on <http://www.graphpad.com>.

## Results

### Features of projects submitted by the participants

All the participants presented relevant pharmacological and therapeutic projects, the scientific quality of which was underlined by the jury. Candidates were able to rethink pathological classifications to identify new therapeutic targets, and in particular new biomarkers. The diversity of the candidates’ backgrounds enabled them to develop translational projects, ranging from *in vitro* studies to umbrella clinical trials, *via* machine learning. Translational approach, innovative character, methodological rigor, and quality of presentation were all factors that attracted the jury and led them to identify the winning group. The winning group was then invited to present its proposal at the national congress of the French pharmacology and therapeutics society (since the 2022 edition).

### Our pilot study

The study displays a MERSQI score of 6 (Table 1).

Of the 39 participants in the three sessions, 27 (69.2%) completed the questionnaire. All the answers were complete and included in the analysis.

### Before the *disputatio*

Over 48% of participants felt they knew what a *disputatio* was, even though they had never taken part in one. Over 50% felt nervous but did not review their notes or books. (Fig. 2).

### During the *disputatio*

All participants clearly appreciated the experts’ lessons. While 42% were surprised by the topic, only 30% were unsettled. Over 66% of the participants felt they had

**Table 1** Medical education research study quality instrument (MERSQI) score.

	Score
Study design: single group cross-sectional	1/3
No. of institutions studied: 1	0.5/1.5
Response rate, %: 50 to 74%	1/1.5
Type of data: assessment by study participant	1/3
Validity of evaluation instrument, internal structure: not reported	0/1
Validity of evaluation instrument, content: not reported	0/1
Validity of evaluation instrument, relationships to other variables: not reported	0/1
Data analysis, appropriateness of analysis: appropriate	1/1
Data analysis, complexity of analysis: descriptive analysis only	1/2
Outcomes: satisfaction	1/3
Total	6/18

Adapted from Reed et al., Association between funding and quality of published medical education research. JAMA 2007;298(9):1002–9 [12].

underestimated the skills they could share with other participants and over 90% felt it was not difficult to work with unfamiliar peers. In line with this latter result, over 95% of the participants found it rewarding to work with unfamiliar members (Fig. 3).

### After the *disputatio*

Over 55% of the participants considered that they learnt in the field of methodology and over 83% considered that the *disputatio* had enabled them to learn in pharmacology or therapeutics. Over 29% of the participants changed their mind concerning pharmacology while 22% did not. Finally, over 92% of the participants would recommend taking part in a *disputatio* (Fig. 4).

### Verbatim and satisfaction score

The three terms most frequently cited by participants to describe the *disputatio* were “sharing” “enriching”, “meeting” followed by “challenge”, “network”, “diversity” and “emulation” (Fig. 5). Finally, participants reported an overall satisfaction score of 8.6/10.

## Discussion

By giving French students and young researchers the opportunity to work with unfamiliar peers, sharing their skills and knowledge with the aim of finding a way to solve a scientific question, the *disputatio* is an innovative approach, appreciated by participants. It has enabled most of them to enhance

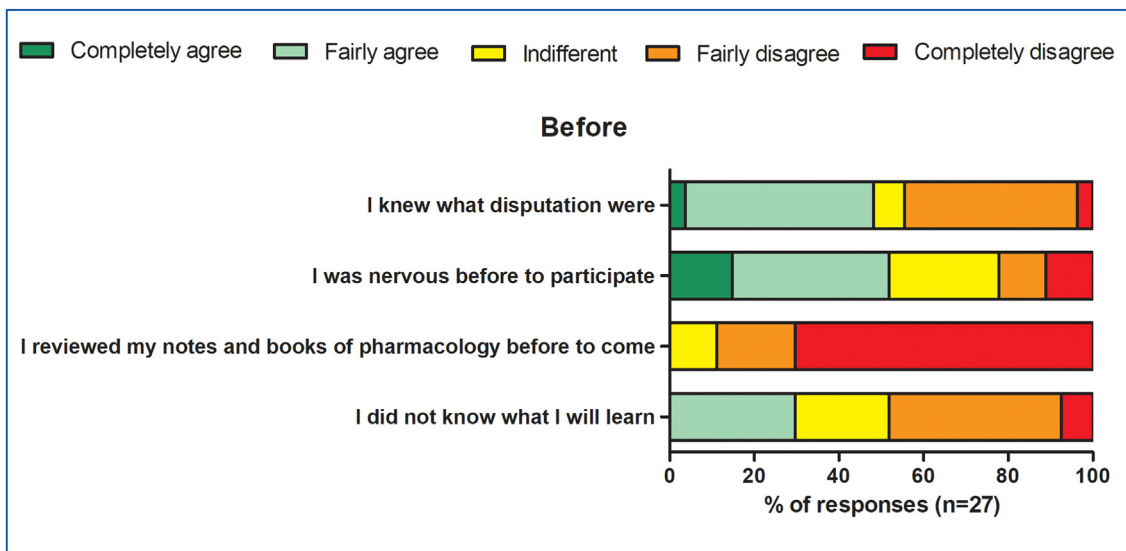


Figure 2. Apprehension of participants before the *disputatio*.

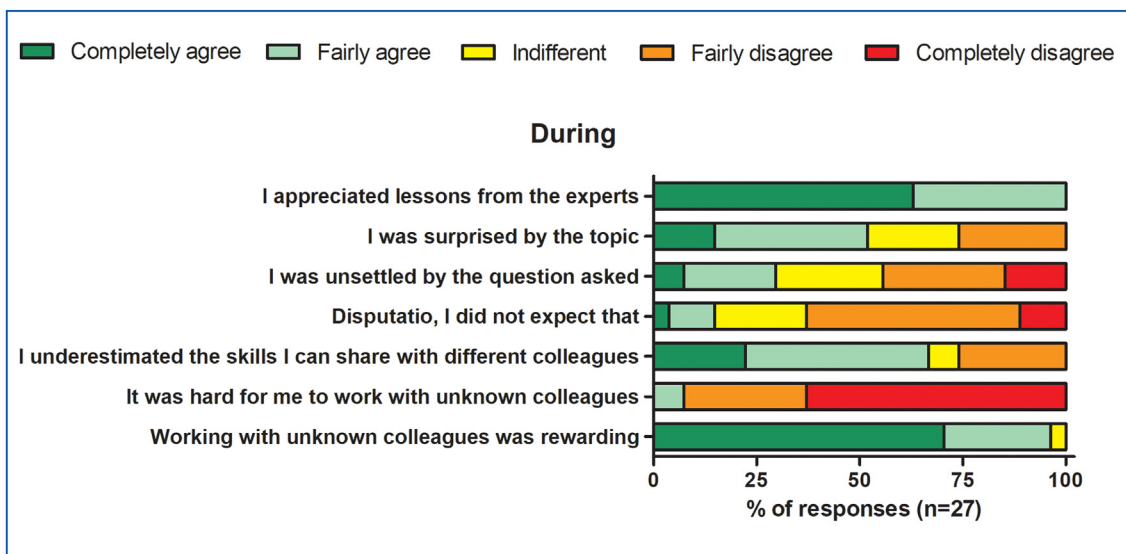


Figure 3. Apprehension of participants during the *disputatio*.

their skills in the fields of pharmacology and therapeutics. Even though most of the participants felt nervous and did not know what they were going to learn, they did not review their courses before taking part in the *disputatio*. This may be because the awareness of the topic beforehand makes the scope of revision too broad, or because participants did not feel much pressure about the experiment. Indeed, it was not a training course sanctioned by a formal examination and participants were not risking their careers in this competition. In addition, the aim of the *disputatio* is not for participants to prove their knowledge of the subject, but rather to demonstrate their reflective skills to solve the problem.

Lessons from the experts were largely appreciated and a wide majority of participants also appreciated to work with unfamiliar peers. This underlines the importance of developing group work, peer learning and

collaboration with unfamiliar peers coming from another area of expertise. Over and above the pleasure of working in a multidisciplinary environment, studies have shown that these practices improve the quality of healthcare for patients [14–19]. Collaboration requires, among others, that each person's role be defined and their skills recognized [20]. Pharmacology is a pleiotropic discipline that has the strength of bringing together professionals from different backgrounds (scientists, pharmacists, physicians) with different trajectories. The translational approach is one of the strengths of the discipline, with professionals for example specializing in preclinical research, clinical research, pharmacoepidemiology, toxicology, pharmacovigilance or addictovigilance [21]. Through the *disputatio*, participants were able to cross-examine their discipline and create a coherent methodological project.



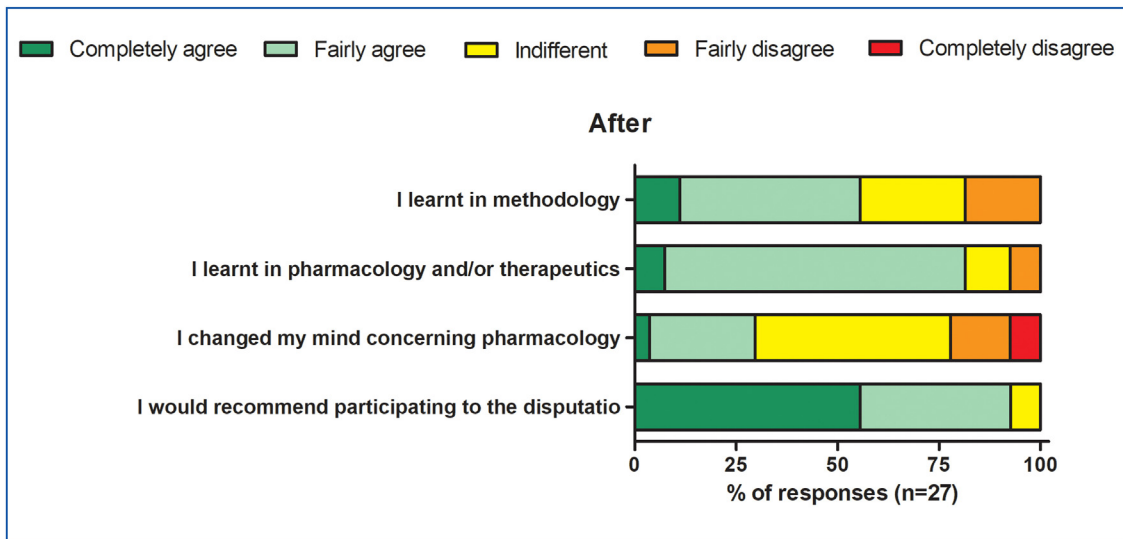


Figure 4. Apprehension of participants after the *disputatio*.



Figure 5. Word cloud illustrating the reported experience of participants concerning the *disputatio*.

The *disputatio* breaks away from the traditional framework of vertical learning, and enables other skills to be put to use [22]. Indeed, the team-based learning-like format of the *disputatio* has been described to increase participant reasoning [23]. This point has been underlined by Freeman et al. in a meta-analysis including 225 studies that found that whatever the discipline, active learning increased students' test scores compared to passive learning like lectures [24].

The participants' verbatim, in which the terms "enriching", "sharing" and "meeting" are the most frequently reported, is in line what was sought through the organization of *disputations* and with previous reports. Especially, Burgess et al. have shown that small-group learning in healthcare professions helps to bridge knowledge gaps, promote students' willingness to share ideas, give and receive feedback, develop skills in critical thinking, problem solving, communication, teamwork and leadership

[25]. In our experience, informal times (breaks, meals) were also essential to get to know the other participants and their skills. These different working and break times contributed to the richness of these meetings, helping to forge links and promote the extension of the professional network [26]. The coronavirus disease 2019 (COVID-19) health crisis also underlined the need for students to meet and exchange ideas on a wider scale, while distance learning and the removal of professional meetings have contributed to a feeling of isolation among students [27].

This pilot survey has several limitations. It was limited to the subjective assessment by study participants, without specific validated survey. Moreover, we did not collect descriptive data of the participants characteristics, and we cannot assess a potential selection bias. In addition, this pilot study displays a MERSQI score of 6, when the mean MERSQI score was 9.95 in a sample of 210 medical education research studies published in peer-reviewed journals [12]. However, the 70% rate of response was high. As a pilot study, it will serve as a basis for before-and-after studies in the years to come. Indeed, another limitation would be that the evaluation has been realized until four years after the end of the *disputatio* (for the 2019 session), which could involve a potential memory bias.

## Conclusion

The *disputatio* is an innovative training program based on an almost forgotten pedagogical approach whose pedagogical and human values were underlined by most of the participants. It is a meeting place for future professionals from different pharmacology and therapeutics fields, enabling them to take a multi-dimensional approach to a subject, and to think methodologically about a coherent research project. Beyond Pharmacology and Therapeutics, the principle of *disputatio* could be extended to other disciplines, spanning the centuries.

## Ethical statement

Not applicable. All methods were carried out in accordance with relevant guidelines and regulations. The participation to the survey was voluntary, free of charge, non-remunerated and anonymous. The participants were not identifiable from their answers to the survey, in order to allow their free expression. All subjects were >18 years old.

## Consent for publication

Not applicable. To participate to the survey implied a non-opposition to the use of the data.

## Availability of data and materials

The data analyzed for this study are available on request from the corresponding author.

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## Disclosure of interest

The authors declare that they have no competing interest.

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