

Critical Investigation – training critical reading skills

Summary

In today's society, there is a growing need for evidence-based practices. Therefore, we teach our students to read and generate scientific evidence, and to translate their findings into practical applications (policy advice, behavioral interventions, etc.). However, the increased awareness of fake news, questionable research practices, and tunnel vision, has taught us that not all evidence is equally reliable. Hence, being critical when reading research articles is of vital importance to our students. In practice, critical reading skills will, for example, help students design valid studies to generate new knowledge, because they recognize the quality of the work their studies are based on. Critical reading skills will also improve the validity of interventions developed in students' future careers. As such, these skills make our students valuable as a science-based practitioners. On a deeper level, critical reading enables our students to acquire freedom of thought, speech, and spirit, one of the core values of our university. Yet, our students often indicate that they have no idea how to critically read scientific articles. Most existing modules and materials on critical reading provide abstract and general tips, provide no or minimal feedback and reflection, and offer insufficient opportunities to fully master the newly acquired skill. In collaboration with our students, we aim to develop and test an innovative and widely deployable online open-access module that consists of science-based critical reading strategies and exercises. This online module will be systematically embedded in our Master program and will help students become even better science-based practitioners.

What is the problem?

The world and therefore the professional opportunities of students are constantly changing. Students need to be prepared for jobs that may not yet exist, requiring knowledge and technology that does not yet exist either. The broad skills necessary for Lifelong Learning are therefore essential for students' careers¹. Vacancies increasingly ask for critical thinking skills² and employers find graduates "woefully underprepared"³. Accordingly, critical thinking (along with problem solving, people management, and creativity) is listed as a key skill for the future⁴.

During their study, we guide students in critically assessing the quality of research and the validity of conclusions. But upon graduating, they need to be able to do so independently, without drawing wrong lessons from the latest research reports when designing new studies or practical applications (policy advice, behavior interventions, etc.). Otherwise, they may waste time and money on studies that lack a solid scientific basis, or even design campaigns that would harm rather than help people (as is not uncommon in course assignments). Being able to judge the quality of research and subsequent conclusions makes our students valuable science-based practitioners.

However, our students often indicate that they have no idea how to critically read scientific articles. They assume that "if something is published in a scientific journal, it must be true". This assumption may partly be rooted in our academic skills courses⁵, where we implicitly teach students that everything evidence-based is good, and peer-reviewed articles are reliable. Another reason why it is hard to be critical is that despite striving for transparency about their studies' strengths and limitations, researchers may have a blind spot for the imperfections of their research⁶⁻⁸, or may be tempted to frame or spin information to persuade their readers of certain decisions and conclusions⁹⁻¹⁰. And even though most publications have been peer reviewed by experts, they too have their blind spots, or may have been blindsided by the authors' persuasive writing style¹¹⁻¹³. As such, our students need to remain critical when reading scientific articles.

The problem is that our students are currently insufficiently skilled to critically assess the quality of research and the validity of conclusions, which makes them feel insecure, incompetent, and demotivated for some of the tasks they face in their study program and beyond. Although universities consider critical thinking a core skill¹⁴, they fall short in teaching this skill¹⁵⁻¹⁷. Critical thinking is required in e.g., class discussions or the Master thesis, but students receive mostly indirect feedback on their critical thinking skills (e.g., by steering discussions or criticizing their arguments). Our students are thus asked to demonstrate their (often still inadequate) skill levels, only to get negative feedback. Although failure can be a valuable learning experience¹⁸, we should not set students up for failure. Instead, we should further increase the constructive alignment between our teaching methods and learning goals. Doing so not only increases students' critical thinking skills, but should also enhance self-efficacy and motivation¹⁹. We aim to achieve this by offering concrete tools that help students develop critical reading skills.

What is our solution?

The idea of teaching critical reading skills is not entirely new. Methods and statistics courses typically create awareness of basic attention points (e.g., correlation/causality, confounds)²⁰, and critical reading is taught in online modules²¹⁻²⁵, documents²⁶⁻²⁹, and YouTube videos³⁰⁻³². However, the existing online modules (some of which are used in Dutch and international higher education)

often simply consist of tips and checklists (e.g., read with an open mind, ask questions, make notes) without direct feedback²⁴⁻²⁶; or they provide general feedback without having students reflect on this feedback in relation to their own perspectives²²⁻²³. Also, most modules lack a critical translation from research to application^{21,23-27}. Moreover, existing modules are only connected to one course, or not connected to any course work at all, offering insufficient opportunities to fully master the newly acquired skill.

In collaboration with our students (see [Project Plan](#)), we will develop widely deployable online open-access modules consisting of science-based critical reading strategies and exercises. The modules will train critical reading skills as well as the translation to application and writing, provides and lets students reflect on feedback, and lets students give and receive peer feedback. Together with the Center for Innovation, we will select a user-friendly platform for the online modules that we will progressively develop, test and adapt, and systematically embed in our 'Economic and Consumer Psychology' (ECP) Master specialization. Because the modules fit seamlessly with the courses' literature and learning objectives, the modules require minimal additional time investment from students, while offering well-needed support in achieving the course objectives.

We aim for the following results:

- Products:
 - o An evidence-based module that increases awareness and resilience of persuasion techniques³³⁻³⁵ and that trains active reading skills to reveal weaknesses in (otherwise good-quality) course literature.
 - o A follow-up module that trains students in identifying underlying processes behind research findings, which are essential in designing sensible follow-up experiments and interventions (e.g., considering the underlying process, would the same manipulation be (in/counter)effective in another context?).
 - o A thesis module in which students receive (peer) feedback on their critical assessment of prior research when developing their own research question, as well as a platform where students critically read each other's thesis drafts to provide and receive feedback on their own arguments and inferences.
 - o A rubric to assess critical reading skills, which will be used for (peer) feedback and assessment of the course assignments (i.e., discussion and application essays) and Master thesis.
- Learning outcomes:
 - o Improved critical reading self-efficacy
 - o Enhanced motivation
 - o Richer classroom discussions
 - o Increased performance on discussion and application essays, and Master thesis
- Analyses and recommendations:
 - o We will analyze the modules' effectiveness (see [Testing and Adapting](#)), and write evaluation reports and practical guidelines (see [Dissemination](#)) for implementation in other programs.

Our project plan

WP1. Module Development

We will first map students' current critical reading strategies and obstacles through interviews among ±20 MSc students, conducted by two student assistants. Additionally, through literature research we will identify 'active ingredients' for training and assessing critical reading skills. Considering students' current strategies and obstacles, together with the student assistants we will translate these 'active ingredients' into a series of exercises that will form the backbone of our training modules. The student assistants will provide crucial feedback on the perceived difficulty and usefulness of these evidence-based critical reading exercises. Based on the types of exercises, we will select a user-friendly platform that ensures clear structure, immediate feedback / guidelines for peer feedback, and opportunities for further practice.

WP2. Implementation and Embedment

2.1. Implementation in 'Emotions and (Ir)rationality in Economic Behavior' (EIEB)

The EIEB course provides a perfect opportunity for implementing our first training module. First, while students struggle with critical reading, this course requires students to raise criticism on course literature in weekly discussion essays on which they receive peer and teacher feedback. The module thus prepares students for this task, while the essays allow further practice and

improvement of critical reading skills, fitting seamlessly with the course goals. Second, EIEB is the first mandatory course in our Master. By having our students complete the module in the first course week (before writing their first essays), they develop critical reading skills early on, experiencing maximum benefit throughout their master program. Module completion will be a course requirement and critical reading ability will be explicitly included in the essay rubric based on our prior literature research.

2.2. Implementation in 'Psychology of Selling and Advertising' (PSA)

Our follow-up module perfectly fits the PSA course as it commences immediately after EIEB and requires translation of scientific findings to practice, while students struggle to critically assess the generalizability of psychological processes to other contexts. Here, students write weekly application essays, again allowing further practice and improvement of critical reading skills. Students will be required to complete the module in the first week, and critical reading ability will be explicitly included in the essay rubric.

2.3. Implementation in Master thesis

The thesis module is the grand finale where students provide and receive feedback on the critical assessment of literature and its translation to their own research questions, for their research proposal and thesis draft. Our students typically find the thesis a daunting prospect, and indicate that they would feel more confident if they were supported by a module that helps them apply their critical reading skills to formulate a research question and write their thesis.

As such, the modules will be strongly embedded in our Master program. Because our project team includes all course/thesis coordinators, implementation is assured.

WP3. Testing and Adapting

Because our courses are offered each semester, we are able to test and adapt our modules as follows in two waves within the timescale of a possible Comenius Teaching Fellowship:

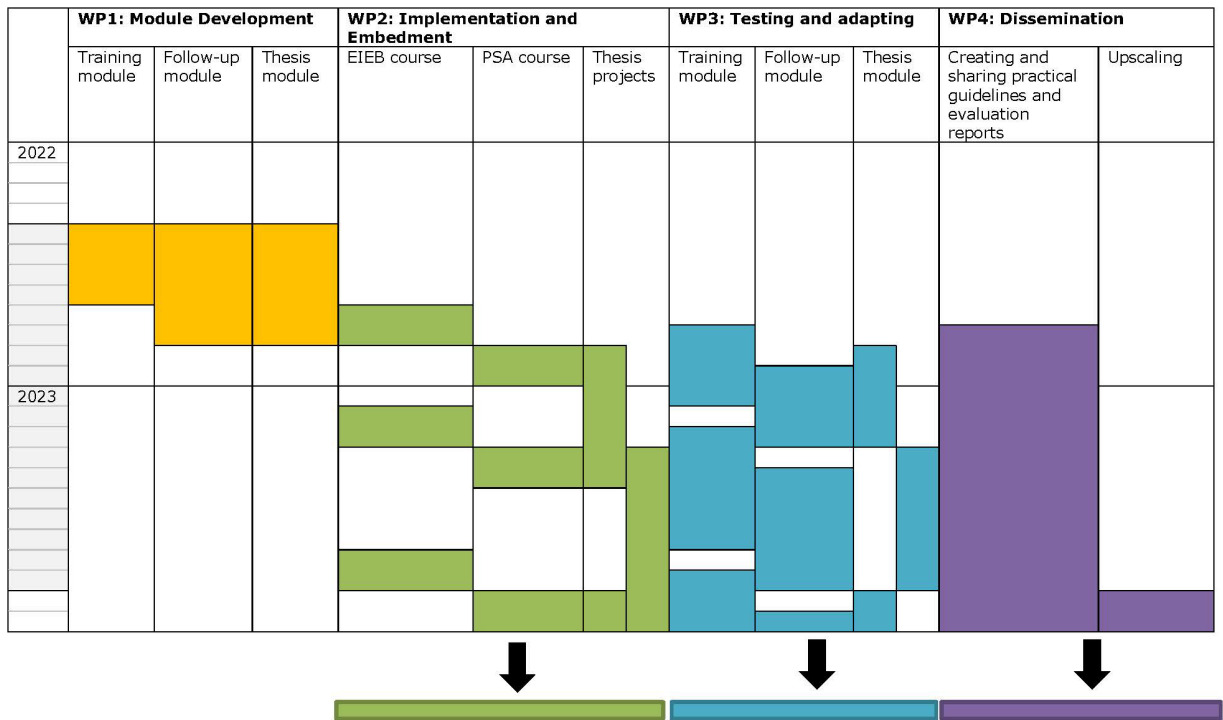
1. Evaluations within the online modules themselves: immediately after completing the exercises, students can indicate qualitatively and quantitatively how useful they found the exercises and what elements could be further improved. Based on these evaluations and students' actual performance within the modules, we can identify what parts may be unclear, too difficult, or even too easy.
2. At the start and end of the online modules, we will measure students' critical reading self-efficacy, for which we will develop task-specific items based on Bandura's guide for constructing self-efficacy scales³⁶.
3. With one or two items we will measure students' motivation for writing the essays and thesis. We will also measure whether motivation has shifted from performance to mastery, as providing opportunities for growth should promote a mastery orientation³⁷. We will compare this with students' motivation in the Social and Organizational Psychology (SOP) MSc program, which has a similar set-up but where we have not yet implemented the critical reading modules.
4. In course evaluations, we will ask students about the experienced richness of classroom discussions. We will also assess this in the SOP Master for comparison. Furthermore, we will discuss the observed richness of classroom discussions among different teachers involved in each course, compared to other courses they teach / have taught at the MSc level.
5. Using our newly developed rubric, we will assess students' discussion and application essays, as well as their theses to test whether students have become more skilled at assessing the quality of scientific literature. For comparison, we will re-assess a similar number of essays and theses from past years. We will pay specific attention to critical observations of the readings, elaborations on apparent similarities or differences in the readings' conclusions, propositions of critical follow-up experiments, and critical notes on the applicability and implications of the literature.

The evaluation of these expected learning outcomes provides directions for potential improvements. For example, if critical reading skills have improved, but the essays have not, we could promote the use of students' newly acquired skills in the essays more explicitly. For the second wave, we will additionally focus on the effectiveness of the implemented adaptations.

A potential risk is that our exercises are too challenging, creating even less self-efficacy and more destructive friction. We aim to prevent this by working closely together with two student assistants who will provide us with feedback on the perceived difficulty and usefulness of the module exercises. Also, if necessary, we will adapt the exercises after the first wave.

WP4. Dissemination

The modules, practical guidelines, and evaluation reports will be shared on Surf³⁸ to facilitate implementation in other programs. The faculty/central communication departments will be involved in announcing and advertising our modules and project updates on their (social) media, e.g., when granted the Comenius Teaching Fellowship. We will present our project at the Leiden Teachers Academy, the Comenius festival, and the European Society of Psychology Learning and Teaching. From 2024, we will scale up implementation within Leiden University, starting with the SOP Master program where there is already an interest and where baseline measurements are already obtained in the current project. Using our collective networks, we will also proactively contact individuals in strategic positions at other universities to enthuse them for our training modules.



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