Moodle-based e-learning courses for introduction to critical thinking in a multidisciplinary perspective

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Abstract

A course design to introduce to critical thinking was built in the context of the need of developing these skills, with aiming at proposing this course beyond disciplinary knowledges. Critical thinking may be considered a process that transcends disciplines, committing students to be actors of their learning. Due to constraints related to the high number, the diversity of students (<500 students/session), this course was proposed as an online learning environment on Moodle. The course contains learning modules including resources and interactive components. We discuss here the strengths and limits of this course design. Optimization and opportunity to adapt the framework of online learning environments for students to exercise critical thinking are considered.

Keywords: Critical thinking; e-learning; Moodle; learning environment.

1. Introduction

1.1 Context

The need for the development of critical thinking relies upon the confrontation with economic, social, human and environmental issues, in a state of political and technical reconfiguration. Critical thinking might be considered as a set of requested tools for students' own development but also for caring for others and our environment. Being a set of attitudes and habits related to discernment, thinking and vigilance over one's judgments and those of others, it shall be included in all academic program. Indeed, critical thinking is a central component for personal and professional autonomy, for social integration and significant contribution at scientific level. One shall note also that critical thinking dynamics is never a definite asset and should be constantly nurtured. Therefore, the development of critical thinking has been promoted both at the French national level - being an institutional injunction (Kammerer, 2021) - and at the international level, being promoted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) or the Organization for Economic Cooperation and Development (OECD) guidelines.

Critical thinking is widely acknowledged as a state of mind and a set of practices that nurture and reinforce each other's. Its place in education is crucial as underlined by the analysis of Sellars et al. (2018) or Southworth (2022). These skills are called to play a major role i.e., for sustainable development or promotion of peace.

Our institution offers a wide range of educational programs in the disciplinary fields of Law, Economics, Management, Life and Health Sciences, Sciences and Technologies, Humanities and Social Sciences. More than 79,000 students are spread across 6 campuses located on different sites. Our course was developed facing two challenges: (1) to provide a course conceived as an introduction and an awareness-raising to critical thinking, while (2) offering this teaching in a multidisciplinary manner, so that it is de-compartmentalized and accessible to all undergraduate students (second and third year), regardless of their discipline or campus.

1.2 Critical thinking nature and training

While the nature of critical thinking itself might be debated (Sellars, 2018), one can point out that substantial contributions have been elaborated to provide a common language around the concept and the specific capacities, attitudes and cognitive strategies intrinsically linked to the exercise of critical thinking (Ennis, 1987; Paul et al., 1989).

Critical thinking is often referred as a reflective process in which the propensity for self-correction is essential (Ennis, 1987; Lipman, 2003) and being best practiced when students have an in-depth knowledge in the considered field (McPeck, 1981).

In order to offer an educational program in a multidisciplinary manner, we focused on the non-disciplinary dimensions of critical thinking since it can be referred to a global set of minds and a wide set of skills that are applied to any subject and/or action, as highlighted by Dekker (2020). Indeed, key factors in critical thinking development may rely upon a multidisciplinary curriculum, a student-centered pedagogy, and the diversity within the academic community engaged in the teaching (Dekker, 2020). We also based our approach by integrating a critical thinking definition encompassing those from primary schools to universities (Eduscol 2016). The latter stresses out (1) attitude such as curiosity, autonomy, lucidity, modesty and listening, which are often omitted when considering critical thinking (Thonney and Montgomery, 2019), as well as (2) the necessity to discriminate between facts and interpretation, knowledge and emotions, inquiries and exchanges.

1.3 Moodle-based e-learning courses for critical teaching

We faced pedagogical, practical and administrative challenges: how to provide an awareness-raising courses to critical thinking, while offering it to a very large audience and taking in account (1) the heterogeneity of the students' profiles (i.e., disciplinary fields, campus localizations) and (2) a sustainable offer regarding the dimension of the administrative staff in support? In a context of the massification of higher education, we aimed at conceiving these courses to be open to every second- and third-year undergraduate student, while being accessible at any time, in order to increase opportunities for students to enroll and conveniently follow these courses.

E-learning appears as a counterintuitive solution for introducing to critical thinking since it relies in part on social interactions and skills. However, critical thinking e-learning environments have been experienced and their efficiency analyzed (Haghparast et al., 2014, Chou et al., 2019, Puig et al.,2020). Thus, we chose to develop an autonomous and asynchronous courses without individual following, with a fully automated examination process. Moodle was chosen being an open-source learning management system that allows users to develop e-learning, providing amenability and integration of various types of learning sources (Hirschel 2012).

Here we discuss several aspects like the amenability of e-learning, student autonomy, success rates, interest generated among colleagues, and the fact that this teaching can serve as a basis for the construction of other teaching units where critical thinking plays a predominant role.

2. Courses design

This optional courses were proposed to second- and third-year undergraduate students. The multidisciplinary academic team, which conceived the courses are mainly in the disciplinary fields of Sciences and Technologies, and Humanities and Social Sciences. We also articulate

our constraints with the three pillars of pedagogical alignment in the construction of this teaching: objectives, teaching activities and assessment (Biggs, 2003). The courses aims, its organization, functioning, timeline and the evaluation process were clearly outline in an introductory section. A forum was open to answer the different questions and requests of the students.

Several aims were defined (1) to reinforce the overall reflexive capacity to increase the freedom of thought and the ability to make choices, (2) to perceive the limits of one's natural abilities to evaluate information in certain circumstances and to demonstrate both modesty, lucidity, caution and listening, according to the information and circumstances; (3) to acquire new tools and criteria to evaluate the qualities of information and to distinguish facts, knowledge, opinions and beliefs; (4) to raise the awareness of taking into account the diversity of perspectives to help develop constructive and respectful communication strategies with others. Activities were built according to these objectives.
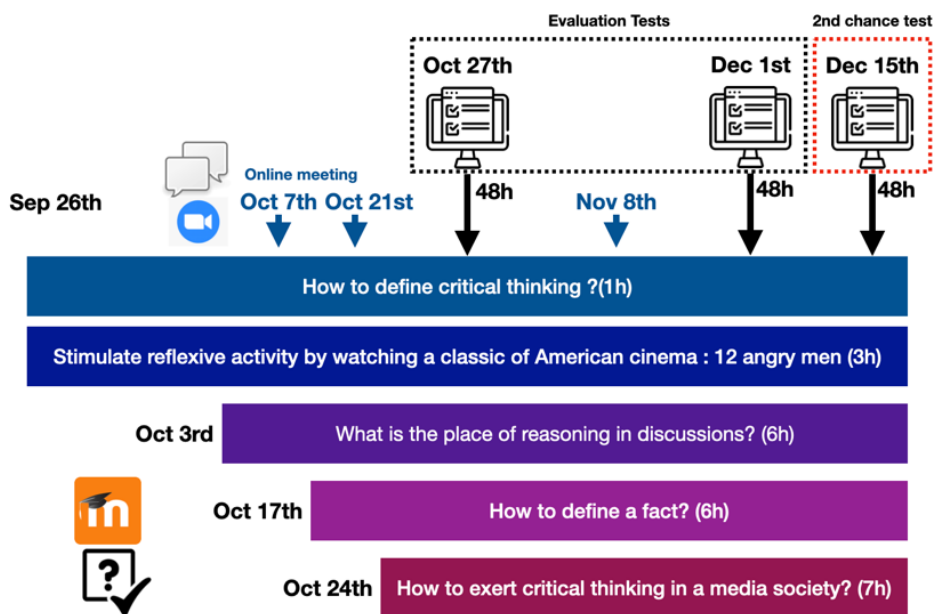

Figure 1. Overall scheme of teachings (academic year 2022-2023). Courses were provided online using Moodle platform. Five sections were proposed and self-assessment of the understanding of the courses to the students.

The courses were made up with five main sections: (1) how to define critical thinking, (2) stimulation of reflexive activity by watching a classic of American cinema: "12 angry men" (the latter movie can be referred to as an example to illustrate the manifestations of critical

thinking (Boisvert, 2015)), (3) to address the place of reasoning in discussions, (4) the definition of a fact and finally (5) how to exert critical thinking in a media society. Overview of the architecture, calendar and assessment schedules is provided in figure 1. Each part of the courses were built upon various activities posted on a Moodle page: guided analyses of films, texts, images, online tests (online multiple-choice quiz, with immediate feedback), etc. Students were asked to complete all of these activities while carefully following instructions. Three times during the semester were organized on-line meeting with students using zoom software.

Learning outcomes were assessed as follows: two continuous assessment evaluations (CC1 and CC2): CC1was related to part 1, part 2, and part 3 of the courses while CC2was related to parts 4 and 5 of the courses. A "second chance" exam was proposed before the end of the semester to students who did not have the overall average on the first two exams as following the rules of the University. During the duration of the evaluations (48 hours), the on-line pedagogical resources were hidden. The tests allowed the teachers to verify that the students had consulted the available resources, that they had understood and assimilated the key concepts explained in these resources, and which students were then able to implement simple skills in simple case analyses. During the academic year 2022-23, 466 students enrolled and participated to the learning outcomes evaluation. Furthermore, 40 students were enrolled but did not participate in the exams.

3. Evaluation

We performed courses evaluation in order to improve the teaching and to enable teachers to undertake a reflective approach to the courses. This evaluation combined quality assessment and analysis of students' academic results at the end of the courses. To avoid and minimize the risks of complacency bias or any Hawthorne-type effect, the evaluations were carried out by an independent service of the university, devoted to pedagogy and Innovation support. The latter are discussed in the following section. The courses quality assessment was based upon an anonymous questionnaire addressed to the students using the LimeSurvey software. It was made up of 28 closed questions (regarding general appreciation, contents, animation, interactions and activities) and 4 open questions (Why do you choose to follow these courses? What are the strengths of these courses? What proposal would you make to improve the courses? Do you have any further remark?)

4. Results and discussion

Our institution is acknowledged for both the excellence and diversity of its research and its educational programs, as well as for its territorial anchoring. It aims to engage students to be actors, as citizens, and to position themselves through skills such as those of critical thinking,

that implement both careers and personal lives. Several teaching formats that mobilize critical thinking are proposed in the disciplinary fields but few courses are offered to respond both (1) to the heterogeneity and diversity of our students and (2) to the need to develop critical thinking skills. Therefore, we specifically developed a course entitled "introduction to critical thinking", built in the specific scheme of courses designed for transversality and enrollment of large groups (up to 600 students). The latter courses, which were optional and proposed to second- and third-year undergraduate students immediately found its audience: 420 students in 2021 and 506 students in 2022. The profiles of these students exhibited diversity, since these students engaged in degrees in different disciplinary fields such as law, political sciences, economics and social administration, education and training sciences, sociology, economics and management, information sciences or linguistic studies.

Regardless of the courses attractiveness, we observed attendance to the tests and examinations that were above the average (personal observations). More than 90% students finished the courses in 21-22 and 87% in 22-23. In 22-23: 466 students participated in the evaluation tests. Out of the 466, 71 students did not get the average at the end of the evaluation test and therefore performed the so-called 2nd chance test. At the end of this test, only 25 students did not validate the courses.

By relying on the results and observations from questionnaires, interviews and analysis of student productions, several teaching strengths emerged: (1) asynchronous Moodle based-teaching unit (mentioned by 88 students out of 190 responses; "distance", "no time constraint", "freedom of organization", autonomy were appreciated, and could be correlated to the reason why the students chose this courses (53 students out of 196 responses), (2) contents (18 students out of 190 highlighted the nature of the activities and their diversities (videos, online tests,…)).

This diversity of different didactic sensitivities and approaches of the teachers appeared in the feedback from the evaluation, as well as a strength and as a source of complexity. While proposing rich and original activities, it appeared that the latter could be adapted and be more concise or request a smaller workload. Some activities could be more efficient if shorter, according to the students, in order to allow them to develop synergy between the time management and the dynamics of the courses. We undertook an adaptation of the distribution of the workload.

More video resources and more interactive resources could accentuate the originality of the offered supports and to promote dynamism. More sensitive themes and more current events are a stimulating development track, thus illustrating the need to resolve the cognitive gap inherent in critical thinking between emotion and reasoning.

We also noted that "12 Angry Men", the cinematographic work that introduced the courses, was well perceived, as well as its input. It drove the viewer to widen their scope and to put

in perspective their own opinions. Beyond prejudices and motivations, it is here the mechanism of critical thinking that is highlighted (Boisvert, 2015).

Several areas for improvement have emerged and remarks that rose during the quality assessment of the courses mirrored considerations that had been at the core of the creation of these courses. The areas for improvement raised by the students mainly concern the evaluation methods (46 students/181 responses, complexity of the questions, other methods, clarity of the questions) and the workload represented by the activities (22/181).

We also identified several limits. The first limit is related to the importance of regulated discussions (an essential didactic tools for the confrontation of facts, ideas and opinions). This dimension is hindered by the intrinsic potentials and limitations of Moodle. Several verbatim from students expressed their desire to participate in these intellectual exercises in the context of the courses, but the pedagogical team was not able to overcome the constraints that a large audience generates on Moodle. In contrast, the meeting organized online had very mitigated success (attendance was very scarce, never reaching more than 30 students) and revealed mostly administrative questions, the need for collective reassurance and little exchange about critical thinking. One might also interpret the low number of students in the online sessions as a sign that the students have taken the courses in complete autonomy.

 The availability of teachers and administrative staff has not been questioned, indicating that the interactions setup and the information made available are adequate. Together with mail exchanges, this online meeting appeared to be sufficient for students' assistance and guidance throughout the courses. Both online meetings and evaluation emphasized that the themes and methods used during the courses were discussed in larger settings (friends, family, other courses).

The second limit was related to the difficulty to evaluate skills related to critical thinking online. The Gordian knot of the pedagogical relationship remains the act of evaluation, so the creation of the different controls generated questions and dissatisfaction, which found an echo among the students both for the length and level of difficulty. A few questions were considered based more on memorization skills than critical thinking and "disconnected from the content of the courses". These questions were revised and modified. Evaluating open-mindedness, curiosity, and modesty remain the challenge to be taken up.

Another point of consideration was the architecture of the courses on Moodle, since it is a crucial point for the operability of these courses. We aimed for clarity and efficiency. The inherent limits of Moodle can make one fear a lack of fluidity and logistical heaviness. The courses quality assessment resonates these concerns, but the quality of the courses structure and the clarity of the instructions was also highlighted. This contrast might be related to the heterogeneity of students' relation towards Moodle and e-learning.

The conclusions of the courses evaluations lead us to several observations, including that the students appreciated developing their critical thinking and became aware of the abilities that are requested to maintain a critical thinking. These courses has raised an interest in other departments in our university, which asked for their students a free access to evaluate the interest of these students in such program. Therefore, teaching supports and assessment tests could be used, adapted and might be proposed in another format, to increase and maintain students' enthusiasm in practicing critical thinking, and ensuring that they can deepen the concepts presented and apply them in cases of increasing complexity according to their discipline, which could optimize their learning. Two constraints potentially limit its expansion within our institution, linked to the human resource that is requested both at the pedagogical and the administrative levels for maintenance of online teaching and satisfying levels of interactions with students.

Acknowledgments

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