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## **O1 - Methodology for distance teaching and learning**

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# CODEIN

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<b>Abstract</b>	This document describes a new methodology for distance teaching and learning, which tries to overcome some of the possible drawbacks of distance learning. This is done by empowering more the students in their own learning process. In particular, our new methodology lies its foundations in enquiry-based learning, which tries to equip students with more powerful knowledge while producing a more engaging learning experience.
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## **INTRODUCTION**

The emergence of distance teaching and learning, also due to the recent covid-19 pandemic, calls for a transformation in how we think about learning. To participate and thrive in a distance learning framework, it is widely believed that students must be right at the center of the learning process and become power learners. This entails developing a set of multifaceted skills, which enable them to properly cope with complexity and embrace dynamicity, thus becoming real learners. Due to the changing scenario implied by distance teaching and learning, we believe that instructors, educators, curriculum designers and all members of university and educational communities are called upon to revise both the way in which learning happens and the educational experience in general.

This document describes a new methodology for distance teaching and learning, which tries to overcome some of the possible drawbacks of distance learning. This is done by empowering more the students in their own learning process. In particular, our new methodology lies its foundations in enquiry-based learning, which tries to equip students with more powerful knowledge while producing a more engaging learning experience.

The remainder of this document is organized as follows. Section 1 illustrates the results of a survey on distance learning that was run on professors, lecturers and postgraduate teaching assistants coming from five different European countries. Starting from this, in Section 2 we describe some of the main challenges in distance learning. Next, we lay down the pedagogical foundations of our new enquiry-based distance learning methodology with the help of a literature review in Section 3. Next, we point out in Section 4 some points of attention that must be considered while implementing the new methodology. Section 5 analyzes some of the benefits of enquiry-based distance learning, while Section 6 details some of its potential challenges. Finally, we list some concluding remarks in Section 7.

## **A SURVEY ON DISTANCE LEARNING**

We describe here the results of a quick survey on distance learning that was run on professors, lecturers and postgraduate teaching assistants in five different European countries. More specifically, there were 148 respondents to this survey: 64.86% were professors (assistant, associate or full professors), 25% were lecturers and senior lecturers and 10.14% were

postgraduate teaching assistants. The respondents came from five different EU countries: Croatia (15.54%), Italy (18.92%), Poland (35.14%), Portugal (4.73%) and Slovakia (25.68%). The questionnaire contained ten different statements, listed below. Respondents could express their degree of agreement / disagreement with each statement (Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly Agree).

### **The results of the survey**

*Q1: Preparing an online class requires more commitment for the instructor compared to preparing for a traditional classroom lecture.*

1.4% Strongly disagree; 6.1% Disagree; 23.6% Neither agree nor disagree; 41.9% Agree; 27.0% Strongly agree

*Q2: Students in online classes can receive just as valuable information as in traditional classroom teaching.*

9.5% Strongly disagree; 28.4% Disagree; 16.2% Neither agree nor disagree; 33.8% Agree; 12.2% Strongly agree

*Q3: Online learning is more demanding for students than traditional classroom learning.*

4.7% Strongly disagree; 13.5% Disagree; 24.3% Neither agree nor disagree; 38.5% Agree; 18.9% Strongly agree

*Q4: Online lectures encourage to acquire the necessary knowledge and skills about digital technologies.*

2.0% Strongly disagree; 9.5% Disagree; 16.9% Neither agree nor disagree; 49.3% Agree; 22.3% Strongly agree

*Q5: Online teaching can induce more stress to the instructors.*

4.1% Strongly disagree; 14.9% Disagree; 21.6% Neither agree nor disagree; 46.6% Agree; 12.8% Strongly agree

*Q6: Implementing student-centered teaching may increase the effectiveness of online learning.*

0.7% Strongly disagree; 0.7% Disagree; 36.5% Neither agree nor disagree; 52.0% Agree; 10.1% Strongly agree

*Q7: The traditional final exam is not suitable for online teaching.*

3.4% Strongly disagree; 21.6% Disagree; 15.5% Neither agree nor disagree; 39.2% Agree; 20.3% Strongly agree

*Q8: Student collaboration and group work in online classes have clear educational benefits.*

2.0% Strongly disagree; 16.9% Disagree; 23.0% Neither agree nor disagree; 45.9% Agree; 14.2% Strongly agree

*Q9: Developing critical thinking during online learning increases students' engagement and learning effectiveness.*

1.4% Strongly disagree; 6.8% Disagree; 30.4% Neither agree nor disagree; 47.3% Agree; 14.2% Strongly agree

*Q10: Increasing students' scientific literacy positively impacts their self-efficacy to acquire additional sources of quality knowledge.*

1.4% Strongly disagree; 2.7% Disagree; 21.6% Neither agree nor disagree; 54.1% Agree; 20.3% Strongly agree

## **Main findings from the survey**

Among the instructors that responded to our survey there was a general agreement that online and distance teaching appears to be more demanding than face-to-face teaching. In particular, preparing an online class requires more commitment (Q1) and, overall, online teaching seems to be more stressful to them than teaching in traditional classrooms (Q5). On the other side, most of the instructors acknowledge that online learning can be also more demanding for the students (Q3). On the other hand, the survey also highlights some important features that can be leveraged to increase the effectiveness of online learning. Indeed, most of the respondents believe that the effectiveness of online learning can be increased by putting students at the center of the learning process (Q6), by implementing suitable teamwork and collaboration frameworks (Q8), by increasing the students' engagement through critical thinking (Q9), and by enhancing the students' scientific literacy, which will boost their capacity to acquire knowledge from additional sources (Q10).

## **MAIN CHALLENGES IN DISTANCE LEARNING**

We analyze here very briefly some of the challenges that could justify why distance learning is perceived as more demanding, both for students and for instructors. Next, we highlight how one could try to overcome those challenges by exploiting some of the features mentioned before, which could increase the effectiveness of online learning.

### **No Physical Interaction**

In traditional face-to-face learning, educators tend to be both role models and knowledge givers for students. In distance learning the physical interaction between teachers and students is missing. In this framework, students and instructors lose physical and personal interaction among each other. As a consequence, the mental buildup and overall learning process of the students may get hampered. Most of the students finds it easier to learn when their educators are physically present in the classroom. On the other side, the lack of direct physical interaction may have a negative impact on how instructors play their role of knowledge givers.

### **Less Motivational and Less Engaged**

In distance learning, students are not expected to attend a classroom in person. Because of this, they may feel isolated and less engaged in their learning process. Moreover, students get less possibilities of interaction with themselves. They do not obtain a close interaction with instructors either, and as a result in distance learning educators are not always able to motivate students as it can be done in traditional classrooms. In face-to-face learning, students get the opportunity to thrive in an environment which gives them a challenge to perform in a peer group. In distance learning, all these motivational factors are not present, which this can be quite problematic for many of them.

### **Less Oral Communication and Social Interactions**

Most of the distance learning courses do not enable or facilitate oral communication and social interactions, which are an important part of a learning process. This is especially true for courses developed with the asynchronous method of learning, which do not allow such interactions.

## **Tackling the Challenges**

To overcome those drawbacks, instructors need to empower more the students in their educational journey, which will put them right at the center of their learning process. At the same time, it is crucial to promote the students' ability to think deeply and critically about the subject material they are learning. We believe all of this can be done successfully with an enquiry-based distance learning process. This process aims at developing more research-based knowledge, in order to stimulate more a curiosity-driven approach for the students. This has the potential to equip students with more powerful knowledge while producing for them more engaging learning experiences.

## **AN ENQUIRY-BASED LEARNING FRAMEWORK**

According to Young and Muller (2013), a learning curriculum should aim for “powerful knowledge”, which can be defined as a specialized knowledge that serves a particular purpose (Harland and Wald, 2018). To have a knowledge which is “powerful” means to be able to apply it in new contexts, engaging in matters of public importance (Young and Muller, 2013) and having access to the conversations and debates about society’s values (social, cultural, political, economic or technological) (Wheelahan, 2007). Powerful knowledge is powerful because it provides human beings with a sound understanding of the natural and social worlds, thereby enabling them to evaluate existing knowledge (beyond individual experiences and specific context) and to produce new knowledge.

Equipping students with powerful knowledge can be achieved through an authentic research-based learning curriculum (Wald and Harland, 2017). In fact, for students to address what is ‘not known’ and serve a specific societal purpose, they need to learn the generative principles of disciplinary knowledge, the so-called “epistemic access”. It helps the learner to understand “how” one might come to know something. For this access to occur, students need to learn about and through research methods, by experiencing Enquiry-Based Learning.

According to Fung (2017), Enquiry-Based Learning is a research-based mode of student learning, employed in contemporary degree programs, in which educational activities reflect the active, critical and analytic enquiry undertaken by researchers. Enquiry-Based Learning “promotes the acquisition of new knowledge, abilities and attitudes through the investigation of questions,

problems, and issues using the ways and standards of enquiry” (Lee, 2011 p. 151). Accordingly, within this teaching approach, learning occurs through student-driven and instructor-guided investigations which address unsolved real-world problems. As such, Enquiry-Based Learning is founded upon a student-centered and self-directed approach which stresses the responsibility of students in the learning process, rather than that of teachers.

Activities associated with Enquiry-Based Learning may include undertaking investigations, formulating critical research questions and arguments, generating new knowledge through data gathering and analysis, disseminating findings, presenting to different audiences, refining new understandings through feedback, reviewing peers’ work and becoming publicly engaged.

The concept of Enquiry-Based Learning finds legitimacy in the Humboldtian notion of unity of research and teaching, in the name of a shared ground of advancing knowledge boundaries and a goal of contributing to the global common good.

Learning, like research, is about paying attention to where the boundaries of knowledge are; they both entail critiquing the potential weaknesses in existing knowledge and seeking better insights and understandings, in a spirit of perpetual discovery aimed at empowering societies.

Enquiry-based learning, by fully realizing this unity of research and education, is not merely a short-term approach to curriculum design but rather a learning technique which promotes space for a genuine critical dialogue, within and across research groups and teaching teams. If diverse students are empowered to collaborate actively in research and enquiry at every level of their learning process, engaging others with their ideas and findings, both education and research will be able to contribute more effectively to the global common good.

Bringing together research and teaching is also consistent with recent trends concerning the development of a shared “quality culture” within universities, which does not consider research and education as two opposing departments in competition for resources and efforts allocation, but rather as a unique realm of knowledge expansion (Wickert et al., 2021).

Lastly, enquiry-based learning is up to date with the post truth era and workplace requirements. Being part of a research-rich culture benefits students by virtue of the intellectual depth experienced by engaging in any cutting-edge investigations and the range of skills associated with independent and collaborative enquiry (Hughes, 2019).

Enquiry-based learning allows students to raise important questions for still unsolved problems (Lee, 2011). Accordingly, enquiry-based learning lets students critically revise existing knowledge, gather and analyze data and interpret a vast amount of evidence which spans different domains (Lee, 2011). Students also learn to adequately present findings to different audiences (Justice et al., 2007; Lee, 2011; Aditomo et al., 2013), and to justify them through the rigor and accuracy typical of research methodologies (Lee, 2011).

By performing all these tasks, students can improve their critical thinking (Lee, 2011; Aditomo et al., 2013) and problem-solving skills (Lee, 2011; Aditomo et al., 2013), as well as their innovativeness (Yuan and Woodman, 2010; Baer, 2012; Acar and Tuncdogan, 2019), capability to interact and collaborate with others, to take initiatives and persevere in the face of obstacles and resistance (Lee, 2011).

In addition, the active role played by the students in their learning process allows them to be more engaged (Spronken-Smith et al, 2007; Hmelo-Silver, Duncan, and Chinn, 2007; Justice et al., 2007) and to develop some sort of “love of learning” (Justice et al., 2009; Aditomo et al., 2013) and appreciation of concepts (Prince and Felder, 2006; Aditomo et al., 2013), which improve their academic achievements and learning outcomes (Prince and Felder, 2006), while promoting a constant “spirit of enquiry” (Aditomo et al., 2013).

Lastly, synergies between research and learning make students increasingly comfortable with and able to make good decisions and judgements under conditions of uncertainty (Lee, 2011), as the enquiry-based learning has been proven to increase self-confidence and reduce anxiety (Aparicio-Ting et al., 2019), which is another of the possible drawbacks of distance learning.

Fung (2017) developed an interesting framework to implement enquiry-based learning and finally achieve powerful knowledge: The Connected Curriculum. The Connected Curriculum is represented by a core principle and six associated dimensions.

The core principle is that students at all levels of a curriculum can benefit in multiple ways by actively engaging in research and enquiry. In pedagogical terms, the premise of the Connected Curriculum is the need to offer students a research-based education, in which structured opportunities are created for them to learn through research and active enquiry at every level of the curriculum.

The six related dimensions are as follows:

1. Explicitly inviting students to connect with researchers and research as an integral part of their learning journey;
2. Building a through line of research activity into each program of study;
3. Empowering students to make connections across subjects and out to the world;
4. Connecting academic learning with workplace learning;
5. Educating students to produce outputs directed at an audience;
6. Connecting students with each other, across phases and with alumni.

## **IMPLEMENTING ENQUIRY-BASED DISTANCE LEARNING**

At the heart of the enquiry-based distance learning framework lies a combination of good subject, theoretical and methodological knowledge and appropriate tools. In fact, this seems necessary to achieve the acquisition of the epistemic access, which ultimately leads to a powerful knowledge (Harland and Wald, 2018).

The main efforts required to implement an effective enquiry-based distance learning methodology can be described along the following two directions:

### **Methodology and Sources**

First, the distance learning process should be built on the analysis of scientific references and papers, the very first milestone to develop a curiosity driven approach. Secondly, research methods pills should be introduced, together with laboratories for practical applications. Research or problem-based projects – conducted either in groups or individually, sometimes in partnership with external entities and/or practitioners from industry – have also to be included in the syllabi, and require the analysis of paper/case study, the interpretations of contents and data, the performance of research exercises and assignments, and the production of written and/or oral presentations of findings. The assessment methodology needs also to be revised: students' performance in learning activities should be continuously assessed throughout the semester and should constitute the main component of their final grade, while the traditional final exam should

account for a small percentage of their overall grade.

## **Actors**

The learning process in enquiry-based distance learning should not be on an individual basis, which may lead to a feeling of loneliness and isolation on the side of student. Rather, it must be fed and forged by human interactions, capable of empowering students to speak out as engaged members of a community at large. Enquiry-based distance programs should be founded on a collaborative approach to learning: students are supposed to strengthen their relationship with both peers and with the faculty, and upheld continuous mutual interactions and dialogues, so fundamental in gaining a deeper understanding of theories and application and in developing a sense of community-belonging, which is especially important in distance learning.

## **POTENTIAL BENEFITS OF ENQUIRY-BASED DISTANCE LEARNING**

The main benefits of enquiry-based distance learning can be classified into two broad categories. The first refers to knowledge outcomes, namely the effects that enquiry-based learning produces on students' academic knowledge, skills, and competencies. The second category refers to personal outcomes, namely students' personal characteristics and attitudes related to both the present and the future.

### **Knowledge outcomes**

As previously argued, the immediate outcomes of enquiry-based learning refer to the realm of knowledge. In particular, knowledge outcomes can be classified into three dimensions, each of which can be considered as being the result of the others.

### **Scientific literacy**

This first dimension is related to the understanding of the knowledge creation process. All the students should gain a deep understanding of what it means to research and how knowledge is produced.

In line with Lee's (2011) arguments, the very first knowledge outcome of enquiry-based learning is a complete and clear idea of all the steps involved in the knowledge-production process. A

strong awareness of the epistemic aspects was achieved with practical modules and projects implemented during each course. For example, students can be solicited to identify first some topics of interest, and then look for various academic references about both those specific topics and other neighboring topics, to understand related concepts and relationships between variables at stake. Then they can go deeper to identify the research gap that they wish to address and therefore, on the basis of the found reference material, make some summaries with main points. Based on this, they can possibly analyze data and from the data analysis and created some new knowledge.

This way, students can acknowledge the need to follow a rigorous method to and generate and to master sound findings. The methodology and procedure to follow might not be easy, and knowledge gain may not be immediate. Yet, this is the main way to achieve satisfactory outcomes.

Students can also acknowledge that investigations start from scratch and develop step by step through a trial/test and learn procedure. A long process of reading is needed to gather information and spot a potential knowledge gap. There must always be room for doubts and questions around assumptions and hypotheses that are formulated as research activities go on. This curiosity-driven approach can be rewarded by the fact that there is always room for contradiction and denial within it.

Through epistemic access, students can understand the specificity of knowledge-creation processes compared to other projects they had previously carried out. Perhaps students have always done projects but they had never been tackling even simple research and curiosity-driven tasks. They can understand that carrying out simple research activities is completely different and perceive the importance of analyzing topics and understanding what problem could be worthy of analysis.

Lastly, with this approach students can understand that research enables them to delve deeper into subjects and knowledge discoveries, and to put theoretical concepts into practice. On the one hand, this allows students to develop their own ideas on a cognitive level, but also on a mental level because they broaden your horizons and form a line of thinking that is much more developed than what they might have gotten from just looking a video or reading a book.

## **Knowledge evaluation**

The acquisition of epistemic access results in the capacity to critically evaluate existing knowledge, an essential element in developing a powerful knowledge (Harland and Wald, 2018), by which is meant carrying out actions with a positive impact on the world. By doing so, students can improve their knowledge-evaluation skills.

First of all, students can develop improved confidence in discriminating between and identifying the quality of different sources. This can also allow them to read things faster, to understand what is more important, what is less important, and to skim the information more effectively. This is especially crucial in distance learning, where students are empowered in planning some of their own learning activities.

Being able to evaluate knowledge not only improves the overall understanding of a particular topic, but also constitutes a fundamental reference upon which students can build both their own opinions and future analysis.

## **Knowledge creation and application**

With the acquisition of epistemic access and the resulting capacity to critically evaluate existing knowledge, students become able to produce and apply new knowledge. As already argued by Justice et al. (2007), Lee (2011) and Aditomo et al. (2013), students who experienced enquiry-based learning learn how to apply the rigorous methods of research to create new knowledge on their own. Such an achievement can surprise students, as they can realize the originality of the knowledge they are able to produce and how it could be beneficial for others and for society at large.

This can also result in developing proper communication skills. Justice et al. (2007), Lee (2011) and Aditomo et al. (2013) have already highlighted the benefits of enquiry-based learning on students' capacity to share and present findings to different audiences.

Students can also recognize that they are able to acquire the capacity to apply what they have learned in different contexts from the classical education framework. This is particularly seminal for the development of powerful knowledge, which, as previously argued, implies the application of knowledge in conversations and debates about society's values (Wheelahlan 2007). On the one hand, this trait is of paramount importance for becoming better citizens and having a positive

impact on society and the world we live in; on the other hand, it allows students to flourish in the workplace, as jobs nowadays require a certain flexibility and a greater adaptability to unknown contexts (Harland and Wald 2018).

## **Personal outcomes**

Students exposed to enquiry-based programs in distance learning can acknowledge not only a growth from an academic point of view – in terms of new specialized competencies, hard skills and pieces of knowledge acquired – but also from an individual perspective. Indeed, personal growth can be enabled by experiencing this innovative approach to learning.

In line with Lee (2011) – who argued that enquiry-based learning renders students increasingly comfortable with conditions of uncertainty – learners that experienced the knowledge-creation process and epistemic access developed a more practical and pragmatic approach to uncomfortable situations.

In addition, teamwork and dialogue can be the major catalysts of growth. In distance learning and teaching, some students (and even educators) seem to greatly underestimate group working, maybe because they had never truly experienced it. The continuous exchange of ideas and discussion really helps students to better develop a personal point of view. This helps them grow up, as by carefully listening to what others have to say, they can understand how to deal with certain situations. In particular, time pressure, critical time management activities and challenges have the potential to award students with great satisfaction and strengthen their self-confidence, motivating them to push on with activities and progress, which is one of the main drivers in distance learning.

The content and methodologies used in enquiry-based distance learning can empower students to develop a new, more open-minded, curious mindset, and clearer perspectives on their future aspirations. By approaching previously untackled issues to creatively find an effective solution, students can develop problem solving skills, as reported by Lee (2011) and by Aditomo et al. (2013). With this approach, students gain the capability to approach problems, even when they do not have already a certain solution at hand. This strengthens their attitude to reason about several possible solutions to the same problem.

Not through infallible knowledge, but through uncertainty, the exploration of new horizons and exchange with others, many students can build up a personal opinion to critically judge the world around them. Enquiry-based learning can equip students with alternative systems of thought which enable a beneficial process of critical thinking development (Lee, 2011; Aditomo et al., 2013)

It should be no surprise that teamwork was identified as one of eleven essential learning outcomes in the seminal AACU report *College Learning for the New Global Century* (National Leadership Council for Liberal Education and America's Promise, 2007). Furthermore, teamwork also plays an important instrumental role in education. Kuh's research (2008) shows that collaborative assignments and projects are especially potent in having a positive impact on student development. In other words, working and solving problems actively with others is not just a desirable outcome of student development; it is also an educational practice that has demonstrably high developmental impact.

In working in teams during a distance learning process, students can also develop a prosocial attitude toward peers to unleash full potential from each group member. They can acknowledge the importance of empathy, a necessary tool for respecting the specific personality of each participant. In line with Lee (2011), by accommodating and getting to know each individual's ambitions and propensities, students learned to manage conflict, mediate, coordinate peers' efforts and collaborations, and to maximize results for the whole group.

Synergies between group members can lead them achieve a performance that they would not have attained otherwise. They can learn to think as a single, unified entity: the team. They can also realize that differences are opportunities to leverage everyone's potential to the fullest. Students can cover many different roles, experiencing active and passive care towards other team members, and acting – when necessary – as motivators and guides.

## **POTENTIAL CHALLENGES OF ENQUIRY-BASED DISTANCE LEARNING**

One of the main challenges in implementing an enquiry-based distance learning methodology could be the adaptation time required by each student to integrate with the new learning method. As suggested by Harland (2016), learning is a very complex process that requires deliberative spaces for thinking and knowledge adaptation. In enquiry-based distance learning, students may experience a radical change that involves some initial difficulties: a novice, indeed, may need more

time to learn how to properly approach learning with a curiosity-driven approach, as well as how to absorb all the information needed in order to carry out a project (Harland and Wald, 2018). For this reason, academic practice requires an active, persistent and focused effort over an extended period of time, which enables novices to correctly adjust to the new setting (Morrow, 2009).

Distance students may perceive that adapting to a new enquiry-based approach is time-consuming (Harland and Wald, 2018) and perhaps potentially destabilizing in nature, especially in cases where multiple simultaneous tasks and deadlines (lectures, midterms, teamworks, assignments, etc.) can occur. Despite a strong initial impact, the presence of multiple deadlines can be crucial for gradual and continuous adaptation. Indeed, more demanding deadlines can be responsible for a step-by-step adjustment and for a stronger engagement in the learning process.

## **CONCLUSIONS**

We have proposed a new methodology for distance teaching and learning, which tries to overcome some of the possible drawbacks of distance learning. The new methodology lies its foundations in enquiry-based learning, which tries to equip students with more powerful knowledge while producing a more engaging learning experience.

As sustained by Wald and Harland (2017), enquiry-based learning is pivotal to attaining powerful knowledge, namely a rich knowledge, know-how and understanding of real-world dynamics at the service of a common good. Connecting teaching with research in distance learning may allow students to see how knowledge gaps are tackled and covered, how new knowledge is created and how such new knowledge can be applied to addressing real-world problems.

We believe that enquiry-based distance learning may not just benefit individual students, empowering them more in their own learning journey, and enabling them to succeed in the competitive and dynamic work environment and in the complex world of everyday lives, but may also benefit the society at large. A strong connection between education and research, by providing students with the knowledge and competences necessary to be change makers, will enable them to develop and implement societal and global missions.

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