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# Think Lab: we have an IDEA (Instructional Design Elementary Application)

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## Cover Page Footnote

We would like to express our special thanks of gratitude to the staff and the students of “Collegio Universitario Renato Einaudi” for the opportunity of implementing the IDEA project.

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## INTRODUCTION

This paper aims to summarise the experience gained by the students in the organization and delivery of a short-intensive and transdisciplinary teaching course offered inside the University College of Merit "Collegio Universitario Renato Einaudi" (Torino, Italy). Colleges of merit are shared residential facilities designed to accommodate talented students with high motivation and commitment, regularly enrolled in different higher education levels ranging from bachelor to doctoral programs. Several services are also offered to support their personal and professional growth, which is usually achieved through both tutoring and complementary cultural activities.

Collegio Einaudi is a private Foundation connected to the University of Turin and the Politecnico di Torino (PoliTo). It was founded in 1935 and hosts about 800 students who are asked to develop various transdisciplinary skills through internal courses defined once a year around a theme. The courses are jointly organized with lecturers and university research groups. In the academic year 2020/21, the chosen central theme was "resilience". Within the booklet course proposals, structured as a ThinkLab, "We have an IDEA" - Instructional Design Elementary Application - aims to review the first-year engineering courses offered by PoliTo.

PoliTo is an Italian public University offering both Engineering and Architectural tracks. Around 5000 first-year students are enrolled each year in the Engineering bachelor's degree programs. During the first year, the students are divided into 20 parallel classes of about 250 each. The addressed topics provide a common background and include Chemistry, Computer Science, Mathematical Analysis I, Linear Algebra and Geometry and Physics I.

The emphasis of this contribution is on the description of the "We have an IDEA" laboratory and on the evaluation of its impact on the daily lives of its students. In the following section, the theoretical framework is defined. The remaining part of the paper discusses the Laboratory's design, the Results, and the Conclusions.

## 1 THEORETICAL FRAMEWORK

A university course redesign is a complex problem-solving action that involves multiple factors and is named Instructional Design. Several methodological approaches support the revision of teaching in the light of new needs or problems that have emerged [3,5,7,8,9].

The above aspect has been further emphasized by the recent worldwide effects of the COVID-19 pandemic, leading to heterogeneous and time-varying national- or regional-level regulations, which have forced educational institutions to change the format of education over the months. However, the above changes were done in an emergency context, paving the way to a more conscious and stable redesign of courses accommodating resilience, learning

effectiveness, and transdisciplinary skill based on the above-mentioned methodological tools [3,5,7,8,9].

Considering the typical characteristics of emergency remote teaching, the reference Instructional Design model for the laboratory is the ADDIE one. ADDIE is an acronymous that stands for Analysis, Design, Development, Implementation, and Evaluation. It relies on an iterative cycle made by the five stages to support a continuous improvement [3,6].

Inspired by the theatre, role-play is used in various professions, from psychological counsellors to mediators, from lawyers to doctors [1,10]. Role-play methodology is particularly effective in teaching where, by tracing the four phases of Kolb (abstract conceptualization, active experimentation, concrete experience and reflective observation), the student learns and acquires knowledge in a more meaningful way [4]. During the Abstract Conceptualization, the lecturers expose the theory in the form of lectures or readings. The case studies are provided (Active Experimentation), which will be interpreted with role plays in the Concrete Experience. Finally, with a self-conversation, there is a phase of re-elaboration of what has been learned (Reflective Observation).

## 2 LABORATORY'S DESIGN

So far, two editions have been delivered, one in Italian and one in English. Due to the pandemic situation, the activities took place online, although some students were physically together in the college. Each edition consists of four parts: (i) a theoretical moment (2h), (ii) a macro-level design workshop (4h), a micro-level design workshop (3h), and a final presentation (1h). While the first theoretical moment took place in a dedicated introductory night, the other activities were scheduled differently. In the first edition, the two workshops and the presentation were all completed on the same day. Conversely, in the second edition, they were divided into two separate days, each one week apart. The temporal fragmentation is driven by the need to reflect and mature the macro level choices to translate them at the micro level. In addition, eight consecutive hours online were considered to be too demanding and tiring for both the students and instructors.

Another difference between them is the environment in which the workshop ran. The second edition took place on a gamified online platform (*Fig. 1*), gather.town (https://gather.town/). Its key characteristics are that:

- people can freely move in a virtual environment that looks like a classroom;
- people can listen and speak to each other only if they are in the same private space (i.e. a table) or if they are close to each other;
- students can share their screen and use a whiteboard;
- tutors can quickly move between the groups;
- the main arena is devoted to the plenary presentation.

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*Fig. 1*. Gather.town environment

The first theoretical moment is used to present and explain the ADDIE model to support this laboratory's bottom-up collaborative nature. During this meeting, the groups are created and linked to a first-year engineering course to be redesigned during the following activities (*Table 1*). Although some students were not familiar with the introductory science course, most have direct experience on the subject in each group.

*Table 1. Number of participants for each group*

| | First edition | Second edition |
|---|---|---|
| Chemistry | 6 | 5 |
| Computer Science | 6+6 (2 groups) | 5 |
| Mathematical Analysis I | none | 5 |
| Linear Algebra and Geometry | 6 | 5 |
| Physics I | 6 | 5 |

The remaining part of the laboratory uses the role-playing learning methodology that requires active participation. Students are asked to behave like one lecturer of the parallel classes and to deal with the different colleagues' ideas. Starting with the macro-level design activities, students perform a guided ADDIE cycle. In the beginning, they receive different materials (slides, guidelines and course

descriptions) that can be used as a reference starting point. The four hours are divided into three different assignments to be delivered: (a) Analysis (1h), (b) Design, Development and Implementation (2h), (c) Course description (1h).

For the analysis, each group must fill a table containing a set of questions for each theme to start the discussion. Starting from the Hodges et al. work [6], the macro themes are the analysis of needs, learner, context, environmental scan - infrastructure, and content - task.

The second assignment consists of defining the strategy chosen and the related technological solutions and completing a table to structure the implementation. Students have to identify the learning objectives, activities, required interactions, skills, required knowledge, and assessment for each week supported by the analysis outcomes.

To conclude the macro-level design, they must prepare a course description that synthesizes all the previous choices for the sake of the future students attending the revised course.

The micro-level design aims to prepare a specific topic in all details to be ready to perform it during the course. Consistency with the course description must be verified, and, eventually, they must be aligned. To do this, they receive a table where each lesson's feature is associated with some questions formulated from both the student's point of view and the lecturer's point of view. The features coming from Bates argumentations [2] are outcomes, overview, read, watch-listen, discuss, do, practice, assess, share, supplementary work, help.

In the end, in a plenary session, each group presents the details of the revised course in 10 minutes as if they were explaining to the students in the introductory lesson.

## 3 RESULTS

The role of the tutors in the two editions was different. In the first, there was more significant involvement of the tutors in the design with frequent and in-depth discussions with students during the overall laboratory. In the second edition, greater autonomy was left to the students with comments by the tutors only at the end of each workshops' activity. This difference highlighted some key characteristics regarding the students learning approach.

In the beginning, especially during the analysis, students found it hard to enter into the role of a lecturer. They typically keep thinking as students trying to protect their needs. For example, to answer the question "what are the critical instructional needs?" they state that "books should be optional". When the students were guided (first edition), they understood the role shift quickly and, by the end of the analysis, they were able to play the workshop in the right shoes. While if the role-play was misinterpreted, the strategies and related implementation proposed by the students were not feasible. During the second

edition, the discussion regarding the course design represented the opportunity to reflect on requests that were more realistic and easier to implement.

Once the role-playing game took hold, some groups proposed and implemented innovative strategies with concrete observations. For example, they suggested having a backup tool for online lessons or opening a direct and more informal communication channel between lecturer and students, such as Telegram or Slack.

For the students, the drafting of the course description was a synthesis challenge for the contents itself but also for the different ideas inside each group. In general, within the groups, the work was balanced between the components. This has brought to light a plurality of ideas and sensitivities that led to some fresh proposals that were clearly structured.

The analysis of the satisfaction questionnaires shows how the students appreciated the methods used during the workshop. In the second edition, the use of the game environment was perceived as very engaging. The survey directly recalled the central theme of the year, resilience. On this matter, few students reported some difficulties to directly export the experience gained during the workshop to other contexts such as university or work. In light of that, in the second edition, some decontextualised example of ADDIE were provided during the plenary session. As general feedback, participants reported that they recommend the seminar to other colleagues, preferably to those studying STEM subjects.

## 4 CONCLUSIONS

The outcome of this laboratory becomes the basis for the courses redesign at the Politecnico di Torino. A “We have an IDEA” follow-up with lecturers, will replicate the ThinkLab structure reinforcing the support for a more profound redesign. In this case, the lecturers will be asked to role-play students.

COVID-19 has pushed toward a shift in course design that will change the traditional teaching environment. This requires a robust methodological elasticity that leads the lecturer to respond to internal stresses and external boundary conditions, sometimes as unexpected. The ThinkLab will help to improve and renew the resilience of all people involved into the educational process. In particular, this new approach highlights the importance of taking into account the students’ perspectives.

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