

TLM (THREE LAYERS METHODOLOGY) MODEL FACING MULTIDISCIPLINARY EDUCATION

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Abstract

One of the main challenges in education today is the need to adapt processes to the multidisciplinary world in which cross-domain communication is essential. Therefore, in this setting, education has to bring teachers and students from various backgrounds to work together, to develop a mutual language and synergistic teamwork and clear added value. These important challenges have gained only little attention by scholars to date. In our School of Multidisciplinary Studies, students who attend classes are from different departments and speak different professional languages. To address these challenges, we have created and implemented the TLM- Three Layers Methodology model, guided by the research question: how to assess and enhance teaching and learning within a multidisciplinary framework. Or, in other words, what educational processes need to be improved, developed and evaluated. In this research, we present the TLM model as we put to practice in our Multidisciplinary School at our institution, in which the curriculum includes courses in technology, the humanities and social sciences, community-engaged learning and entrepreneurship. Furthermore, teaching methods range from lectures to project-based learning courses (PBLs), to workshops in design of technological Proof of Concept (POCs). The research presents a program aimed at initiating processes of connection between faculty teams and promoting the quality of teaching for students, from a multidisciplinary point of view. The program is based on a holistic, innovative process that includes three layers: Peer Learning, Peer Review and Teaching Evaluation. The TLM model is groundbreaking both from an academic practical perspective and from a research perspective, while creating synergy and mutual relationships between its layers. It highlights the changes in teaching and learning patterns, the introduction of new digital tools, and unique Generation Z approach. In this article, we will present the process conducted, the evaluation study and implications.

Keywords: *Multidisciplinary, active learning, peer review, peer learning, teaching evaluation.*

1. Introduction

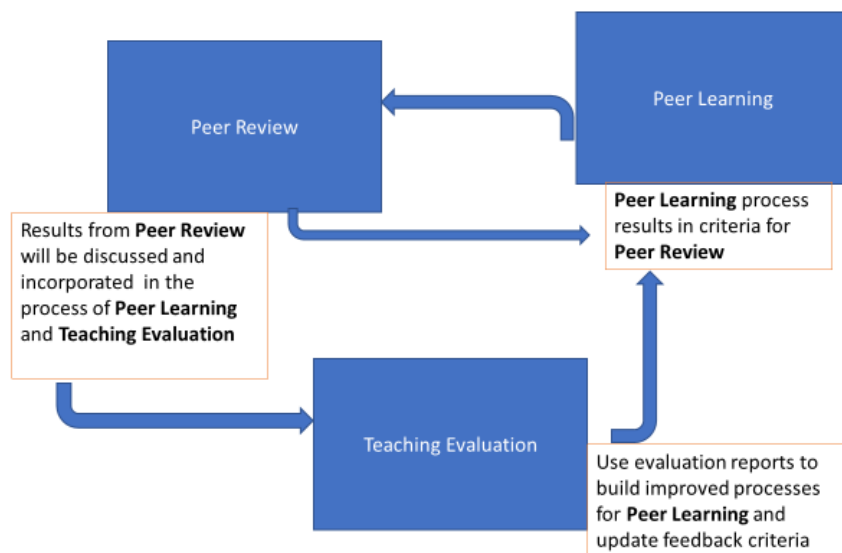
The School of Multidisciplinary Studies at the Holon Institute of Technology (HIT) was established in 2018 as a department and later developed into a school with an updated structure in 2021, providing a unique format in Israel higher education. This format enables the utilization of assets found in the academic institute and the knowledge and abilities of each faculty. The school empowers faculties and fills gaps needed for students' next steps in industry, performing cooperation at the international level with similar applied universities and institutions. The school aims to establish an ecosystem different from the landscape of higher education, with multidisciplinary discourse between lecturers and students. The school offers four different content components within the bachelor's degree curriculum, essential for every graduate of the institution, such as Humanities and Social Sciences, Integrated Technologies, Community-Engaged Courses, and Entrepreneurship and Innovation. The school developed an up-to-date teaching methodology with a diverse team of leading lecturers from different disciplines who collaborate in both teaching and research. Project-based courses that connect two fields of knowledge are taught, requiring entrepreneurial and multi-layer outside-the-box thinking. Teaching at the school integrates academia, industry, and society, requiring the construction of different quality control systems adapted to the study material, nature of the courses, and diverse mix of students and lecturers.

2. Motivation & rationale of the model

The purpose of the program described in the article is to enhance and leverage the quality of teaching within a unique ecosystem of a multidisciplinary school. It is utilizing an innovative and distinctive methodology based on an integrated process. In response to the changes brought about by the COVID-19 pandemic in 2019, including digital and asynchronous advancements, the school successfully conducted a Peer Review process. The purpose is to monitor the quality of teaching under the new conditions of a unique and distinct study program, different from the students' core faculties. Based on this process, and accompanied by research, a set of recommendations was formulated to improve online teaching within a multidisciplinary framework, promoting interactive communication among students from diverse fields. This is how the "**Three Layers Methodology (TLM) Model**" was developed.

To clarify, this article aims to outline the conceptual framework of the model. In practice, more information and assessment tools were developed and used in an iterative process that resulted in several layers of finding, conclusions and feedback which could not be included in this article format. The work plan consists of three layers that complement each other methodologically and practically: **Peer Learning, Peer Review, and Teaching Evaluation**. Figure 1 shows the TLM model layers ecosystem.

Figure 1. The TLM models layers ecosystem.



The three levels of the TLM model are interdependent, creating a comprehensive model that highlights their mutual contribution to the advancement of teaching and learning. **Peer Learning** aims to synchronize different areas of knowledge, promoting mutual fertilization and cooperation. Based on the trust and dialogue developed during Peer Learning, we have developed a **Peer Review** process that improves teaching quality and enhances the students' learning experience. Through formative evaluation, we focus on real-time change through ongoing feedback provided by the teachers themselves, promoting personal development and best practices. Finally, to provide a comprehensive and conclusive picture, we conducted a **Teaching Evaluation** process using both external and internal assessment tools.

2.1. Peer learning

According to Topping (2005), Peer Learning can be defined as the process of acquiring knowledge and skills through active assistance and support among individuals who share equal status or are matched companions. In our case, Peer Learning occurs when a group of lecturers get together to discuss or study a common topic to develop their pedagogical and personal abilities. In addition, the goal of Peer Learning is to create synchronization between the various fields of knowledge for the purpose of mutual fertilization and cooperation both at the level of curricula and for research purposes, similar to peer review process (Shortland, 2010). Based on Topping (2001), several aspects need to be considered when planning peer learning. These aspects are applicable not only to students' peer learning as discussed in this article, but also in the context of teacher peer learning. These considerations include:

1. Identification of specific problems and opportunities that need to be addressed within the given context.
2. Clear definition of objectives, outlining what is hoped to be achieved through the peer learning process.
3. Determination of the participants who will be involved in the peer learning.
4. Selection of the appropriate method to be used for facilitating the peer learning.
5. Consideration of frequency, duration, and location of interactions that will take place during the peer learning process.
6. Identification of the necessary resources that will be required to support the peer learning activities.
7. Assessment of whether any training is necessary to enhance the effectiveness of the peer learning.
8. Definition of what will be assessed and the methodology to be used for the evaluation.

After carefully considering these aspects, we successfully planned and implemented our Peer Learning program. Here are examples of the activities conducted as part of the Peer Learning process:

- Round table open discussions where participants openly addressed common needs and issues.
- Brainstorm sessions to generate innovative solutions.
- Sharing and analyzing case studies to deepen understanding.
- Conducting workshops and joint training sessions focused on providing tools for enhanced teaching practices.

These activities facilitated an open dialogue among lecturers allowing speakers to articulate their thoughts, emotions, and opinions regarding various topics. The aim was to foster a collaborative and supportive environment that encouraged active engagement and knowledge sharing.

2.2. Peer review stage

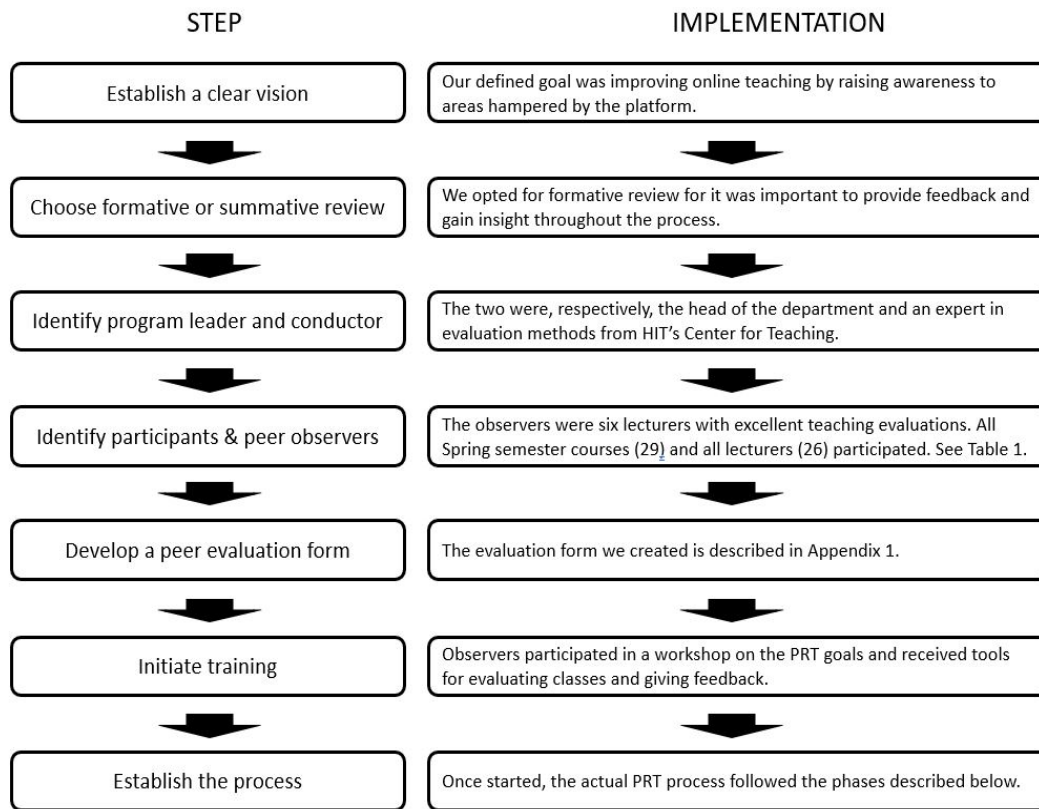
The Peer Review process is designed to improve the quality of teaching and enhance the learning experience of students through formative assessment. The focus is on improving processes through feedback in real time, with the aim of promoting development and improving quality. This approach is different from summative assessment, which mainly measures results (Shortland, 2004; Shortland, 2010). The Peer Review process was implemented during the COVID-19 restrictions period, and after drawing conclusions and insights, it was integrated into the overall TLM model to promote effective teaching, learning, and assessment.

2.2.1. Planning & execution of peer review. Guided by the aforementioned insights from the literature and an exploratory research, we consulted several approaches to the implementation of a peer review process. According to the literature, a meaningful peer review of teaching (PRT) should include concrete review experience, reflection and recommendation (Donnelly, 2007; Drew & Klopper, 2014). In this sense, a peer review is a flexible process whose success is not achieved solely by the actual observation by colleagues. For it to succeed it requires analysis of observed classes under criteria that observers may elaborate, and most importantly, by the communication between the observer and the observed peers, which would encourage an effective implementation of the review. Webb and McEnerney (1997) developed a set of steps to a successful formation of PRT that gave us conceptual foundations. In formulating our own PRT we mainly followed Torbeck and Dunnington (2021), who offered a shorter sequence of steps, adjusting them to the specific circumstances of a multidisciplinary ecosystem. Figure 2 describes our implemented sequence of the Peer Review of Teaching (PRT) formation, as designed for a multidisciplinary context.

These preparatory steps laid the ground for the actual Peer Review process conducted in three cycles. The population of participating observers in all cycles was a total of 44 (26 male, 18 female) and the total observed lecturers in all cycles was a total of 16 (7 male, 9 female).

Establishing the peer review process in practice was carefully designed procedure making sure that Lecturers' consent was obtained through enrolment and explanation of the process. The school courses were assigned to observers and each observer watched and evaluated classes using an evaluation form and then gave individual feedback to each participant. Observers reported their overall assessment, and summarized their experience which allowed them to generalize from their accumulated experience, and thus to provide useful input on common challenges and flaw. The head of the project analyzed the data and conclusions were shared with all staff.

Figure 2. PRT Formation Sequence.



2.2.2. Assessment of the peer review feedback. To fully assess the efficacy of the entire process, it was important for us to understand the perspective of the lecturers observed. We formed an online reflection questionnaire to be filled out by the observed lecturers in which they could voice their experience of being reviewed by peers. The reflection questionnaire, which was both quantitative and qualitative, was conducted about a month after all individual reviews between peers – an observer and an observed lecturer – had been communicated. This time period gave lecturers sufficient time for reflection on the review process and its efficacy, as the feedback they received could raise awareness to weaknesses and strengths, enabling them to put into practice suggestions for improvement of their online teaching.

2.2.3. Discussion and evaluation. Following the implementation of the methodology along its three steps, the data collected allowed us to better understand the pros and cons of online teaching in the school. We learned about each lecturer's shortcomings that required improvement, as much as their skills and strengths. Furthermore, we could gain a general picture of common challenges that lecturers are confronting, both technical and pedagogical, based on the data analysis.

In light of the common themes that emerged from the analysis, we formulated a set of recommendations for enhancing teaching in a multidisciplinary setting, which were communicated to the academic staff of the department.

2.3. Teaching evaluation

The evaluation process encompassed both external and internal control tools, providing a comprehensive summative evaluation aimed at delivering feedback at the end of the learning process. The objective was to assess the students' satisfaction of the learning processes. The aim was to provide a comprehensive overview of the learning experience, covering both the achievements of the students and the quality of the teaching and feedback provided.

A dedicated teaching evaluation questionnaire was created based on the institutional evaluation questionnaire, which contains parameters based on the dimensions of good teaching (SET), such as lesson organization, clarity, interest, attitude towards students, student involvement, and general satisfaction with teaching. This questionnaire can predict the effectiveness of teaching, as shown by Marsh (2007). The next stage is to include other relevant dimensions related to non-verbal behavior of lecturers, such as eye contact, movement in space, monotonous speech, and gestures. These dimensions have been shown to

be relevant and predict satisfaction with teaching, as demonstrated by Babad, Sahar-Inbar, Hammer, Turgeman-Lupo, & Nessim (2021). They are particularly relevant the Multidisciplinary courses. Different types of questionnaires will be built according to the different variety of existing courses and different teaching methodology. In addition, external teaching evaluation tools will be used. The teaching evaluation questionnaire, based on SET indicators, is delivered every semester by the institution. This questionnaire will provide a control and feedback tool for the peer learning and peer review process.

3. Discussion & conclusion

We consider the TLM model to be of great significance and believe that it can have a positive impact on the teaching, learning, and evaluation process not only in our institute but also in other faculties and academic institutions facing similar challenges. This methodology can be particularly relevant to programs where multidisciplinary studies are encouraged or required, whether within departments or between different faculties. Furthermore, our approach can serve as a model for implementing a peer review process in various settings, such as K-12 schools and the corporate world. Additionally, the quality control program has the added benefit of fostering dialogue between researchers from different fields, strengthening the academic vision, and enhancing the relationship between faculty members.

In conclusion, this program was developed with the understanding that assessing teaching is a crucial element in academic teaching today, particularly in light of the changes occurring in teaching and learning, the introduction of new digital tools, and unique teaching methods. The unique feature of our model is that, despite the diversity and differences in courses in our multidisciplinary ecosystem, clear criteria for quality and success can be applied while still allowing room for creative thinking and academic freedom. Finally, beyond addressing the challenges, we have also benefited from unintended outcomes, such as fostering dialogue between scholars from diverse disciplines and improving interconnectedness among faculty members. Thus, this program is groundbreaking both in the practical academic sense and in the research sense.

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