



Development of a system for recording and monitoring Transformative Learning Initiatives at Mackenzie Presbyterian University in Brazil

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Abstract

The summary presented here discusses the processes of implementing training aimed at developing socio-emotional skills in university students. Guided by the theory of Transformative Learning (TL), students are invited to review their assumptions on topics that involve their personal views as ethical, entrepreneurial, reflective subjects, open to cultural diversity and accustomed to sustainable thinking. Such skills are recorded by the student in their e-portfolio, which mainly presents their socio-emotional skills, as well as their professional technical knowledge, with a view to communicating to society the training profile achieved by the students. For this reason, a system was created to record the development of socio-emotional skills and build students' electronic portfolios during graduation. The system is under the responsibility of the Center for Excellence in Transformative Teaching and Learning at Mackenzie Presbyterian University, São Paulo, Brazil. The proposal is that the system is further improved, and that the repository lasts throughout the student's professional life, also serving as an inventory of their professional life. Finally, it is expected that Artificial Intelligence can be applied, based on records made in the system, to assist in evaluating the development of socio-emotional skills. This will support the choice of the candidate who best adapts to the job vacancies available in companies.

Keywords: Transformative Learning; Systems Development; Soft Skills; Self-Learning; Student Engagement.

1 Introduction

In 2020, the Dean of Undergraduate Studies (PRGA) presented the MackSTLR Program (acronym for Mackenzie Student Transformative Learning Record) to the academic community of Mackenzie Presbyterian University (UPM). The Program aims to provide undergraduate students with the opportunity to reflect on themselves and their previous conceptions, leading them to develop their socio-emotional skills. It is, therefore,

complementary training, relevant to technical-professional preparation, which ends up enriching the educational profile of our students, in aspects such as Ethics, Sustainability and Collective Well-Being, Leadership Capacity and Entrepreneurship, Critical Reflection and Communication, and Cultural and Global Skills. Configuring what we call Key Competences, these dimensions allow considering in the training of students the ability to act in an integral way and committed to the production of a fair and egalitarian society, being, at the same time, capable of creating and implementing solutions favorable to the economic and social growth, aiming to increase the quality of life of our population.

Consequently, the program in question seeks to respond to the growing demand for soft skills present in the contemporary job market, marked by constant changes, globalization, and the knowledge economy, which end up demanding more in terms of qualification of human resources. Different studies (Succi; Canovi, 2019; Baird; Parayitam, 2019) that aim to evaluate the preparation of young graduates for the current professional market, indicate that companies have long been dissatisfied with the training offered by Higher Education Institutions, from the perspective of development of the socio-emotional skills of its trainees.

Responding, therefore, to the training gaps mentioned above, the MackSTLR Program seeks to develop students' socio-emotional skills, based on the theoretical principles of Transformative Learning, a concept that aims to train adults capable of thinking autonomously, freeing them from previous perceptions that restrict and condition their way of acting and interpreting the world (Mezirow, 1991). To this end, critical reflection plays a fundamental role, favoring the review of uncritically assumed presumptions, through the questioning of personal assumptions, leading the individual to probe new ideas and produce new interpretations of reality. In the words of Mezirow (1991, 2000 apud 2003): "Transformative Learning is learning that transforms problematic frames of reference — sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets) — to make them more inclusive, open, reflective, and emotionally capable of change. Such frames of reference are better than others because they are more likely to generate beliefs and opinions that will prove to be more true or justified in guiding action." (pp. 58-59). By questioning and revising unreflective frames of reference, students can develop social-emotional skills such as empathy, self-awareness, effective communication, and adaptability, which are fundamental to positive interpersonal interactions and interpreting the world in a more comprehensive and inclusive way. The critical reflection proposed in the Program is a tool to challenge these assumptions and promote students' socio-emotional growth.

The concept of Transformative Learning refers to a deep and profound process through which individuals undergo a fundamental change in their assumptions, beliefs, values, and perspectives. It involves critically reflecting on prior knowledge and experiences, challenging deeply held ideas, and developing new understandings that result in personal growth, expanded consciousness, and transformative change. Transformative Learning goes beyond acquiring new information or skills. It involves questioning and examining the underlying assumptions and social norms that shape our perspectives. This process often occurs when individuals are faced with disorienting dilemmas or difficult life experiences that challenge their existing worldview (Taylor, 2008).

The key elements of Transformative Learning include:

Critical Reflection: Transformative Learning requires individuals to engage in critical self-reflection, questioning their assumptions, biases, and habits of mind. It involves critically examining one's beliefs and values and considering alternative perspectives and interpretations.

Perspective Transformation: Through this deep reflection, individuals may experience a significant shift in their worldview and the way they perceive themselves, others, and the world around them. This transformation can lead to increased self-awareness, empathy, and the ability to see beyond individual or cultural biases.

Action and Application: Transformative Learning is not solely an intellectual exercise; it necessitates taking action and applying new knowledge and perspectives in real-life situations. It involves actively engaging with others, advocating for change, and making good choices based on the new insights gained.

Emotional and Identity Dimensions: Transformative Learning can evoke intense emotions and potentially challenge one's sense of identity. It often involves grappling with uncertainty, dissonance, and sometimes discomfort as individuals confront inconsistencies between their existing beliefs and emerging understandings.

Transformative Learning is a widely studied concept in adult education, psychology, and various other fields. It has practical applications in contexts such as personal growth, professional development, social change, and transformative leadership (Cranton, 1994; Dirkx, 2008).

Over the last four years, and with a view to implementing the Program at the University, several initiatives have been implemented. The theory of Transformative Learning was disseminated in Forums held every six months, in addition to continuing education actions, aimed at promoting teaching updating. These actions were led by the Dean of Undergraduate Studies, through its Center of Excellence in Transformative Teaching and Learning. The purpose of such undertakings was for teachers to understand the objective of the Program, know its theoretical foundations, as well as how to operationalize it through their teaching activities. This was accomplished through the creation of Transformative Learning Initiatives (TLIs). In general, a TLI consists of activities planned by teachers, aimed at promoting a given soft skill, the result of which will be observed through reading the reflective activities prepared by the students. To produce their texts, students are encouraged to narrate how the activity they experienced was able to lead them to reevaluate their way of perceiving, knowing, believing, feeling, and acting.

In terms of concrete examples, a TLI can promote empathy, through the proposition of teamwork, giving the student the opportunity to understand the emotions and perspectives of colleagues with whom they worked collaboratively. To improve communication skills, the TLI can propose activities that require the clear expression of thoughts and feelings, in addition to encouraging the practice of active listening. Additionally, a given Initiative may include strategies to develop conflict resolution skills, encouraging negotiation and the search for solutions that benefit everyone involved. It is clear, therefore, that the core of these Initiatives is to encourage students to live and reflect on their experiences, purposefully designed to enable them to improve their socio-emotional skills.

A student transformative learning recording system was produced by the University of Central Oklahoma (Farrell, 2019; Kilbourne, 2017). However, the articles located in the research databases do not detail how the system was organized and produced, as detailed in this article. The authors' records indicate only that student assessment is carried out using a learning management system (LMS). This finding suggests the very originality of the work presented here.

At the same time that the academic community understood the purposes of the Program, as well as the means of implementing it in the classroom, the need to create the MackSTLR System became present, with the objective of recording the Transformative Learning Initiatives

conceived by our teachers. It is also through the MackSTLR System that our students take part in these Initiatives, share their reflections and create their Mackenzie e-Portfolio. The latter consists of a document capable of making society and themselves aware of their personal and professional development trajectory.

2 Methods

The MackSTLR System is part of one of the modules of the Center for Excellence in Transformative Teaching and Learning (<https://www.mackenzie.br/ceat/home>) and is used to record Transformative Learning Initiatives, whether in preparation by teachers, either in execution by the Institution's students. So that the TLIs could be stored in a specific repository, a system was developed based on the system already implemented at the University of Central Oklahoma (<https://www.uco.edu/academic-affairs/transformative-learning/>). In this way, all prototypes were developed using Figma software for screen design, considering the need for an initial profile for both students and teachers. Likewise, the system was developed considering integration with other University systems so that it could be fed with basic registration information, such as name, email, and academic unit.

The initial steps included the review and approval of the prototypes by the CEAT team. Once validated, the prototypes were sent to the Technology Management of Instituto Presbiteriano Mackenzie (GERTI), which made necessary adjustments before passing it on to the outsourced company for implementation. The implementation of MackSTLR involved the use of technologies such as PHP and Javascript, with the Laravel framework and its Blade library to build views. Bootstrap v5.0 and a custom CSS style complement the application, which uses both to perform the responsiveness of some special screens for mobile devices, although the system's main focus is on desktop environments. In the database aspect, the system uses SQLServer, with a structure made up of 50 tables. Integration and version control practices are managed by Jenkins and for each development tag generated, the codes are evaluated by SonarQube, a solution that evaluates good practices and possible errors in the code. The adopted hosting structure consists of a Docker environment with Linux Ubuntu, equipped with 8 cores, 1024MB of memory and 300GB of storage. Access to the system is restricted to university members, validated through Azure B2C, which differentiates between employees/faculty and students based on their institution-specific email addresses. MackSTLR is implemented in three distinct environments: development ("ceat-dev.mackenzie.br"), approval ("ceat-hom.mackenzie.br"), and production ("ceat.mackenzie.br"). The transition between these environments is managed by GERTI, which carries out tests and approvals in conjunction with CEAT before implementing it in production. Azure B2C validates the login and the system checks via an API whether the user is a student, teacher or collaborator. Depending on the profile, access to features is restricted, thus aiming to provide appropriate permissions for each user category. This approach aims to optimize the user experience, ensuring efficiency and security in accessing the specific functionalities of the MackSTLR system.

Considering the registration of the Transformative Learning Initiative by the teacher, he/she must start the registration, considering the following steps: identification of his/her personal data that automatically appears in the system; details of the Initiative, containing title and brief description; whether the Initiative will be curricular or co-curricular; whether or not there will be a need to carry out a survey (previous activity to assess what and how much the student knows about that topic before being exposed to it); whether the Initiative is a project, an event, or an action outside the University walls; whether all students from all courses can participate; and what are the execution and delivery deadlines.

That said, the teacher then adds the assessment rubrics that will consider:

If the student has Transformed: the student who transforms presents a significant change, which goes beyond their way of thinking, which impacts their actions. Their reflective activity highlights the adoption of new habits and practices, carrying out activities that affect their surroundings, among others. Examples: implementation of innovative practices; inspiration and mobilization of people; problem-solving; adoption of a more empathetic, cooperative, and civic stance; creation and execution of projects.

If the student was Integrated: in Integration the student demonstrates that they have undergone changes in their way of thinking. Thus, in their reflective activity, it is expected to perceive the opposition of previous beliefs in comparison with current ones. This gain in terms of thinking involves expanding your previous understanding through the acquisition of analytical capacity; questioning posture; evaluative action; interest in researching and seeking new information; expansion of ways of seeing and interpreting the world; elaboration of hypotheses and diagnoses.

If the student has been Exposed: in the context of Exposure, the student tends to return to information discussed during their involvement in the Transformative Learning Initiative. In his text it is not possible to identify deep reflections or problematization of thought, nor changes in his ways of life and action.

Or if the student has Not Achieved the TLI objective: The student does not provide evidence that demonstrates recognition of information and content previously covered during the implementation of the Transformative Learning Initiative.

Subsequently, the teacher inserts how he will develop the activity: in person, remotely or in a hybrid way; synchronous or asynchronous. It then links the description of the reflective activity to the Key Competencies and links it to the Sustainable Development Goals.

After registering the Initiative, screens were developed for student registration, development of research and reflective activity, as well as for sending them, evaluation by the teacher and later completion of the activity and linking to the e-portfolio. Teacher feedback is provided by assessment rubrics that assess students on four levels of engagement: unachieved, exposure, integration, and transformation.

Moreover, so that students can present the activities developed throughout their academic journey, the e-portfolio was developed. It was prototyped to meet the needs of creating a student curriculum that presented their professional technical history, as well as the link with the Initiatives they developed and socio-emotional skills they acquired throughout his training process. The student can add information about themselves, their philosophy of life, personal values, as well as their academic-professional trajectory and information about the Transformative Learning Initiatives carried out. Still, so that the student could have greater engagement in the development of activities, a gamification process was also considered in which each Initiative developed counts which skills were improved.

After the screens were prototyped, the system was programmed with support from the Institution's Information Technology Sector as well as through the assistance of a third party company. It was prototyped, programmed, and implemented in approximately 18 months of uninterrupted work.

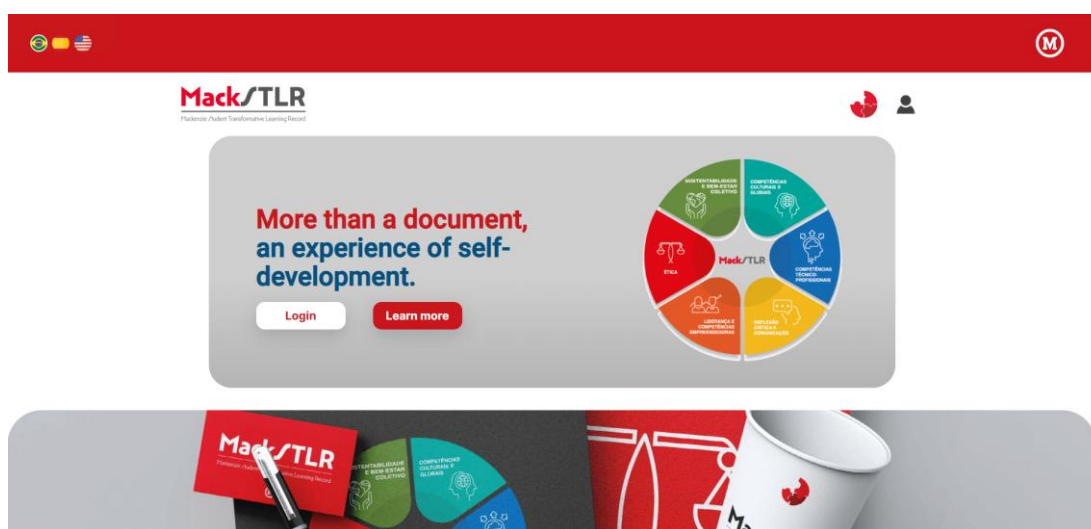
3 Results and Discussion

The MackSTLR System was prototyped using the Figma software considering each of the screens to be used, as can be seen in the following figures. Likewise, the system was developed to integrate with the other pages that Mackenzie Presbyterian University already has. Furthermore, once prototyped, it was programmed so that it could be put into production and used by teachers and students.

The platform has been widely used by teachers and students in curricular and co-curricular components of the most different courses at the University. There is no accounting of grades, only the recording of reflective activities carried out and growth of the e-portfolio.

Figure 1 shows the system's home page before students and teachers log in.

Figure 1 - MackSTLR System home page (www.ceat.mackenzie.br)



After logging in, the user is then directed to a new page so that they can view their profile as seen in Figure 2.

Figure 2 - System welcome message presenting its features



After logging in, the teacher's screen shows the option to register Transformative Learning Initiatives, while for the student, in addition to this option, it also shows the option to build the e-portfolio.

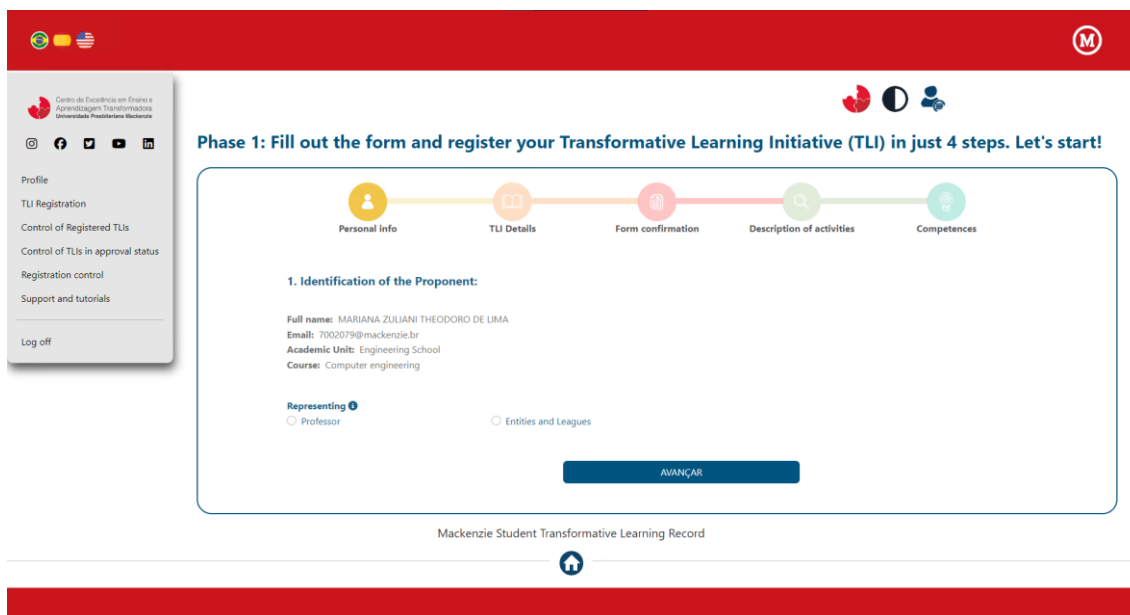
The option indicated as MackSTLR TLIs Management when clicked shows the indication in Figure 3, with the possibility of viewing the profile, register a Transformative Learning Initiative, in addition to evaluate how many students signed up for the Initiative. It is noteworthy that the manager profile has the option of approving or not the TLI created by the professor. Possible corrections are highlighted by the University Committee so that the teacher can improve the development of the activity until it is within the designated parameters of a Transformative Learning Initiative. Likewise, it contains the option of viewing tutorial videos so that it can assist students and teachers in the usability of the System.

Figure 3 - System home page after login



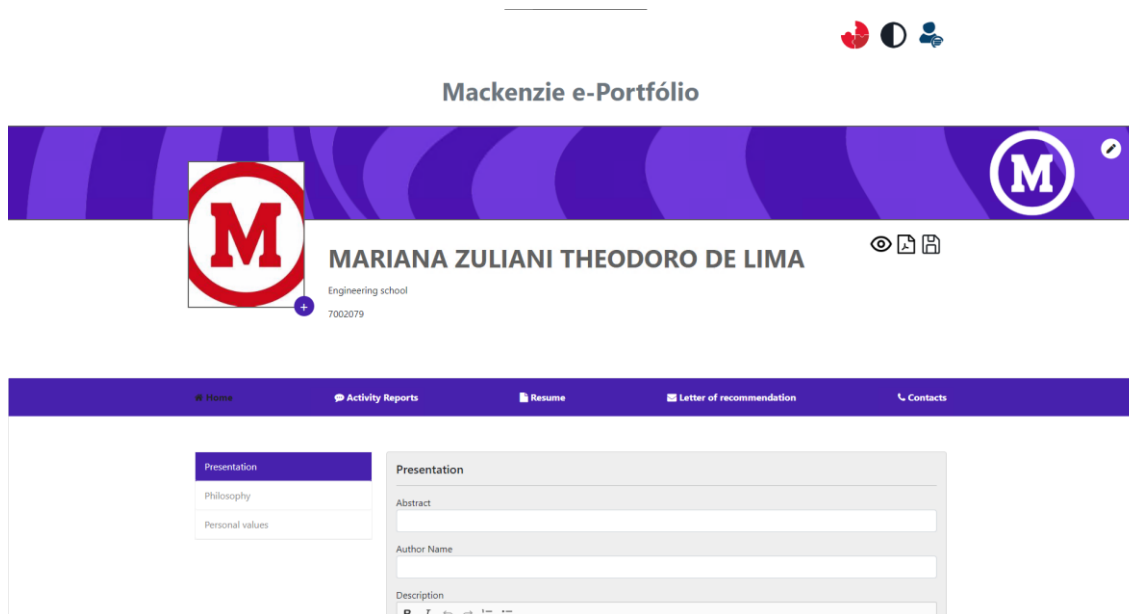
The registration of Transformative Learning Initiatives stands out as an important tool for the teacher, as identified in Figure 4. It is verified, in a step-by-step process, the identification of the registrant's personal data; the details of the Initiative, such as the title, the objectives and a brief description; the assessment rubrics; and the alignment with the Key Competencies and Sustainable Development Goals.

Figure 4 - Identification of the step-by-step process for registering Transformative Learning Initiatives



The MackSTLR System also features the Mackenzie e-Portfolio. It is used by students to complete their training path, whether considering technical-professional activities or developing socio-emotional skills through action in Initiatives throughout their academic career. The overview can be identified in Figure 5.

Figure 5 - Representation of the e-Portfolio to be completed by the student throughout their educational path



In general, the MackSTLR System has been widely used by students and teachers since its implementation, with expansion from one semester to the next by more than 10% of the institution's teaching staff (considering a sample of 1000 professors) and 20% of students (considering a sample of 30000 students). It is noteworthy that there is still a lot to be done, whether through students' understanding of the importance of developing the socio-emotional skills that the University offers, or through the motivation of teachers in developing these projects.

The development of the System aimed to consolidate, in a practical way, the Transformative Learning Initiatives developed at the University, and with it, there is uniformity and better organization of what has been done at the Institution in these terms. Likewise, the user experience pertinently considered the speed and agility for teachers and students, both in registering and in carrying out these Initiatives.

Transformative learning is about the power that the process of exposure to reflective activities can have on students. In that way, having a system that can consolidate these activities and result in a portfolio in which the student can put their professional history and development of social-emotional skills is of extreme value for the development of a university that values not only technical but also social and emotional skills for the job market and for the life of the university student, since one of the premises of Mackenzie Presbyterian University is "Educate and form the entire human being".

It is worth mentioning that, as the System is in the implementation phase, the students who are developing the Initiatives are not yet on the job market so that we can consider engagement in terms of employability.

However, it is noteworthy that the implementation of the System was successful in organizing activities, as well as developing a database to store information that, in the future, will serve as the basis for Machine Learning algorithms and the application of Artificial Intelligence that will allow automatic assessments, as well as recommendation systems for students and teachers.

4 Conclusion

In general, the development and implementation of a system brings constant challenges regarding updating it, resolving bugs and improving usability, however, the implementation of the MackSTLR System brought improvements in the concentration and storage of Transformative Learning Initiatives in an assertive and effective way, with greater engagement from both students and teachers, as well as presenting the System to the job market, which will allow students to move up to jobs using the Mackenzie e-Portfolio.

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