EXPLORING STUDENT LEARNING AWARENESS AND ASSESSMENT IN HIGHER EDUCATION: INSIGHTS FROM A LONGITUDINAL STUDY IN MANAGEMENT OF ENGINEERING

C. Guglielmetti[1], M. Milani[2], M.A. Piccardo[1], A. Portioli Staudacher[3]

[1]Università degli Studi di Milano (ITALY)
[2]Humanitas University (ITALY)
[3]Politecnico di Milano (ITALY)

Abstract

Learning is an active process whereby students construct their understanding, yet often utilizing emotional, cognitive, and behavioural aspects unknowingly. While student awareness of learning typically involves comprehension and application of learned material, it often overlooks the multidimensional nature of learning. Additionally, students tend to interpret new learning requirements based on past experiences. This paper, centred on higher education, explores whether students can effectively evaluate their own learning, particularly during the transition from traditional classrooms to practical settings. It also assesses the efficacy of a Semantic Differential Scale in gauging student attitudes toward different learning environments. Drawing from a longitudinal study involving 160 international Master's students in Management of Engineering, the paper reports on their completion of an 11-item Semantic Differential Scale before and after a 4-month curricular internship. Results indicate students' ability to discern distinct evaluative, emotional, and descriptive dimensions defining both learning environments. Notably, the principal distinctions between conventional courses and internship lie within emotional and relational aspects frequently overlooked by traditional evaluation methodologies. Additionally, the paper reflects on the methodological advantages and challenges associated with using the semantic differential methodology for evaluation in higher education.

Keywords: Learning awareness, internship, higher education, semantic differential.

1 INTRODUCTION

In recent years, Italian universities have undergone a profound transformation in the structure and methodology of their study programs. What was once predominantly based on traditional, transmissive teaching methodologies conducted in conventional academic settings has gradually evolved into a landscape enriched with practical learning experiences and innovative teaching approaches. This evolution, while initially rooted in the medical and health fields, remains in an experimental stage across various academic disciplines. This shift is paralleled by a gradual new interpretation of the role of academic instructors and their essential skills. Here, the emphasis is shifting away from mere content knowledge and towards the ability to effectively facilitate the learning process.

One of the main challenges posed by this transformation is represented by the learning assessment practices adopted by Italian academic institutions. Currently, course feedback primarily relies on customer satisfaction metrics, as mandated by national law, evaluating aspects such as interest in the subject matter, punctuality of lecturers, clarity of examination methods, and other traditional criteria [1]. However, such feedback systems prove inadequate when it comes to evaluating courses characterized by a strong experiential component, as they fail to capture the multiple dimensions of this type of teaching.

This discrepancy presents challenges for both academic institutions, which lack accurate feedback to assess the effectiveness of their study programs, and for students, who are accustomed to evaluating courses through the lens of traditional feedback tools. Consequently, simple modifications to customer satisfaction questionnaire items are insufficient to address this disparity.

Such evaluations, which prompt students to provide feedback primarily in terms of approval, thereby placing them in a customer-like situation, undoubtedly hinder the development of reflective and metacognitive skills essential for self-observation, awareness, and enhancement of learning capabilities [2].

Student awareness of learning has been defined as an increased comprehension of the subject content and the ability to use the material learned [3]. However, this definition does not address the affective aspect of learning in terms of the feelings and attitudes that students have when learning in different contexts. Moreover, students tend to interpret what is required of them in a particular learning situation based on past school and academic experience [4] and this can pose a problem when we ask them to evaluate a completely different learning experience - for most entirely new, strongly experiential, and external to the university context - such as an internship.

Finally, the importance of the role of expectations and prefiguration in shaping the student's approach to the new learning experience must be considered. It is indeed well-established that realistic and coherent expectations are associated with greater post-experience satisfaction and, above all, serve as a modulator of organizational socialization behaviours in the initial phases.

The paper, focused on higher education learning level, address the following research questions: Are students capable of assessing their own learning, particularly when transitioning from a traditional classroom setting to a "practicum" context? To what extent do traditional assessment tools in education effectively elicit and facilitate the detection of these perceptions and/or evaluations by students?

2 METHODOLOGY

A longitudinal study involving 2 cohorts (N=160) of international Master's students in Management of Engineering was carried out in accordance with ethical guidelines and with the approval of the Politecnico di Milano Ethics Committee.

The curriculum attended by the involved students includes a mandatory internship activity lasting 4 months (referred to as LAB), during which students are tasked with contributing to the implementation of an improvement project within a real company. They receive weekly methodological support from an academic supervisor to assist them in their fieldwork, addressing technical issues such as identifying problems, collecting data, and proposing appropriate methodological tools. Additionally, the supervisor motivates them through challenges.

Students completed surveys both before and after LAB experience. These surveys aimed to assess students' expectations and their perceived quality of the internship learning experience through a combination of open-ended questions and Likert scale items. For the purposes of this study, we examined the results of the Semantic Differential [5], a tool designed to quantitatively measure the meaning associated with a given topic (“concepts”) using a series of bipolar pairs of adjectives. Participants were asked to evaluate, as concepts, two learning experiences: the "traditional course" (lessons without lab or training experience) and the "LAB". The latter was assessed twice: once prior to the experience, and again after the LAB session concluded, referred to as the "post-LAB experience," to explore potential changes in student attitudes resulting from the experience.

In this research, an 11-item version of bipolar adjectives (7-point scale) was utilized. Please refer to Figure 1 for the labels.

The adherence of the adjectives to the selected concepts, their familiarity, and the actual bipolarity of the adjective pairs were validated [6] through a preliminary research phase. This validation process involved the analysis of a series (n=11) of semi-structured interviews with students from the same course, as well as textual analysis of responses (n=87) to open-ended questions in the final evaluation of the internship experience (not reported here).

3 RESULTS

For each concept, we computed the mean and standard deviation across the 11 pairs of bipolar adjectives. The results are presented graphically in Figs. 1, 2, and 3.

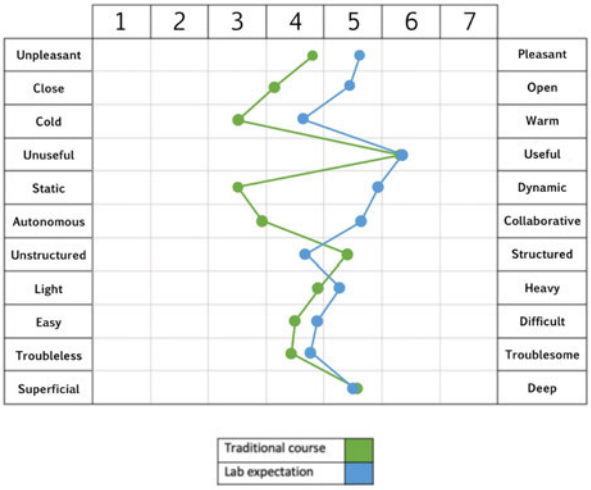

Figure 1. Means: Traditional course vs LAB pre-experience.

As depicted in Figure 1, students exhibit a capacity to discern disparities between traditional academic courses and the impending LAB experience. The LAB is characterized by notably more positive attributes, including dynamism, collaboration, warmth, and openness. Conversely, distinctions in perceived difficulty between the two contexts (heavy, difficult, troublesome) seem less pronounced. Notably, students attribute a similarly high degree of utility to both learning environments.

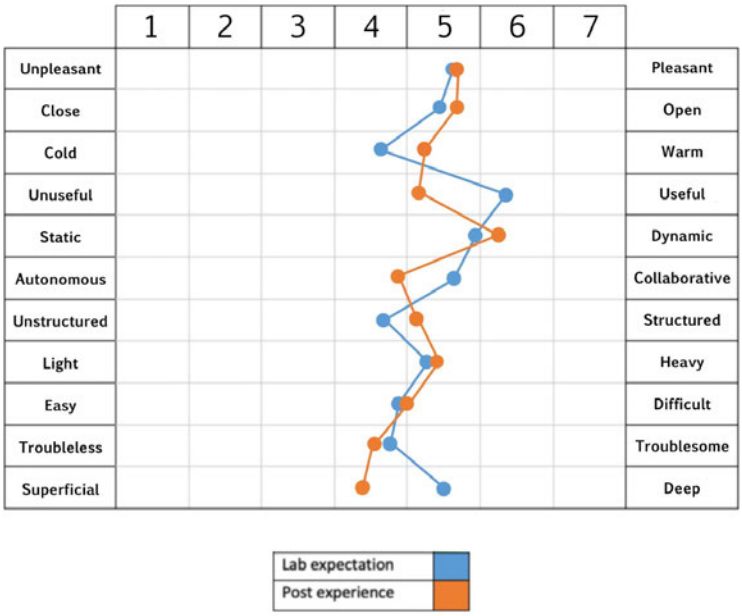

Figure 2. Means: LAB pre-experience vs LAB post-experience

The comprehensive examination of the graph depicting expectations and experiences (Fig. 2) illustrates a striking similarity between the two descriptive profiles, suggesting that students harbored realistic expectations regarding the LAB. Notably, the comparison reveals an intriguing observation regarding the adjective pair useful-useless, indicating that the LAB was perceived as less beneficial than initially anticipated. Nonetheless, it is pertinent to acknowledge that the expectation level regarding usefulness exhibited the highest absolute value among all adjective pairs, potentially indicating unrealistic expectations.

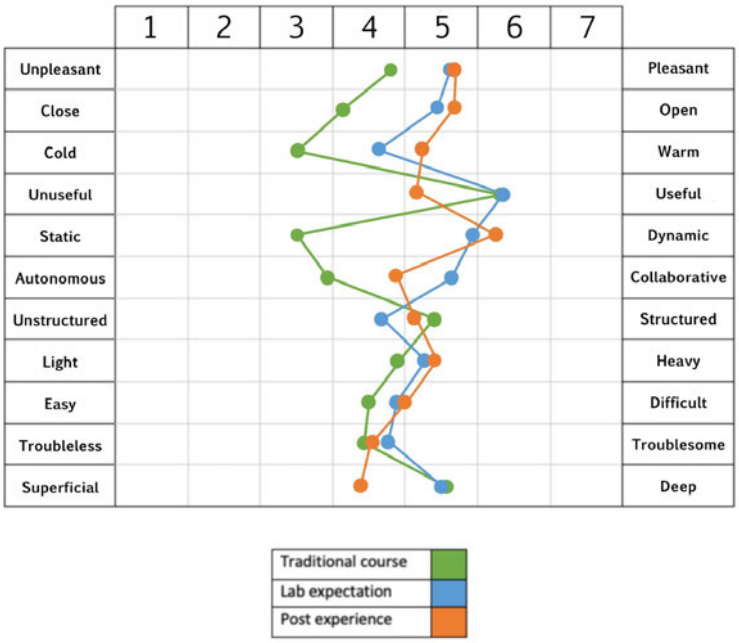

Figure 3. Means: Traditional course, LAB pre-experience and LAB post-experience

It can be observed that the distinguishing elements can be attributed to multiple levels: a descriptive level of the activity itself (autonomy and staticity), one more closely related to cognitive stimuli (closure), and one that refers to affective and relational dimensions (coldness).

4 CONCLUSIONS

The paper presented some results from a broader research aimed at developing more appropriate teaching evaluation tools in an academic learning context, which offers students both traditional teaching methods and a particular type of internship monitored by academic supervisors (LAB).

Students enrolled in this degree program are exposed to different modes of knowledge acquisition, and it is important that they develop the ability to evaluate these diverse experiences considering various assessment criteria. Indeed, the aim is to assist them in cultivating a learning awareness that disrupts established evaluative routines, moving beyond mere satisfaction or preference judgments and also embracing less conventional dimensions such as emotional and relational aspects.

Specifically for this paper, the focus was on the appropriateness of using the Semantic Differential tool as a parsimonious, agile, and highly context sensitive to understand whether and on which dimensions students perceive differences between traditional learning experiences and experiential field-based learning.

The results of these analyses appear to confirm that an appropriate set of bipolar adjectives is a tool capable of enabling indirect evaluations of learning modalities that are very distinct from each other, prompting students to utilize evaluative dimensions typically not considered. By providing students directly with the elaborations of the results, or through a presentation made by the academic instructor, students can be more aware of the various dimensions on which experiential teaching operates and therefore the value they receive.

The results of these analyses may have some interesting practical implications.

First and foremost, Semantic Differential is a highly parsimonious method, quick to administer, and results are easily processed. Hence, it is suitable for systematic application across various student groups, facilitating the early detection of changes in student perception or specific contextual variations. Moreover, it facilitates comparing different learning formats on similar dimensions, overcoming the challenge of comparing diverse experiences without imposing extensive reflective tasks on students, such as journaling, which may not effectively contribute to teaching improvement processes.

An additional advantage related to its ease of use is its longitudinal application to collect attitudes both before and after the learning experience. Having a pre-experience assessment is important not only to verify that institutional communication generating expectations is accurate (how the experience is

presented and described by the instructor) but also to intercept misunderstandings early and support students in approaching the field experience with appropriate expectations. Gathering information at the beginning of teaching allows the instructor to better tailor their communication to the evolving characteristics of students over time (for word of mouth, for the different knowledge and expectations of new generations, etc.), even on the characteristics of the specific class.

Regarding the observed limitations, it should be noted that the Semantic Differential tool adopted, although derived from preliminary qualitative work, does not appear adequate. The 11 bipolar adjectives are not exhaustive of the three dimensions identified by the methodological literature on the Semantic Differential tool (Evaluation, Potency, and Activity), and they should be enriched with other distinctive and peculiar traits of the analysed experience.

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