





Engineering Students' Utterances about Assessment and its Roles in Physics and Calculus Subjects

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ABSTRACT

Background: Assessment could provide feedback to both students and teachers on teaching and learning processes. However, this perspective coexists with an evaluation dynamic focused on performance and results. **Objectives:** This research intends to problematise what a group of engineering students says about the evaluation processes and their purposes in Mathematics and Physics subjects, offered in the context of remote teaching. **Design:** Ideas from qualitative research from a Foucauldian perspective. **Setting and participants:** The sample consisted of 85 engineering students, enrolled in Physics and Calculus subjects, in the first semester of 2021. **Data collection and analysis:** Application of an online questionnaire, with six Physics or Calculus classes, in a community university of Rio Grande do Sul. **Results:** The discourse analysis, according to the Foucauldian perspective, produced two analysis units that indicate how the 87 participating students conceive assessment in their utterances. The first one indicates that they think evaluation enables their own learning to be monitored and assessed, and decisions to be made by professors. The other one points out that students conceive assessment as classifying and meritocratic, focusing on performance, outcomes, and grade measurement. **Conclusions:** Contradictory and complementary conceptions coexist, indicative of the different roles attributed to assessment in formal education contexts. In general, the research participants evidence the reproduction of statements that circulate socially about the evaluation and its roles. Such results can be productive for teachers and institutions to understand that they also meet the expectations of an evaluation system with an emphasis on regulation and control.

Keywords: Assessment; Higher education; Engineering programmes.

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Enunciações de estudantes de engenharia acerca da avaliação e seus papéis em disciplinas de Física e de Cálculo

RESUMO

Contexto: A avaliação poderia prover feedbacks tanto para alunos quanto para professores, sobre os processos de ensino e de aprendizagem. No entanto, essa perspectiva coexiste com uma dinâmica de avaliação focada em desempenho e resultados. **Objetivos:** Essa pesquisa intenta problematizar o que diz um grupo de estudantes de Engenharia acerca dos processos de avaliação e suas finalidades em disciplinas de Matemática e de Física, ofertadas em contexto de ensino remoto. **Design:** Ideias da pesquisa qualitativa em uma perspectiva foucaultiana. **Ambiente e participantes:** A amostra foi composta de 85 estudantes de engenharia, matriculados em disciplinas de Física e de Cálculo, no primeiro semestre de 2021. **Coleta e Análise de dados:** Aplicação de questionário *online*, com seis turmas de Física ou Cálculo, em uma universidade comunitária do Rio Grande do Sul. **Resultados:** A análise do discurso, na perspectiva foucaultiana, apontou duas unidades de análise. A primeira evidencia que os estudantes reconhecem a importância da avaliação para a autorregulação das aprendizagens. A outra unidade sugere uma concepção de avaliação classificatória, com foco em desempenho e aferição de notas. **Conclusões:** Coexistem concepções contraditórias e complementares, indicativas dos diferentes papéis atribuídos à avaliação em contextos de ensino formal. Em geral, os participantes da investigação evidenciam a reprodução de enunciados que circulam socialmente acerca da avaliação e seus papéis. Tais resultados podem ser produtivos para que os docentes e as instituições compreendam que também atendem a expectativas de um sistema avaliativo com ênfase em regulação e controle.

Palavras-chave: Processos avaliativos; Ensino superior; Engenharias.

INTRODUCTION

Despite an interconnected world, cyberspace (Lévy, 2010), which favours and expands interrelationships, exchanges, and collective and collaborative learning, diversity, assertiveness, and interactivity provided by many digital technologies available - including free access -, the systematic incorporation and mediation of those tools to education is still slow and neglected in various teaching contexts. In this scenario, the outbreak of the Covid-19 pandemic forced schools and universities to migrate to online teaching processes. The need to transpose in-person teaching experiences to different – emergency – non-face-to-face or remote teaching models confirmed, on the one hand, the mismatch in the integration between education and technologies and, on the other hand, revealed possibilities, paths, and experiences built with the virtualisation of classes.

In higher education, challenges, difficulties, and, at the same time, solutions for what has been called emergency remote or non-face-to-face teaching have emerged (Moreira, Henriques & Barros, 2020; Biotto & Serra, 2020). In fact, some institutions adopted the term virtualised teaching, as did a community university in South Brazil, the context of the work presented in this article, in which we analyse scenarios of undergraduate engineering courses that include basic formation subjects, such as physics, mathematics, and chemistry.

Recent studies in this area have analysed emergency remote teaching contexts. Santos, Donato, Ottoni, Weide, and Werner (2020) examined this experience in seven disciplines of engineering courses at a public university. In summary, they realised that the pedagogical approach to content did not change much in relation to what would be done in the context of face-to-face and synchronous classes. The lack of qualification or teacher training, in terms of these authors, contributed negatively to the effectiveness of the teaching and learning processes. Regarding assessment, “we notice that the in-person application of written tests as a way of assessing students’ knowledge is a deep-rooted custom among teachers” (Santos, Donato, Ottoni, Weide, & Werner, 2020, p. 6).

In the same direction, Biotto and Serra (2020) realised that remote communication and interaction tools applied in synchronous classes played an important role in connecting students and teachers. However, they found that this was insufficient to maintain motivated students who were still adapting to social distancing. In this scenario of virtualisation of classes, thinking about and implementing assessment practices appeared as one of the relevant challenges for teaching practice. Despite the trends of replicating face-to-face and remote teaching models (SANTOS et al., 2020), it is possible to state that innovative practices are being built from such experiences in individualities and in the community regarding teaching practices, learning, and assessment.

In this context, this article discusses the assessment practices developed by Calculus and Physics teachers, in the context of remote and non-face-to-face teaching, having the first semester of 2021 as a time frame. Calculus and Physics subjects are part of the curriculum matrices of the engineering courses at the institution. The professors, holders of six classes whose students were invited to participate in the study are also researchers linked to the research group Practices, Teaching, and Curriculum (Práticas, Ensino e Currículos - PEC/CNPq), and one of the investigated topics is assessment. Theoretical and methodological discussions about teaching in

higher education, therefore, were already part of the ongoing studies when the pandemic broke out.

That new scenario brought new problems related to teaching at higher education, raising questions that demanded, more than ever, reflection and self-assessment on teaching and assessment practices. Concerning pedagogical and logistical processes, the centrality of concerns, education, and initiatives - materialised in both personal and institutional initiatives - orbited in the guarantee of quality, assertiveness, and construction of learning in a historical period in which cyberspace and digital technologies became the first condition for the continuity of classes.

Dussel (2021) and others embarked on research that problematises teaching and learning during the pandemic. In particular, Dussel expresses that ways of learning were being modified in the remote context, citing, among others, that the school has become a kind of podcast that students used while doing other tasks, such as listening to music. From this perspective, we can "pretend we are there when we are not". She also believes synchronous and asynchronous movements must be addressed, highlighting the power of synchrony. Those questions allow us to problematise how to synchronize with the time of others in the coordination of pedagogical work. The ideas expressed by that researcher also allow us to (re)think various aspects related to teaching, especially assessment.

The confluence of these factors proved fruitful in investigating to what extent and how the assessment practices proposed by this group of researchers to their undergraduate classes were perceived by students as practices whose ultimate purpose should be the self-regulation of learning (Borralho, Lucena, & Brito, 2015). Thus, we propose a research question: What does a group of engineering students say about assessments and their roles in Physics and Calculus? To deal with this problem, the objective of the analytical methodological path of the empirical material consists of examining engineering students' statements about the assessment processes and their purposes in Mathematics and Physics subjects offered in the context of remote teaching.

THE METHODOLOGICAL PATH

This is a qualitative research study because, according to Yin (2016), it allows investigating a wide variety of topics or themes, it applies to different academic subjects or professions, and it makes it possible to

represent the opinions and perspectives of the participants of a study. Furthermore, it contributes to producing existing or emerging concepts that can help explain behaviours or positions.

In this case, the participants were represented by 85 students of Calculus or Physics subjects, enrolled in engineering courses at a community university in Rio Grande do Sul. Their ideas about assessment practices and their relevance to feedback about learning constituted the empirical material of the study, collected from an online questionnaire answered anonymously and voluntarily, at the invitation of the research professors.

It is important to highlight that when accessing the questionnaire, the students, were informed of the ethical precepts in research, through an informed consent form. Therefore, answers could only be made after agreement and acknowledgment of the terms, which included, among others, the non-disclosure of any information that could identify the research participants. It is also important to emphasise that the investigation that generated the article was carried out by research professors linked to two postgraduate programmes in teaching, members of a group that investigates the theme of assessment in mathematics and natural sciences teaching. For this reason, its premise is to frequently investigate the teaching practice itself in subjects linked to engineering courses, which is why this research was not sent to the institution's research ethics committee. Furthermore, the students answered the questionnaire mentioned during class hours, being able to request any clarification they deemed relevant. Therefore, the authors of the article are aware of the responsibility and ethical precepts related to the dissemination of the generated data.

From this perspective, we are in line with the thought of Larrosa (2004), when he problematises the “insertion” of researchers in the empirical field. By pointing out that he “always resisted what we could call social tourism” (id., p.2), Larrosa alludes to one of his forays into a Landless Movement camp in Brazil to research this empirical field. After questioning a woman from the camp about her way of life, her family, and the reasons that made her go there – and having his questions promptly answered – the author problematises how he would behave in an inverse situation, i.e., if someone from that social movement declared to be interested in his life stories, of male and heterosexual university professors of his generation, thus feeling entitled

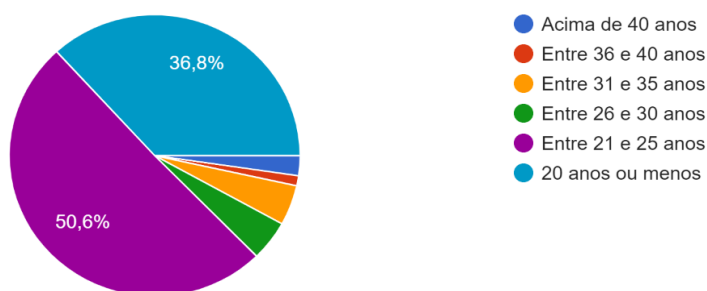
(...) to ask me anything about my way of life, my personal trajectory, my expectations, my ideas, my loves, my victories and frustrations, my joys and my sorrows, and that that person

told me that they would publish something about my vital experiences in some collective book prepared by poor and illiterate researchers interested in the ways of life of rich individuals with a university education. (Larrosa, 2004, p.2-3)

Aware of “our intrusion” and armed with these references that proclaim the need to think about ethical issues based on the information generated in the empirical field, we proceed to analyse the profile of the respondents. Figure 1 shows the distribution by age, with the majority aged between 20 and 25 years (87,4%).

Figure 1

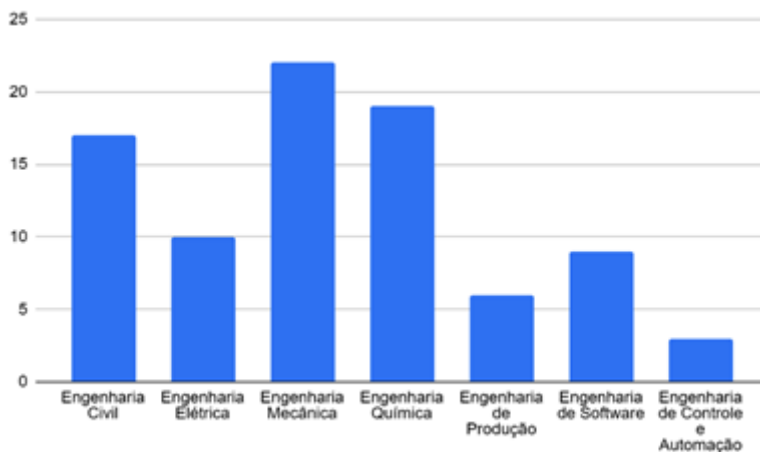
Age range of participants



As they are subjects common to all engineering courses, the students may attend any of those offered by the university. In the research, as seen in Figure 2, those from mechanical, chemical, and civil engineering predominated.

Figure 2

Distribution of participants per course



Students were invited to answer an online questionnaire with three objective and four descriptive questions. The application took place near the end of the first semester of 2021; therefore, in a remote or virtualised teaching context. The discursive questions proposed were the following:

Question 1: What are the assessment practices most often used by your Mathematics and Physics teachers in remote classes?

Question 2: Do you consider it important to know the criteria used by the teacher in the different assessment tasks? Comment your answer:

Question 3: In your opinion, which assessment tasks are most effective in providing feedback on your learning to the teacher? Comment your answer.

Question 5: Do you consider it important that teachers provide feedback on assessments to students? Why?

The scrutiny of the research materials generated by the questionnaire application took place through discursive analysis from Michel Foucault's perspective. At this point, we are interested here in making two caveats. As Veiga Neto (2003) rightly points out, the philosopher's ideas - who did not

centrally research education - should not be thought of as a remedy that would save us from the ills that surround educational processes. “Foucault is not a salvationist to the extent that, for him, there is no path, not even a place to reach and that can be given in advance” (Veiga Neto, 2003, p.18). Still for the author, “This does not mean that many places cannot be reached; the problem is that such places are not there - in another space or in another (future) time - to be reached or to wait for us” (Id., p.18). However:

But if Foucault is not a great remedy, he is undoubtedly a great stimulator. He can function as Nietzsche does: as a catalyst, a mobiliser, and an activator for our thinking and our actions. And certainly, more than Nietzsche, Foucault brings us detailed historical studies with which and from which he builds various analytical tools that we can use in our own research and our social and educational practices. (Veiga Neto, 2003, p.18)

One of these tools concerns the notions of discourse, statement, and regime of truth. For the philosopher (Foucault, 2005, p. 11), there are two true stories. “The first is a kind of internal history of truth, the history of a truth that corrects itself based on its own principles of regulation”. For him, it is the analysis commonly carried out from the history of science. Opposing this idea:

[...] It seems to me that there are, in society, or at least, in our societies, several other places where truth is formed, where a certain number of rules of the game are defined - rules of the game from which we see specific forms of subjectivity arise, specific object domains, specific types of knowledge - and therefore we can, from there, make an external, exterior history of truth, (id., p.11)

Opposed to the idea of considering the facts of discourse only under their linguistic aspect, the philosopher understands them as “games, strategic games of action and reaction, question and answer, domination and avoidance, as well as struggle” (Foucault, 2005, p. 9). Moreover, from this perspective, “discourse is a regular set of linguistic facts at a certain level, and polemical and strategic at another” (Id., p.9). From this perspective, it is also important to highlight that, for the philosopher mentioned above, the notion of truth is not disconnected from that of power, emphasising that “truth is of this world, it is produced in it thanks to multiple coercions, and it produces regulated effects of power” (Foucault, 1979, p.12). He adds that each society has its regime of truth; in other words, a general policy of truth, that is:

[...] the types of discourse it welcomes and makes function as true; the mechanisms and instances that make it possible to distinguish true from false statements, the way in which both are sanctioned; the techniques and procedures that are valued for obtaining the truth; the status of those who have the task of saying what counts as true (Foucault, 1979, p.12).

It should be emphasised that here the word "truth" is not associated with a supposed set of true things, it is not about "a fight 'in favour' of the truth, but around the statute of truth and the economic-political role it plays" (Foucault, 1979, p. 13). In this sense, we do not postulate "telling the truth" about what students thought, or how the assessments should be in the context of the exact sciences in engineering courses. What we intend is to point out the historical, contingent character and how a set of statements about assessing such subjects is constituted, considering that the discourses "are practices that systematically form the objects they talk about [...] are made of signs, but what they do is more than using these signs to designate things" (Foucault, 1995, p.5). The philosopher completes by saying that it is exactly that "more that makes them irreducible to language and the act of speech. It is that more that it is necessary to make it appear and that it is necessary to describe it" (Id., p.5, emphasis added).

It is also relevant to highlight that the philosopher says that discourse can be understood as "a set of statements that is supported by the same formative system" (Foucault, 1995, p.5), which is why the notion of Veiga Neto (2003, p.113) explains that a statement "is not any proposition, nor a speech act, nor a psychological manifestation of some entity that is situated below or more inside the one who speaks". The author says:

The utterance is a very special kind of speech act: it detaches itself from local contexts and trivial everyday meanings, to construct a more or less autonomous and rare field of meanings that must then be accepted and sanctioned in a discursive network, according to an order - **either in terms of their truth content, or in terms of who practiced the utterance, or in terms of an institution that welcomes them.** (Veiga Neto, 2003, p.113, emphasis added)

The philosopher also points out that he does not conceive the subject of an utterance as "the cause, origin or starting point of the phenomenon of the written or oral articulation of a sentence" (Foucault, 1995, p.109). In this area, Veiga Neto (2003, p.137) says that Foucault, by decentralising the

subject, “by not seeing them as an entity before and above his own historicity” and by not attributing them “any substance that *has always been there.*” (Id., p.137) [author’s emphasis] takes them “from the outside” (Id., p.138), that is, surrounds them and examines “the layers that surround and constitute them” (Id., p.138). For Veiga Neto, these layers are the many discursive and non-discursive practices, the many types of knowledge that, problematised, can show who this subject is and how they were constituted.

The theoretical-methodological references explained in this section allowed the analysis of the students’ utterances, emerging two units of analysis. Thus, the scrutiny of the research material showed the coexistence of contradictory and, at the same time, complementary conceptions, indicative of the different roles attributed to assessment in formal teaching contexts.

AN ANALYSIS PROPOSAL

The study of the research materials pointed out two units of analysis that indicate the conceptions of assessment that crossed the utterances of the 87 participating students. The first shows that they attributed to assessment the role of monitoring and evolving their own learning and decision-making by the teacher. The other unit indicates the direction of a classifying and meritocratic testing concept focused on performance, results, and assessment of grades. This evidenced the coexistence of contradictory and, at the same time, complementary conceptions, indicative of the different roles attributed to assessment in formal teaching contexts. In common, both signal students’ concern with meeting teachers’ expectations. In other words, the research participants reproduced statements that circulate socially about the assessment and its roles.

Thus, we begin our argument by explaining a set of recurrent statements about the recognition of these students regarding the role of assessment for monitoring and self-regulation of learning:¹

It helps us improve what was possibly missing for a better result.

Yes, because it gives the student an idea of their learning, whether it was efficient or not.

¹ Following research ethics, the names of the students and the subject they were attending at the time of the investigation will be deleted from the text.

*I consider it possible to understand **where we need to improve** and even the points we find more difficult.*

*With the feedback, it is easier to understand why you made a mistake, **it is also important to comment in class on the questions with the greatest error.***

*It is possible to know which criteria are most relevant in an assessment and **improve in future work.***

*It helps us improve what was possibly missing **for a better result.***

***It is possible to follow the scores** and have it clearer as classes go by.*

*It is important [to assess], but it must be followed by a concern not only inherent to the grades **but to the learning obtained through the assessment methods used.***

*Feedback is always very important, it is the basis for **individual self-correction**, it is a guide.*

*For students to know **whether they are within expectations** and achieving the teacher's goal.*

The utterances expressed above show that the students were immersed in a discursive network that proclaims the importance of the evolution of their own learning so that the teacher can decide on the new stages of the process. This idea is echoed in theorisations widely disseminated in academic and school circles. Let us take as an example the systemic and comprehensive perspective through which the assessment is expected to provide feedback for both students and teachers. To the former, they would provide subsidies for students to effectively follow and monitor their development, converging to a conception of assessment for learning (Borralho, Lucena, & Brito, 2015; Irala, Blass, & Junqueira, 2021; Gonzatti, De Maman, & Neide, 2021).

In particular, Borralho, Lucena, and Brito (2015, p.16) argue that, in school contexts, “it is usual for assessment to be associated with the difference between what the teacher teaches and what the student learns”. The authors state that this association induces the idea of the need for congruence between what is taught and what the student learns. In this sense, “preferably via a specific instrument to be used in a specific calendar” (id., p.16),

expecting that “the results express the models given by the teacher” (id., p.16). Therefore,

There is no thinking about learning processes that explain how students have learned. If students make mistakes, it means that they did not study enough, it indicates that they did not learn, and this failure is solely their responsibility. Assessment as congruence strengthens classification, selection, and certification practices (Borralho, Lucena, & Brito, 2015, p.17).

The researchers continue with their arguments, explaining that, in the field of mathematics, the ideas described above are more widespread. However, they also point out that another understands it as checking parameters, diagnosing the type of student performance, i.e., assessment as interpretation. In this framework, “we understand that the student develops their knowledge from the interaction with their learning” (id., p.17).

It is also worth highlighting that the concept of interpreting and diagnosing - with the premise of monitoring students' difficulties and progress - allows thinking about the “regulation of learning” (id., p.17), of interest “to know more about how students think and less whether they show correct results”. From this perspective, the error is seen as fundamental so that interpretive analyses can be carried out by both the teacher and the students. In that theoretical register, feedback plays a central role, as teachers who make them possible through different evaluative strategies or artefacts would ensure indicators for decision-making and feedback on pedagogical practice (Santo & Luz, 2012). Conceived as an intrinsic component and integrated into the educational act, one of the roles of assessment would be to influence the planning and qualification of teaching work (Cazzanelli, Fabrício, Amaral-Rosa, & Ramos, 2020).

Thus, the feedback provided by the teachers and the clarification of the assessment criteria for the tasks would be important for students to identify difficulties, solve their doubts and correct their mistakes. Not by chance, there is a significant recurrence of utterances in which the word error and its variations (verb - err, erred, adjective - wrong) are correlated in the students' utterances.

*Of course, because we have to know whether **we are on the right path.***

*Yes, because that way, **we can evolve.***

Tests and assignments are the best way to evaluate the student and also for the student to see how they are doing.

Yes, it is extremely important that the teacher makes it clear what the best assessment criteria are, so that students can focus more on the assessment requirements, performing better.

*I really like activities, because I believe that practice leads us to obtain **better results**.*

*For I will know specifically in **what way the teacher wants my answer**.*

To achieve higher scores, it is essential to have a sense of what is being assessed.

*I believe that it is important for each teacher to explain **their assessment criteria**.*

*It helps students have a better idea of how the teacher **wants to assess**.*

The analysis of the utterances allows inferring that, for the students, it is important to pay attention to the result of the assessments, focusing on the assessment of grades and performance, from the teachers' perspective. Studies on assessment in higher education, in particular, have systematically shown that assessment practices, in general, are at variance with theoretical premises on assessment focused on learning. In line with this finding, Santo and Luz (2012) point out that assessment carries an authoritarian meaning and a strong subjectivity intrinsic to the process, because,

Although it is not possible to generalise, we perceive in our educational practice that many professionals who work as university professors have a real aversion to the discussion of pedagogical topics of this nature, seeing them as a waste of time and “pedagogisms” of little practical value. Thus, they continue to repeat the assessment practices they experienced in their formative process in the classroom on a daily basis, disregarding the demands that contemporary times impose on everyone, educators and students alike (Santo & Luz, 2012, p. 142).

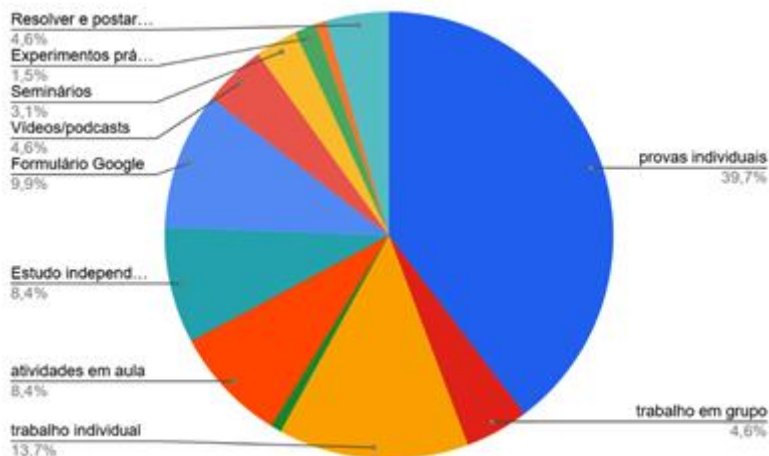
Those authors also point out that teachers are generally conditioned by the authoritarian and excluding conceptions of traditional pedagogy. From this perspective, a collective discourse that emerges from this influence is the belief that “assessment is an activity capable of measuring the level of achievement of objectives” (id., p. 146), reflected in teaching practices and mechanisms for note checking. In turn, Santo and Luz state that assessment “should trigger actions capable of regulating teaching and learning interactions permeated by autonomy and self-regulation” (id., p. 147).

Let us resume the idea of the repetition of teachers' evaluative experiences as their main assessment model, also found in the study by Siqueira, Freitas, and Alavarse (2021). This practice carries with it implicit theories about the acts of teaching, learning, or assessing, and is echoed in the ideas that conceive assessment as measurement and classification, which, in turn, can explain the preference of university professors and students for the test device (Santos, Donato, Ottoni, Weide, & Werner, 2020; Gonzatti, De Maman, & Neide, 2021; Gonzatti, 2021).

In this theoretical register, the tendency towards the thoughtless reproduction of assessment practices in higher education teaching can also be associated with the fragility or absence of a teacher education aimed at assessments in their formative paths (Santo & Luz; 2012; Siqueira, Freitas & Alavarse, 2021). From this problem, another one emerges: Siqueira, Freitas, and Alavarse (2021) found serious errors in the assessments carried out by teachers, “from the use of inadequate procedures and instruments to the adoption of floating criteria with inaccuracies that compromise the entire assessment process, with harm to students (id., p. 1). The utterance of one of the participating students can be powerful for understanding our arguments exposed so far: **“Let's say it's good to know how a client wants a project to be done, the way he/she wants it”**. What draws attention to this statement is that the teacher is the client who needs to be pleased by the student who must solve the project, test, or task. The assessment practices considered most important by the interviewed students attest to this idea (Figure 3).

Figure 3

The most recurrent assessment practices in Calculus and Physics remote classes



When giving their opinion on the types of assessment practices to provide feedback, the students pointed out the tests as the most effective, followed by individual or group work. One factor that may be linked to this perception is their (and teachers') conditioning to an assessment culture focused on grade assessment (Boldarine, Barbosa, & Aníbal; 2017; Duarte; 2015; Santo & Luz; 2012). From this perspective, the test is considered one of the (supposedly) most objective and reliable instruments, to which the student usually responds without the support of any materials or resources and, therefore, would be the most reliable way to measure their performance and the learnings.

One aspect worth mentioning concerns the percentage of students who cited the tests as an assertive instrument for feedback (Figure 3): 33% compared to the use of the test, mentioned fifty-two times in question 1 (the assessment practice teachers most adopted). Indeed, the work by Gonzatti, De Maman, and Neide (2021) confirms that engineering students perceive tests, virtual experiments (remote classes), and the provision of feedback through different means as powerful strategies for self-regulation of learning. It is also essential to emphasise that, in the justifications, several stated that the correction of activities is extremely important for the teacher to understand

the learning situation, as it is possible to identify how and where the students went wrong.

Regarding the justifications for the efficiency of giving feedback, the analysis revealed that different arguments are evoked. In the case of tests, part of the students inferred that they facilitate the progress of the learning process, as they demand less time and cover more content. From this perspective, the interviewees considered that *“a proof with greater value becomes easier to be developed than several small works”*; or *“[are] a faster way to analyse the quality of studies”*. Others stated that the tests allow analysing aspects that still need to be improved: *“we can know where we can and should improve”*; and *“they tend to pull content from past classes and add subjects from disciplines already studied”*. Therefore, it is possible to see that some answered the question in view of the ease of the process; others, its quality. To a lesser extent, some consider the tests carried out through the form platform Google® the best feedback practices, as they enable the better organisation in the process and faster feedback.

Following Wanderer's (2014, p. 30) ideas, it is interesting for the ongoing argument to understand that the option for this theoretical framework occurs as we understand that the subject becomes the result of the contexts in which he/she is inserted, "being manufactured and regulated by the various discourses that challenge him/her". Thus, it is powerful to analyse the students' statements "by what they say and by the rules that generate them, not [being] attached to the meanings of the signs that compose them" (Id., p.28).

Regarding the works, there were twenty mentions, including those carried out individually (nine), in pairs (one), or in groups (two). In general, individually or in pairs or groups, the predominant justification pointed to the time of involvement, which would lead to a greater depth of the studied themes, being able, in this way, to assess knowledge more reliably. In this sense, we highlight some manifestations:

[Jobs] are designed for both creative and logical development.

There is more commitment and time in carrying out (response referring to those who specified individual works).

In turn, others highlighted the oral presentation of papers or seminars as a mechanism that *“always makes the student's understanding of the subject very visible”*, or *“that demonstrates that the student has really learned”*. However, this set of arguments was in the minority [four]. In this sense, it is important to reflect on the functioning dynamics and subjectivities of each

student, as some have some difficulty speaking in public, which does not mean a lack of knowledge, but social issues. Just as some prefer the activities individually because they manage to establish a continuous line of reasoning, others prefer pairs or groups, as they enable the exchange of knowledge, favouring collaborative learning.

The resolution of exercises was also mentioned a few times, divided into proposed and evaluative, which can be interchanged. Some students stated that assigning grades to “exercises” results in greater commitment from individuals, an argument that is consistent with the dominant summative and meritocratic logic of assessment (Cazzanelli, Fabrício, Amaral-Rosa & Ramos, 2020; Santo & Luz, 2012).

In addition to a view of assessment as verification and classification of performance, the analysis also shows that students had a perception that assessment should support decision-making to develop learning. In this line, they emphasised that the proposed exercises, both at home and in the classroom, with their subsequent teacher's grading, tend to offer very reliable feedback because, through it, it is possible to identify errors and understand how to correct them, thus emphasizing the level of learning:

Exercises are useful as they can show the teacher how the class and students are dealing with the current course content.

You can see well the specific errors and doubts during the calculations visualised during the exercises.

However, criticisms of remote teaching emerged: “*If the given theme exercises were charged by the teacher, without the student knowing, we would know who is really studying at home and not just ‘copying’ from colleagues on assessment days*”. In this situation, the meritocratic and verifiable function of the assessment emerged again, revealing a quite common behaviour, cited by a respondent: “*some students dedicate themselves to activities only when they are part of the course assessment*”. Although to a lesser extent (three students), the creation of memorials and immediate response quizzes were also mentioned as assessment artefacts. As for the former, the justification was the possibility of *recording* the content studied throughout the course, an enunciation that is also in line with the units of analysis proposed in this article. In this sense, it is worth highlighting what Foucault expresses about the circulation of some discourses to the detriment of others. For the philosopher, any society has so-called “greater” narratives that are told and repeated; formulas, texts, and sets of discourses that, depending on specific

circumstances, are said and preserved because they are believed to comprise some kind of secret or wealth. Thus, it is necessary to analyse the context in which they were generated and

[...] the political and economic conditions of existence are not a veil or an obstacle for the subject of knowledge but that through which the subjects of knowledge and, consequently, the relations of truth are formed. There can only be specific types of a subject of knowledge, specific orders of truth, specific domains of knowledge starting from the political conditions that are the grounds that form the subject, the domains of knowledge and relations with the truth (Foucault, 2005, p.49, emphasis added).

That said, in the last section, we propose some problematisations that, in opposition to the idea of being definitive and propositional, point out possible paths for us to also think about other ways of assessment.

SYNTHESES OF POSSIBLE CONCLUSIONS

The investigation results allow us to highlight two ideas expressed by the students, permeated by a diverse set of utterances about assessment. The first of them concerns different and complementary views about assessment. Indeed, some respondents exposed ideas regarding aspects related to verification and classification, expressed, above all, by grades and pass and fail rates. However, for others, the results may lead to processes that involve guidance and mediation as a way of understanding the evolution - or not - of student learning. Such thoughts are in line with what has been verified in studies by Borralho, Lucena, and Brito (2015), widely disseminated in academic circles about learning assessment.

Thus, as much as we are imbued with pedagogical discourses that propose other concepts about assessment and its purposes, it seems sensible to consider that our assessment practices also assume characteristics of a perspective of summative and classificatory assessment, an end in itself. However, we understand that it should provide teachers with feedback on the assertiveness of their strategies, enabling decision-making processes regarding teaching planning (Cazzanelli et al., 2020).

Our university practice has shown that, frequently, coordinators and professors do not use the results of the

assessments as a tool for feedback or reflection on the educational process, resulting in errors that compromise the ultimate goal of meaningful learning (Santo & Luz, 2012, p. 149).

Another point to highlight is what the students thought about the feedback given by the teacher. Indeed, they expressed that they received it in different ways, recognising the teachers' concern about feedback on assessments. This fact can again be referred to studies by Borralho, Lucena, and Brito (2015, p.19), when they show that “both assessments based on formal criteria and those based on the experience lived in the classroom day-to-day” - evidently systematised - enable “the monitoring of learning, they can say better about the learning carried out by the students” (Id., p.19). In this perspective, the assessment processes would not be at the “service of the institutional bureaucracy only but, above all, to assume a commitment with the improvement of the quality of students' learning” (Id., p.19).

It is also important to point out that, in the theoretical framework that supports the investigation, it would not be appropriate to blame students, professors, institutions or bodies that regulate undergraduate courses. Rather, it is about understanding that we are captured by the discourses circulating throughout the social fabric, going beyond the walls of higher education institutions. On the one hand, the emergence of a vision, on the part of the research participants, of assessment as self-regulation of learning can be associated with the discussions and assessment practices implemented by the teachers of those disciplines, who seek to establish convergent processes with the notion of assessing for the learnings. On the other hand, a vision focused on summative and classificatory assessment can be interpreted as a trait of a culture focused on performance, whose results are little connected with the organisation of teaching and learning processes and which still predominates in higher education.

Thus, it is relevant to emphasise that the investigation results, instead of immobilising us, have impelled us to continue researching other ways of evaluating. It is productive, as Wittgenstein (1996) pointed out, to understand that each context requires its own configurations and solutions. Thus, "we fall on a slippery surface where friction is lacking, where the given conditions are, in a certain sense, ideal, but where for this very reason we can no longer walk; we then need the friction. Let us return to the rough ground" (Wittgenstein, 1996, p.107, emphasis added). The rough ground to which the philosopher refers may indicate vanishing points of what has been presented,

characterising itself in spaces of resistance; however, it is not about betting on processes based on confrontations.

In his analysis, the philosopher shows that where there is power, there is resistance. Regarding that notion being present in Foucault's work, authors such as Castro (2004, p.315) say that this possibility to Foucault “is not essentially of the order of moral denunciation or the claim of a specific right, but of the strategic order and struggle”. The philosopher refers to this relationship of strategy and struggle in power relations when alluding that resistance, as he understands it, “is not prior to the power it faces. It coexists with it and is absolutely contemporary” (Foucault, 1979, p.241). In an interview granted to Bernard Henri-Lévy, when asked whether resistance would be the “inverted” image of power, Foucault replied that, in that case, there would be no resistance. “To resist, resistance must be like power. As inventive, as mobile, as productive as it is. That, like power, resistance must come from 'below' and be strategically distributed” (Id., p.241). He also states that to analyse power relations, there are only two models available: power as law, institution, and prohibition and the “warlike or strategic in terms of power relations” model (id., p.241, emphasis added).

At another point, Foucault (2005, p.153) pointed out that, in his studies, he did not want to identify the binomial power and oppression. In effect, for him, where there is power, there is resistance, “extraordinarily numerous, multiple, at different levels, where some support each other and where some contest the others”. As the points of resistance are present throughout the power network, it is not possible to think that there is “a place of great Refusal – the soul of the revolt, the focus of all rebellions, the pure law of the revolutionary” (Id., p.91, author’s emphasis). In this context, it is powerful to think of “(...) resistances, in the plural, which are unique cases: possible, necessary, improbable, spontaneous, wild, solitary, planned, dragged, violent, irreconcilable, ready to compromise, interested or doomed to sacrifice [...]” (Foucault, 1979, p. 91) also in the evaluative processes. Above all, it is important to understand that “we are never imprisoned by power: we can always modify its domination under certain conditions and according to a precise strategy” (Foucault, 1979, p. 241, emphasis added).

Finally, it is powerful to show that we are aware that the choice of the theoretical-methodological framework that we chose to support the investigation implies being aware that, as Veiga Neto (2003, p. 21) points out, “in Foucault’s thinking there is no there is no place for metanarratives and for expressions like “human nature” and “the history of mankind”, nor for certain

words like “all” and “always”. By adopting this perspective, it is not possible to start from stable and secure concepts, nor to worry “about getting to stable and secure concepts in our research, since believing that they have such properties is believing that language itself can be stable and secure - an assumption that makes no sense from this perspective” (id., p.21). We follow these ideas and understand, as does the author, that “it is more interesting and productive to ask and examine how things work and happen and to rehearse alternatives so that they come to work and happen in other ways” (Id., p.21). Following this idea,

If we really want to know knowledge, know what it is, learn it and its root, in its manufacture, we must approach not philosophers but politicians, we must understand what the relations of struggle and power are. And it is only in these relationships of struggle and power - in the way things among themselves, men hate each other, fight, seek to dominate each other, and want to exercise power relations over each other - that we understand what knowledge consists of. (Foucault, 2005, p.23)

This has therefore been our task: to think of other possibilities, other knowledge, and also for the assessment processes in engineering courses, even though we are aware of the constant challenge from regulatory agencies and the market. These interpellations spread, throughout the social fabric, discourses about good and bad assessments. In opposition to this idea and paying attention to what Foucault taught us, we understand that it is powerful to generate other types of knowledge.

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AUTHORS' CONTRIBUTIONS STATEMENTS

IMG, SEMG, MTQ and MJHR designed the research question and applied the data generation instrument to their undergraduate classes and students. SEMG designed the electronic data collection instrument. IMG and SEMG carried out the data analysis. IMG, SEMG, MTQ and MJHR contributed to the writing of this article.

DATA AVAILABILITY STATEMENT

The data supporting this article are in the custody of SEMG and may be made available upon request for a period of 5 years.

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