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Methods of Teaching Centered on Learning and Formative Assessment in Higher Education

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Abstract

We analyse the importance of meaningful learning and the use of a formative assessment strategy, promoted by peer learning methods centred on the students, in a curricular unit (CU) pertaining to a degree in Exact Sciences, in a Higher Education Institution. Five students from the CU were questioned, through a focus group; the teacher was interviewed. Data of 12 hours of lessons was analysed and categorised using webQDA. We conclude that emphasising the students' engagement in teaching, learning, and evaluation, has the power to drive the methodological teaching options to incline towards active methods that involve students in activities that foster meaningful learning. And the use of systematic formative assessments, integrated in the teaching-learning process, by using effective feedback, is most likely to make students and teachers responsible for an overall improvement in learning.

Keywords

Higher Education, Methods of Teaching and Assessment, Feedback, Centrality of the Student

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Methods of Teaching Centered on Learning and Formative Assessment in Higher Education

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We analyse the importance of meaningful learning and the use of a formative assessment strategy, promoted by peer learning methods centred on the students, in a curricular unit (CU) pertaining to a degree in Exact Sciences, in a Higher Education Institution. Five students from the CU were questioned, through a focus group; the teacher was interviewed. Data of 12 hours of lessons was analysed and categorised using webQDA. We conclude that emphasising the students' engagement in teaching, learning, and evaluation, has the power to drive the methodological teaching options to incline towards active methods that involve students in activities that foster meaningful learning. And the use of systematic formative assessments, integrated in the teaching-learning process, by using effective feedback, is most likely to make students and teachers responsible for an overall improvement in learning. Keywords: Higher Education, Methods of Teaching and Assessment, Feedback, Centrality of the Student

The guidelines given by Bologna (1999) to the Higher Education Institutions (HEI), in Portugal as well as in the European Higher Education Area, have placed new demands to the way that we develop the three basic pillars of a quality education for the high performance of students: teaching, learning, and evaluation processes. Given this context, and given that a decade has passed since they were first introduced, it is pertinent to identify the teaching, learning, and evaluation settings in HEI.

The purpose to develop professional skills makes HEI responsible to offer students the creation of opportunities in the fields of knowledge, the ability to use the acquired knowledge, and the collaboration with their peers in problem solving. Likewise, they are responsible for creating the opportunities for students to have experiences of personal development structured around individual freedom and the capacity to ethically self-determine their course of action, be it restricted to their professional area, or enlarged to the fullness of their citizenship. The fields of knowledge, the abilities, and the correct and desired competences, find in the teaching-learning setting an interactive (holistic) totality, which enables the development of skills, including the ability to continue to learn throughout our lives. Therefore, the improvement of the teaching-learning processes implies changes in the methods of teaching, learning, and evaluating, consequently reconstructing the roles of teacher and student.

To sum up, the reconstruction of these roles consists of the teachers' centring of teaching on the students' learning, in which the latter actively participate. In turn, they develop processes of personal reflection, therefore making them responsible for the improvement of their own learning.

Introduction: Methods of Teaching Centred on Learning

This unitary perspective as well as the interaction between the domains of teaching,

learning, and evaluation changes the more traditional methods of the organization of teaching, centred on the teacher, and the methods of evaluating learning, centred on the summative and punctual product. It changes them to other methods that are subordinated to the participation of the students into all the phases of the teaching-learning and evaluation process. Hence the emphasis placed on the participation of the student and on the unit of teaching, learning, and evaluation orientates the methodological options of the teacher to the active methods that involve students in activities that foster significant learning. Furthermore, through the use of systematic, formative, and integrative evaluation methods, with permanent access to feedback, both students and teachers are made responsible for the improvement of learning.

The change of the traditional methods of teaching centred on the teacher to methods of teaching more centred on the student, and the conviction that students build meanings rather than receive knowledge from the teacher, altered the emphasis of the content of the processes. These have obvious consequences on the practical level of teaching, learning, and evaluation, as well as on all the other structural elements of the curriculum.

As regards the underlying principles and assumptions of the methodologies centred on learning, also known as active methodologies, we can say that they are a set of teaching and learning strategies that assume an “active involvement by students in the acquisition of knowledge, skills and attitudes” (Hurd, 2000, p. 30), in other words making them “do things and to think about the things they are learning” (Bonwell & Eison, 1991, p. 18). In this context, learning is seen as a dynamic process in which a student actively participates in the analysis, understanding, discussion, and reflection of one or more activities. In fact, it is the involvement of the student in the learning processes that best characterises these types of strategies. As Prince states (2004), “active learning is generally defined as any instructional method that engages students in the learning process. (...) The core elements of active learning are student activity and engagement in the learning process” (p. 225). By proposing and utilising active learning strategies, the teacher recognises that he/she will have to allow the students to be involved in their own learning, that is, he/she will have to encourage them to take more responsibility for their own learning. In this context, the role of the teacher in the classroom will be to speak less and to facilitate immersion in the subject (concepts) that the student will have to learn with his/her peers.

Introduction: Formative Assessment

Formative assessment stands out due to the regulation of pedagogic performance. As such, it is fundamentally concerned with procedures rather than results. It is an assessment that seeks pedagogic regulation, risk management and the consolidation of achievements (Fernandes, 2009). Formative assessment allows teachers to follow students’ learning, helping them in their schooling. It is a type of assessment based on dialogue, whose objective is the constant readjustment of the teaching and learning processes. It demands a lot of involvement from the teacher, as it demands an availability of time that goes beyond that which is given during class. This is because, in between activities, it becomes necessary to build a register about each student, and then it becomes further necessary to update this register as new data emerges. Therefore, it is primordial to plan the activities that will be developed by students on a daily basis and to elaborate upon individualized strategies. Consensus is the goal; if it is not possible to achieve, the teacher ought to expose him/herself to contradictory or distinct views in order to clarify them. In any case, assessment in this model is a participative, collaborative, interactive, and negotiating process.

In the educational process, efficient feedback given through comments to the student about his/her work allow him/her to regulate their own learning (Crisp, 2012), as this is the result of the interaction with the outside world and of some of the feedback received of that

interaction (Cummins, 2010). Beyond its own objective, the specific value of formative assessment with recourse to feedback lies in the changing of relevant aspects like student-teacher or student-student interaction, self-regulation and self-assessment. Integrating feedback in the activities of teaching and learning is like a dialogue between the teacher and the student (Higgins, 2001), or between the student and his/her peers that looks towards readjustment and the improvement of those same activities.

Methodological Options

Aiming to check the contribution of the teacher to the centrality of the student in his/her learning and its assessment in an HEI, this study was guided by the following questions: How do students and teachers think about what happens in learning? In what way is feedback used in the classroom by teachers and students?

We observed 12 hours of class in a Curricular Unit (CU) that is part of the curriculum of the second semester of the first year of an undergraduate degree in Optometry and Sight Sciences in a Higher Education Institution (IHE) in the north of Portugal. The CU was attended by 70 students and it had a 100% approval rate. The classes were both theoretical and theoretical-practical. In the latter, the students were divided into two shifts of 35, and working in groups of 4/5 students. In order to monitor the lessons, authorization was previously requested from the coordinator of the department of Exact Sciences and also from the teacher in question. The observation was carried out with the investigator taking all the precautions in order to minimize the intrusion effect in the classroom. The table supporting the observation of the classes was adapted to the dimension of the AVENA project¹, whose theoretical framework lists four dimensions: teaching, assessment, learning, and classroom environment. In order to get to know the perspectives of the teachers and the students about the learning and assessment process that we had observed, we held a semi-structured interview with the teacher, who we shall call D, as well as a focus group interview with 5 students, who we shall call E. The content of these interviews was recorded, transcribed *ipsis verbis*, and then subjected to content analysis and cataloguing (Bardin, 2011). The tables of the interviews were validated by the experts of the AVENA project. Both teacher and students gave their consent to participate in the study and validated the content of the interviews. The interviews were conducted by one of the researchers. The content analysis, reading of the data, codification and subsequent categorization (Amado, Costa, & Crusoé, 2013), were carried out by using the quantitative research software webQDA (Souza, Costa, & Moreira, 2011). The codification and the intra codification carried out with an interval of two months had a 0.62 reliability index, which is to be expected according to Miles & Huberman (Miles & Huberman, 1984). The inter codification of the data was carried out by two external investigators and had a 0.77 and a 0.65 reliability index, respectively. As such, the categories and indicators that we present in summary in Table 1 were approved.

¹ The TFC Project Evaluation, Teaching and Learning in Higher Education in Portugal and Brazil: Realities and Perspectives (AVENA) (PTDC/CPE-CED/114318/2009). This project encompasses 4 Portuguese HEI: University of Lisbon, University of Coimbra, University of Minho, and the University of Évora; and 3 Brazilian HEI: State University of Pará, University of Amazônia, and the University of São Paulo.

Table 1. Categories, indicator and definition of indicators

Category	Indicator	Definition
Teaching Perceptions (EnC)	Teacher centred teaching (EnC1)	Comments indicating that the centralization of education is on the teaching process.
	Student centred teaching (EnC2)	Comments indicating that the teaching process is centred on the student.
Learning Perceptions (ApC)	Passive Learning (ApC1)	Comments that suggest passive learning by the student.
	Active Learning (ApC2)	Comments that suggest active learning by the student.
	Learning with their peers (ApC3)	Comments that suggest learning with their peers.
Nature of Feedback (FA)	Oral and Informal (FA1)	Responses generated in a discussion to encourage participation or to direct the discussion.
	Written and Formal (FA2)	Comments made in the assessment planned beforehand in the planning of courses where students' performance can be "measured."
Distribution of Feedback (FB)	Classroom Activities (FB1)	The interpellation about strategy, organization, priorities, policies or description of classroom activity.
	Out of Class Activities (FB2)	The interpellation about strategy, organization, priorities, policies or description of classroom activity.

Presentation and Discussion of Results

A presentation and a discussion of the results obtained will follow, with generic inferences being made from the reading of the results presented in matrixes. These pertain to the questioning for each category and to the codifications concerning the teacher and the students, in turn triangulating the data from the supervised classes with the data gathered by the interviews. We will be using the term *references* when referring to the units of register that can be the sentence or group of words that make sense and have meaning. In Table 2, we present the matrix pertaining to the category "Learning Perceptions" (ApC).

Table 2. Matrix of Learning Perception of Teacher and of Students

	No. references Passive Learning (ApC1)	No. references Active Learning (ApC2)	No. references Learning with their peers (ApC3)
Teacher (D)		5	2
Students (E)			5

From Table 2 we can see that there are no references to the indicator "Active Learning" (ApC2) in the students' narrative when answering the interview's question "In your opinion, what factors were the most decisive concerning learning in this CU? Why?" This might indicate that students are unaware of the concept or the meaning of learning, since they mostly answered "good lecture notes" (E); "summaries" (E). In contrast, the teacher shows references to active learning when talking to the class (5 references); for example: "The students will now present the hydrophobic part in a class discussion" or "I want you to, in groups, prepare an abstract about the behaviour of the organelles in acid." Furthermore, the teacher understands that his/her students should learn with their peers (2 references): "If we are speaking about a given topic

and I think that they are not understanding me, but I notice a student nodding his head affirmatively, I say the following: - Look, tell your classmate over there what you thought, what you understood, as he might understand you better than me.” (D). Students agree that they learn with their peers (5 references): “We understood it better when our classmates explained it” (E), or “Sometimes we explained it to our classmates.” (E)

Table 3 is the matrix regarding the “Nature of Feedback” (FA) category.

Table 3. Matrix of Nature of Feedback of Teacher and Students

	No. of references Oral and Informal (FA1)	No. of references Written and Formal (FA2)
Teacher (D)	2	1
Students (E)	6	1

An analysis of Table 3 tells us that the feedback on assessment is essentially oral and informal (FA1). This was referenced both by the teacher (2 references) and the student (6 references): “That is how it is, but does that make sense to you? Explain to me what you wanted to say, and how it makes sense in your head?” (D). “Yes, we help each other a lot. There were a lot of tips that we would give each other, even more to the classmates in our group.” (E)

It is worth noting that formal and written feedback (FA2) was only mentioned once by both student and teacher: “I give written feedback as the student won’t be able to know what is wrong if he doesn’t have feedback of what is wrong... if he does something wrong and is unaware of why he did it wrong, I don’t think it’s very useful...” (D). “We would write a report on what we thought of the work of our group of classmates.” (E)

Table 4’s matrix pertains to the Distribution of Feedback (FB) category.

Table 4. Matrix of Educational Perceptions of Teacher and Students

	Teacher centred teaching (EnC1)	Student centred teaching (EnC2)
Teachers (D)	2	7
Students (E)	4	6

From the analysis of Table 4, we can conclude that both the teacher (2 reference units), as well as students (4 reference units), have the perception that the teaching is focused on the teacher (ENC1), but we also find students (6 referral units), and the teacher (7 reference units), to have the perception of student centred teaching (ENC2). It will be interesting to see if the teaching perceptions of teachers and their students are consistent with what we observed in the classroom. Therefore, we did a code search of the category "Educational Perceptions" (EnC) by the encodings of the narrative, of the observation and of the interview to the students and to the teacher, resulting in the matrix in Table 5.

Table 5 presents the resulting matrix with some representative references of the code search of the category "Educational Perceptions" (EnC). We only found two educational perceptions, which led us to consider two indicators: the teaching indicator centred on the teacher and the indicator student centred teaching.

The teacher has a teaching perspective centred on the student (ENC2). The teacher selects a variety of materials, provides guidance and monitoring in order to allow the students to participate independently in the self-regulation process of their learning by improving the understanding and development of cross curriculum skills, as observed in the classroom: this teacher's lessons seemed to us more student centred, they were conducted in an interactive mode, since in addition to using a variety of materials, the teacher takes a reflection approach in the teaching and learning process and the student participates autonomously in the process of self-regulation of learning (D).

The CU has a theoretical and practical character, and perhaps because of this feature, students participate more, naturally having the tendency to become active in their own learning process, either in individual activities or collaboratively, diverse, having in mind the support of the teacher, putting therefore in practice their autonomous construction of knowledge: "We could learn what the teacher taught because she would expose the contents in one way, or sometimes in different ways and that they seemed easy" (E); "Sometimes, the teacher would not go any further in the contents because some fellow students were not understanding" (E); "The teaching was well delivered, we would understand all the contents, even the most difficult ones because everyone can learn, because we participated a lot in class and no one failed" (E); "theory, practice and guidance" (E); "lots of individual and group work" (E); "... but always with the teacher's support" (E).

The teacher refers to the differences in the learning rhythm in the classroom, respecting them: "They do not work, no, not all of them work or not all of them work the same way and, therefore, here starts the great difficulty to reconcile ways to work in the classroom" (D). She stresses the need to implement various activities: "I wish I could have activities in which there would be some reflection and that I would realize that there was, whether I promote it or not, but I do not know if it actually exists" (D).

She refers the support she provides to the students: "it worries me. It feels that I should walk back, walk back, which is something I can do up to a point, but from that point I can't, because I cannot ... because I have to make a choice, I either do not teach the contents of the curriculum unit, or I do not teach all the contents, I do not go any further, on the other hand, there will always be students that are always aware and can move forward" (D).

The teacher implements a reflective teaching, which explains the advances and retreats in the teaching process itself, which is built interactively, which seems visible in her speech: "something has gone wrong with me in the previous step. So we have to go back and, well, let's stop and see: Then what would we need to know to solve this problem? We needed this and that. So when we talk ... and therefore there is here a moment of dialogue or ... we have to go and get what's behind to bring forward to realize how one can build with what's behind the next step" (D).

In general, the teacher believes that teaching is a process and she does not separate the teaching from learning, as we can verify in her speech: "I have a lot of difficulty because there is no teaching, there may be some teaching if there is any learning." "I do not really believe that there is a teaching, I mean, stripped of beings that supposedly learn something. And this process also, I do not see it only in a sense that there is someone who teaches someone. I think that if there is a teacher who teaches some students who learn, it is also alleged that the teacher learns something from students" (D).

The teacher emphasizes the two-way aspect of the teaching-learning process, that is, he/she teaches someone who learns, but he/she's also an apprentice with his/her students. This perspective is a starting point for the teacher to face the curriculum development in a reflexive way.

Table 5. Matrix of Distribution of Feedback of Teacher and Students

	No. of references Classroom Activities (FB1)	No. of references Out of Class Activities (FB2)
Teacher (D)	9	5
Students (E)	10	2

An analysis of Table 5 shows that the distribution of feedback in the assessment of both classroom (FB1) and out of classroom (FB2) emerges in the teacher's speech (9 and 5 references respectively). In classroom activities the teacher would refer to debates or to

presentations in the class as: “very complete;” “very clear structure and very well thought through;” “very enlightening work, very clear;” even though he/she never registered these in any assessment table in the classroom. As to out of class activities, an example of the teacher’s narrative is: “Therefore, feedback is given in a timely manner to all the assignments... in one week I go over all of their assignments... not of all of the students, but of all the groups” (D). As to the students’ narratives of classroom activities, they said the following: “maybe the professor was evaluating our work in class.” When referring to out of class activities (2 references), the students said that “we sent what we did for the professor to have a look” (E).

Conclusions

The strategic guidance of teaching centred on the student implied for the teacher a responsibility to promote learning environments that are diversified, flexible and susceptible to value the student’s participation in all the steps of the process. This includes tasks and activities that develop cognitive competences of a superior level. As such, learning with one’s peers revealed itself to have the potential to foster participation and improve students’ learning, by promoting their centrality. This has the potential to be more fruitful as long as accompanied by efficient methods of formative assessment and monitoring of the process.

The evidence that feedback was materialised in the expression of an action or sets of actions that the student developed to improve his/her learning lacks an equivalent action from the teacher. We do not consider the feedback given in class as being a form of formative assessment, thus preventing its effectiveness.

When materialised by an effective, timely and constant feedback, formative assessments, between students and between teacher and student, be it in classroom or out of classroom activities, oral and informal or formal and written, has an implication on learning which allows the student to correct mistakes and address issues throughout the entire teaching process.

We cannot highlight a teaching model that we have observed and, as emphasised by Joyce and Weil (2014), there is no perfect model of teaching that encompasses all types and learning styles. For this reason, the model is defined as a developed plan that can be used to set up the process of development of the curriculum. In general, the choice of a teaching strategy "involves the deliberate choice of a plan of action or teaching model which constitutes a way to intervene using methods and techniques which, in turn, give rise to a particular style of teaching" (Pacheco, Alves, Morgado, & Viana, 1999, p. 161).

Therefore, we can say that by having observed some practices that are integrated into the information processing models and others in the models of social interaction, teaching is seen as a social process, valuing student's relationship with the other students in an interaction context. The teacher's role was to promote the participation of students towards the development of interpersonal relationships in the context of the educational community (Sá, 2015; Sá, Alves, & Costa, 2014).

These results reveal that, in similar contexts, the contribution of the teacher to the centrality of students in activities that foster significant learning in teaching-learning-evaluation strategies, where the evaluation is systematic, formative, and integrated in the process that resorts to permanent feedback, is susceptible of making teachers and students responsible to improve learning. This then brings advantages in motivation, in self-regulation, and in the development of critical thought, consequently developing cognitive competencies of a superior level, (Blair & McGinty, 2013; Cummins, 2010; Bonwell & Eison, 1991; Crisp, 2012; Sá, 2015; Sá, Alves, & Costa, 2015).

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