# Innovating in University Teaching Through Classroom Interaction

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**Abstract**

Previous research has shown that the best educational practices are built on the basis of interaction in the classrooms, regardless of their level. However, the dialogue among the students themselves and between them and the teacher is still more scarce than desirable, especially in the university context. Taking this weakness into account, the authors of this contribution propose a Teaching Innovation Project (TIP) as a means of confronting the reality of this matter and advancing in it through an interdisciplinary collaboration involving 16 teachers, who participate as external observers, representing all the Faculties from the University of Cantabria (Spain). Here, we present the design of the TIP that we are currently developing, the working methodology and an advance of the first partial results. Specifically, each of the 16 people involved in this TIP will externally evaluate 6 teachers from their own field of knowledge. The aim is to identify varied interaction practices throughout the university. To develop this process we have designed three observation scales: one for students, another for the teacher in action and a third for the external observer. Data will be collected between October 2018 and May 2019. The ultimate goal is to promote innovation in university teaching through interaction in the classroom in order to achieve the active learning of the students. We hope to contribute to inspire other universities that may be interested in following our steps.

**Key Words**

Interaction, Innovation, Higher Education, University Teaching, Spain

## 1. Introduction

Previous empirical research has shown the advantages of teaching based on interaction, as well as dialogue in the classroom both amongst the students themselves and between them and the teacher. Although it has been demonstrated that its implementation is essential in the improvement

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of teaching quality in the field of Higher Education, interaction as a teaching-learning methodology is still only used by a minority in Spain (Álvarez, 2017; Tronchoni, Izquierdo & Anguera, 2018).

We are all aware that lecture-style classes often fail to capture the attention of students, and a methodological change in the classroom that truly matches the European Higher Education Area (EHEA) is required. Further, we are convinced that we all, as teachers, can improve our interactive dynamics in the classroom. For this reason, we have proposed the development of a TIP in which the coordinators, researchers and collaborators jointly analyse the classroom interactions that are currently occurring in the UC.

In a recent investigation carried out at the University of Cantabria-UC (Álvarez, 2017), the minimal presence of interactive teaching-learning methods in university teaching was verified. Monological discursive practices on the part of the teachers, in which there is hardly room for the interaction of the teaching staff with the students or of the students amongst themselves, were predominant.

Students easily identify classroom practices ubiquitous to lecture-style classes wherein the teacher does not interact but rather follows a more traditional academic logic, as well as similar practices that do not engage with the doubts, questions, and observations that may arise during the course of the classes. Likewise, students also criticize the misuse and abuse of PowerPoint.

The study also concludes that, in part due to their scarcity, students experience serious difficulties in identifying interactive practices in which the teaching-learning process exceeds the previously mentioned models. Most of the students interviewed have not been able to identify any, or if they can it is in other stages of education or in the non-formal environment, referring mainly to the classes received in the private academies located in front of the University Campus.

The experiences of teaching-learning by interaction in the university constitute "isolated cases", but they are very positively valued by the students. Students demand a methodological change in which the interaction in the teaching-learning process is prioritized. Those who have had some interactive experiences claim to have been more involved in their studies and feel they are members of the educational process, ask more questions, have delved more into the content, have enjoyed the subject, have paid more attention in class, and have obtained better academic results. A methodological change is required in current university classrooms and the practices of teaching-learning by interaction are essential to propitiate it.

The group of professors who designed this TIP have proposed to collaborate with each other to analyse and improve interaction in our university classrooms. Betting on the introduction of dialogical practices of teaching-learning in our university is something viable, necessary, and urgent, and could suppose a great advance towards the improvement of the teaching quality within our Higher Education system. In order to carry out our proposal, we will continue the evaluation model of university teaching proposed by Medina (2012), working at three levels: self-evaluation, co-evaluation and hetero-evaluation.

The team of teachers that designed this PID have the firm conviction that our teaching activity can and should be analysed and improved in terms of interaction. We are an interdisciplinary group of young people with a desire to contribute and improve, who took part in a training course about "Teaching-learning by interaction" organised by the UC in 2016, 2017 and 2018.

## 2. State of the art

This section has three aims. Firstly, the concept of interaction will be described in greater detail. Secondly, working with this definition, and given the absence of specific instruments for measuring this concept, a brief overview of the techniques most frequently used in the area of

teaching will be given. Thirdly, after this review, a brief conclusion will be drawn of the most useful techniques for the present project and its application.

### 2.1. The Concept of Interaction

The concept of interaction, considered in some fields as similar to the concept of dialogism, and its effects on the learning process have been amply studied in the literature. However, the authors of the present study were surprised to find that, upon conducting a literature review, there seemed to be no agreed upon definition for the concept in the area of teaching (Duschl & Osborne, 2002; Gauci, Dantas, Williams, & Kemm, 2009; Exley, 2013; Haneda, Teemant, & Sherman, 2016; Majlesi & Broth, 2012; Scott et al., 2006; Stockero, Rupnow, & Pascoe, 2017).

Among the studies that did include a definition of the concept, given its clarity and capacity for synthesis, the work of Howe and Abedin (2013) stands out. They defined interaction as a combination of communicative exchanges in which one individual addresses another individual or group of individuals and receives at least one response in return. This definition, applied to the field of education, is the one selected for the present study.

In terms of interaction as it applies to teaching, it is worth highlighting the work developed by Exley (2013). As this author notes, in the classroom it is possible to distinguish three categories of interaction:

- Task- learners independently interacting with tasks and resources
- Peers- interacting with fellow learners
- Teacher- interaction between learners and teachers /facilitators

Bearing in mind all of the above, we conclude that it is practically impossible to understand the learning process without interaction given that, regardless of the type, it is an essential component of teaching (De Longhi et al., 2012; Fusco, 2012). However, the usual communication within the classroom tends to follow a unidirectional pattern, a lecture-style, and this is fundamental when it comes to defining the didactic relationship established in university classrooms given that interactive methodologies of teaching-learning are still used infrequently (Álvarez Álvarez, 2017). Instead, monologic-discursive methods, similar to master classes and lectures by the professor, are more frequent, thereby leaving minimal space for interaction between the teacher and the students and among the students themselves.

However, national and international empirical research has shown the advantages of pedagogical methods based in interaction, as well as on the dialogue in the classroom that occurs among students and between students and their teachers at all levels of education. Further, implementing this interaction in the classroom is demonstrably necessary in order to improve teaching quality in Upper Education (Álvarez Álvarez, 2017; De Longhi et al., 2012; Fusco, 2012; Tronchoni, Izquierdo, & Anguera, 2018; Wells, 2001).

### 2.2. Evaluating University Teaching

The focus of this project is to demonstrate the basis and the results of the construction of an observational tool to measure the level of interaction in university classrooms since there are few academic studies directed at analysing and measuring these interactions in university classrooms (Scott et al., 2006; Tronchoni et al., 2018; Wells, 2001).

After reviewing the literature, we the authors were unable to locate a single article that proposed a method or designed a specific instrument with which to measure interaction in the classroom. Faced with these results, and with the aim of proposing an adequate instrument, a more general review was conducted which sought to identify the evaluation methods used in teaching and that, by extension, could be applied to the evaluation of interaction.

Evaluation is the process by which proof or evidence is obtained (objective qualitative and quantitative information) by systematic means such that weaknesses (or areas of improvement) can be detected and corrected. Additionally, there are two types of evaluation: external, undertaken by agents who are external to the centre, and internal, undertaken by those individuals involved in the teaching and with the clear goal of improving the teaching activity.

Internal evaluation, given its goal, is of greater interest for the present study and, as such, we have identified a variety of methods. One of the primary methods for internal evaluation is that done by students of their teachers, for example via surveys or questionnaires. It is worth noting that, even though this is one of the most well-known and used methods, its utility is debatable (Crumbley, 2001).

A second method of evaluation is the Critical Friends model. A critical friend is a person who offers constructive criticism after observing the work of another. In taking on this role, the critical friend dedicates time and effort to understanding the context in which the work under evaluation is developed and the objectives toward which the observed person is working (Costa & Kallick, 1993). Along these same lines, a Critical Friends Group is a group of teachers who decide to work collaboratively with the objective of analysing how teaching is currently carried out in order to propose improvements that will have a positive effect on students' learning and, at the same time, on the teacher's experience (Bambino, 2002).

As discussed by Andreu et al. (2003), in order for the critical friends method to be correctly applied, three requirements must be met: participants must be involved; the teaching method, and not the contents, must be analysed and the evaluation must not affect promotion; and, prior to undertaking any evaluation, the criteria to be used must be decided and agreed upon by the critical friends.

Finally, a third method is self-evaluation, understood as the process by which the evaluating agent and the evaluated agent are one and the same (Fuentes-Medina & Herrero, 1999). In the case of teaching, this is the process through which the teacher, with a capacity for self-criticism, analyses and reflects on their own teaching practise.

Having described the most common methods of internal evaluation identified in the literature, it is worth pointing out that there is a tendency towards an integral system of evaluation, also known as 360º evaluation. This type of evaluation is present not only in education but also in general terms in Human Resources as the most complete system of evaluation when it comes to evaluating the level of development in organisations who claim a high degree of internal familiarity (Andreu et al., 2006). One of the principle advantages of this method is that it can obtain information from a variety of sources, avoiding the biased results that can occur when a single vision is used (Andreu et al., 2006). The proposed integral evaluation method coincides with the model for university teaching evaluation proposed by Medina (2012) which identifies three levels of work that must be explored: self-evaluation, co-evaluation, and hetero-evaluation.

In this article, and following the proposal offered by Medina (2012), we propose a questionnaire that will enable the measurement of the level of interaction in university classrooms, as well as identifying the best interactive practises, from a triple perspective: the observed teacher (self-evaluation, such that teachers self-evaluate their interactions in the university classroom),

external observer (hetero-evaluation, such that other teachers serve as external observers and evaluate the interactions of other teachers in the university classroom), and students (co-evaluation, such that students evaluate our interactions in the university classroom). This triple, collaborative process has great potential (Andreu et al., 2006) and could generate shared learning, permanent development, and foment continuous improvement in teaching practise through greater interaction.

## 3. Teaching evaluation model

To carry out our proposal we follow the university teaching evaluation model proposed by Medina (2012). This author considers that analysing university teaching is a complex task, but one that is necessary to advance in the thinking and relevance of our teaching practice. Medina (2012) offers a three-tiered framework that we intend to implement: self-evaluation, co-evaluation and hetero-evaluation.

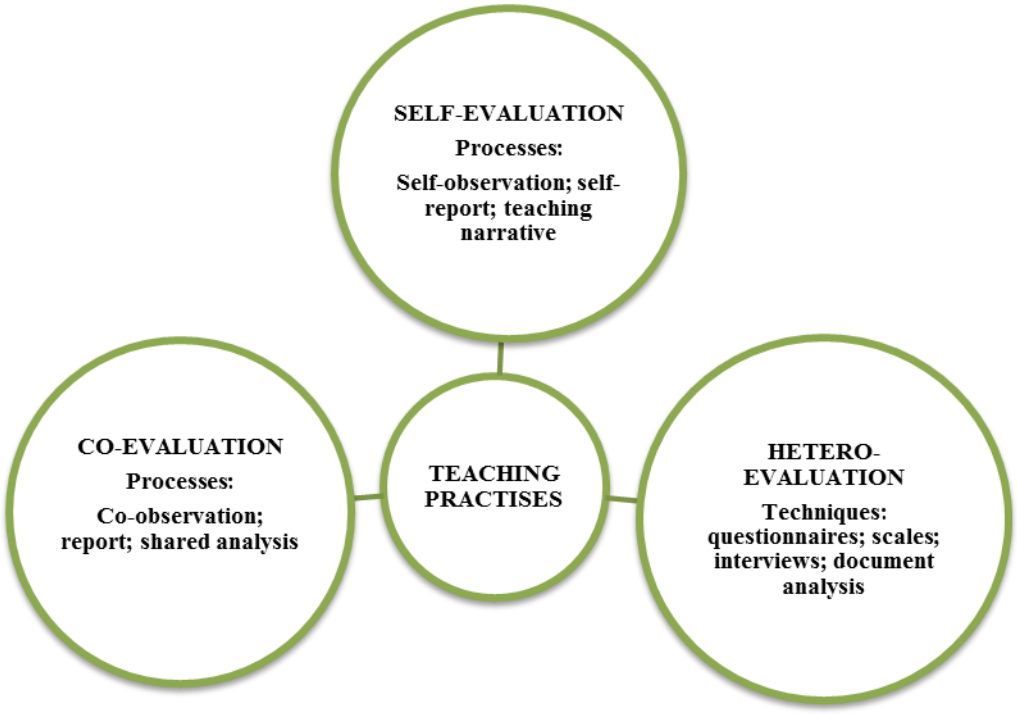


Figure 1: Three Levels of Teaching Practise Analysis

Analysing university teaching in order to promote the implementation of self-assessment, co-evaluation and hetero-evaluation practises is essential in order to recognise, become aware of and opt for the most appropriate improvement decisions in order to innovate in teaching.

To promote self-evaluation, each of us begins with a self-critical study by completing a self-evaluating questionnaire that we have designed ourselves. To achieve the co-evaluation we have decided to work in collaboration with other colleagues by visiting their classes to give them feedback on their work and allowing them to visit ours for the same purpose. This collaborative process generates shared learning, permanent development and helps to promote continuous improvement. To complete the process and conduct a hetero-evaluation, we will propose to the students that they also evaluate our interactions in the university classroom.

In this triple process, we will use questionnaires and measurement scales in whose design, approach and development we have been working. Based on the results we obtain, we will implement measures for innovation and teaching improvement, promoting a more interactive teaching approach in the classroom.

### 3.1. Project aims

With our TIP we aim to analyse and improve interaction in the university classrooms in which we teach through the following:

a) Encourage student participation through active methodologies and promote student learning.
b) Encourage student participation through innovative and active learning methodologies that promote student learning
c) Improve theoretical and practical classes through innovative teaching methodologies to promote interaction in the classroom
d) Develop a 'best practises guide' for interactive classroom practises to be shared with all teachers and lecturers throughout the university
e) Propose a new specific training course that could be integrated into the UC Teacher Training Plan
f) Disseminate our findings from the TIP across the wider university/higher education environment.

### 3.2. Working plan

This is an interdisciplinary project in which teachers from a wide variety of degrees (all the Schools and Faculties from the UC) will collaborate. Therefore, the transfer of the planned innovations is intended to be total, being useful for any subject of any degree.

The TIP will be developed mainly in undergraduate courses, although it could also be developed in some postgraduate courses our idea is that these will be less present.

To ensure that the project has an impact on all the Centres, we have contacted at least one professor from each of them within the UC. Further, we will seek the cooperation of other teachers, who will allow us to attend different classes and evaluate, as observers, the interaction in the classroom.

The work plan is structured as follows:

Stage 1. Prepare the three questionnaires. The first questionnaire is for teachers to self-assess their interactions in the university classroom; the second one is for students to evaluate their teacher's interactions in the university classroom; and the third questionnaire is for the external observer to evaluate the interactions in the university classroom carried out by the other professors. This step is the responsibility of the coordinators and researchers of the TIP. The initial design was done in July 2018. This first draft was shared with a group of 20 secondary school teachers so that they could give us feedback. It was also shown to the 16 university teachers who comprise the researchers of this group.

Stage 2. Attend classes and complete the questionnaires along with all those involved (teachers, students and observers). The organisation and carrying out of this stage is the individual responsibility of all the members in this TIP and will be done between September and May of 2019. Each external observer is responsible for giving feedback to the observed teacher.

Stage 3. Collect and record information for analysis. The coordinators and researchers of the TIP are responsible for this and it will be carried out between November 2018 and May 2019.

Stage 4. Analyse the results obtained from the different questionnaires. This will be done between May and June 2019.

Stage 5. Share the results with all the team members and extract conclusions for later dissemination. In this final stage of the TIP, we will propose a best practises guide for interaction in the classroom, as a result of the observations made and the results obtained, with the aim of making it available to all the teaching staff as well as the organisms responsible for teaching quality and planning. The final aim is to communicate and disseminate the results of the project in our academic environment in order to make the initiative public along with its conclusions and to promote its application within the university community.

## 4. Preparation of the three questionnaires

Given the lack of tools for measuring interaction, we have created one based on the literature reviewed on the topic, primarily the work of Wells (2001) and De Longhi (2012), as well as the first author of this article, who is a specialist in interaction and in dialogic teaching practises in the classroom.

Table one shows a summary of the aspects of interaction that we sought to measure with each of the items included in the measuring tool. The items, phrased as questions on the questionnaire, and indicating that respondents should indicate their degree of agreement/disagreement on a scale of 1-7, are those used in the students' questionnaire, while those for the teacher observed and the external observer are the same with minor grammatical adjustments to fit the respondent. The questionnaire, with instructions that indicated not only that the information provided was entirely confidential but also that it should only contemplate the class under observation that day (not the class in general), also provided a space for respondents to describe in their own words their observations regarding what they considered the best interactive practise observed as well as the least effective. The external observer and the teacher were also asked to include their reflections on what the teacher and the students did during the interaction, the length of time dedicated to interaction, as well as any material or technology employed. Further information collected on all three questionnaires included the number of students in class that day and the gender of the students present. Teachers were also asked to indicate their rank, while students were asked to indicate what they considered the general level of participation in the class and their own level of participation in class.

Table 1: Aspects of Interaction to Be Measured and the Resulting Item on the Questionnaire (Álvarez-Álvarez, Sánchez-Ruiz & Montoya-del-Corte, 2019).

| Variables to be measure | Items on the questionnaire |
|---|---|
| Teacher's attitude | The teacher demonstrated a positive attitude with the students: respectful, warm, and polite. |
| Contrast between interaction and explanation | The class was more interactive than expositive. |
| Asking about doubts | The teacher inquired if students had doubts in order to resolve them. |
| Closed questions | The teacher asked closed questions (with a clear correct or incorrect answer). |
| Open questions | The teacher asked open questions (with a wide range |

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|---|---|
| | of possible answers or solutions). |
| Diversity of opinions | The teacher asked questions that elicited a variety of opinions from the students. |
| Tension teacher-students | There were signs of tension between the teacher and the students. |
| Tension between students | There were signs of tension between the students. |
| Excessive intervention by students | One student "excessively" intervened in the class. |
| Unplanned content | Content not in the teaching plan was addressed during class time. |
| Attending to students before/after class | The teacher took time either before or after class to attend to the students. |
| Promoting reflection | The teacher expressed an idea in such a way that students were puzzled and encouraged to use their reasoning. |
| Understanding content | The teacher ensured that the students understood all the content taught. |
| Quality contributions from the students | The teacher made an effort to ensure that students' contributions were valuable in order to build knowledge in the classroom. |
| Individual activities | The teacher proposed individual activities during class time. |
| Pair or group work | The teacher proposed pair or group work during class time. |
| Questions from students | The students asked questions during class time. |
| Dialogue and debate | There was dialogue and debate during the class. |
| Interaction technologies | The teacher used technology as a means of encouraging interaction in the class. |
| Attention from the students | The teacher caught and held the students' attention. |
| Questions in class. Cognitive challenges | The questions posed by the teacher offered cognitive challenges that were not easily resolved, thereby requiring students to think. |
| Questions in class. Time to think | The teacher gave students sufficient time to reason out the answers to the questions posed. |
| Questions in class. Asking new questions | The teacher took advantage of students' responses to formulate new questions. |
| Questions in class. Reformulating answers | When students responded to the teacher's questions, they were then invited to reformulate their answers. |
| Questions in class. Constructing knowledge | The teacher took advantage of students' responses to construct knowledge. |

| | |
|---|---|
| Questions in class. Synthesising and unifying | After students' responses, the teacher offered a synthesis, a unification, a rephrasing and/or an improvement of the student's version. |
| Unsuitable intervention from students. Dismiss through arguments. | When a student has made an unsuitable intervention, the teacher has corrected it by offering arguments. |
| Unsuitable intervention from students. Penalising errors. | The teacher in no way penalised students for incorrect answers. |
| Unsuitable intervention from students. Penalised by classmates. | Students in no way penalised incorrect answers from their classmates. |
| Students' questions. The teacher's response. | The teacher responded to all the questions the students asked during the class. |
| Individual activities. Dialogue between students. | During the individual activities, students talked amongst themselves. |
| Individual activities. Teacher feedback. | The teacher offered feedback during individual activities that helped the students to improve. |
| Pair or group work. Dialogue between students. | During the pair or group work, the students talked amongst themselves. |
| Pair or group work. Teacher feedback. | The teacher offered feedback during pair or group work that helped the students to improve. |
| Debate. The teacher correctly moderates. | The teacher knew how to moderate classroom debates so that students could intervene in a polite and organised manner. |

## 5. Expected results

At the time of writing (June 2019), the project participants are visiting classes and collecting data. Specifically, more than 80 classes have already been visited and the responses of more than 2100 students have been obtained.

Additionally, the data analysis itself will include an initial phase of basic descriptive analysis that will then be enhanced with more complex analysis. Examples include an analysis of the factors that make up or compose the interaction concept. This could also be a contribution of interest since, if the factors that make up the interaction are known, they can be enhanced in the classroom. The proposal and validation of more complex causal models could be an additional step after the identification of factors.

All of the above can be complemented through the analysis of different variables such as class size, teacher experience or degree, among others, as these may have some effect on the level of interaction and, if they do, we aim to consider what this is.

Finally, and given that the questionnaire being designed includes qualitative questions, the possibility of content analysis using software tools such as Atlas.ti or similar is also raised. The objective of this type of analysis will be to identify additional information of relevance that could not be captured with the quantitative questions of the study.

## 6. Conclusions

In addition to responding to the objectives set out in the teaching innovation project, as discussed in the previous paragraphs, we also intend to analyse the data in greater depth in order to contribute to the advancement of the field of research on interaction.

The first contribution that we expect to make is the proposal of a questionnaire that allows for measuring or quantifying the level of interaction that exists in the classroom. We believe that this would be a contribution of quality since no previous studies have been found that propose a measurement tool of this type.

We consider that one of the key aspects of this contribution is the triple perspective that is proposed in the design of the questionnaire: self-evaluation, co-evaluation and hetero-evaluation.

Through the use of the questionnaire we hope to ascertain the level of interaction; to analyse the factors that can influence the attainment of a higher or lower levels of interaction (characteristics of the teacher, the group of students, and the subject itself); to analyse the effects of the interaction on the results obtained; and to identify interactive practises that may be applicable to different areas. Additionally, based on the qualitative analysis of the data obtained, we intend to obtain a manual of best practises for interaction.

As far as limitations are concerned, one of the main ones is the preliminary nature of this work. Thus, given that the work is in the data collection phase, it has not yet been possible to validate the questionnaire. This is to be considered as a future line of work together with the analysis of the results.

On the other hand, the scope of the study, only centred on the UC, is another limitation. However, we believe that this first project has to be seen as a pilot plan that can be extended to other Spanish universities and, certainly, universities outside Spain. In addition, the multidisciplinary nature of the innovation project, comprised of teachers from the different fields of knowledge must be emphasized.

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