# A method to propose good practices of teaching educational innovation

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## ABSTRACT

The MAIN method for the application of educational innovation was designed to make it easier for teachers to apply educational innovation so as to achieve a good practice of educational innovation. In this work the mentioned method is used not to apply educational innovation but to make a proposal of educational innovation that has great possibilities of becoming a good innovation practice. Twenty-four professors have made proposals for educational innovation following the MAIN method. Once these proposals were presented, teacher's perception of the processes of the method was studied, as well as the effort to develop the different phases of the proposal following the MAIN method.

## KEYWORDS

Educational innovation, innovation projects, MAIN method, indicators of innovation

## 1 Introduction

The teaching staff began to develop educational innovation by personal initiative, motivated more by improving student learning than by the possible recognitions and merits involved in carrying out the innovation itself [5]. The application of educational innovation was the initiative of teachers and studies on innovative models identified that the process was carried out from bottom to top [13]; it means, it was initiated by the teaching staff and in most cases was accepted by the institutions.

Currently, the situation has changed considerably, most educational institutions (education departments, universities and institutions) support and encourage teachers to carry out educational innovation. Also, more and more institutions are making public calls among their teachers; with them it is tried to promote the educational innovation, the improvement of the teaching quality and, in some cases, to promote the strategic plan of the educational institution.

In addition, in some countries, as is the case of Spain, universities provide teaching innovation support for their staff, because that is their responsibility [2]. More and more universities are making calls to promote educational innovation, as well as conferences to disseminate the innovations that have been made in the calls and that the memories of innovation are published in an institutional repository [1, 11]

When educational innovation is applied in the classroom, it is usually called teaching innovation or teaching educational innovation (TEI) [8] and this has a set of characteristics that condition both its planning and its application and dissemination. The characteristics of the TEI are linked to several actors: the teaching staff, the institution and the innovation itself. It is

necessary to know them in order to perform TEI efficiently and effectively.

One of the characteristics associated with teaching staff is called innovation exit line. This consists in the starting situation, from a certain moment, from which organizations start to develop a certain innovation that the sector to which it is directed can assume. While in companies that compete for the same product or service, the starting line is very similar for everyone, in the educational sector the starting line is very different. This means that, in the educational sector, it will cost a lot of effort to do the same innovation on the part of the teaching staff and on the other part very little[3]. In other words, if the same effort is invested in innovation, the progress will not be the same. This is because the innovation is carried out by teachers in their own course. Thus, the situation of the starting line depends on the knowledge on innovation and on Innovation and Communication Technologies (ICT) that teachers have, on the type of subject and the objective of innovation. The reason why the starting line is similar, for example, the companies that compete in a sector and different for teachers is very simple: the action field of the first is global (the sector), while for seconds is local (the subject).

A characteristic associated to the educational institution is that the call for innovation has indicators associated to which teachers who make a proposal will have to adapt. The problem is that practically each institutional call has its own indicators and criteria, since the strategies regarding teaching quality or innovation can be different. This means that what for one institution is considered TEI, and it may not be for other.

A characteristic associated with the innovation itself is its cycle. Any innovation starts from competitive objectives, it is planned and designed, it is developed, a prototype is made, it is validated and, if everything is ok, it will be put into production [12]. The cycle of an innovation is optimized so that when the innovation goes on the market, it is effective and efficient. The cycle also separates costs: the cost associated with planning, production and validation is not the same as the cost of the final product. In a TEI the cycle is reduced: on the one hand, there is the planning and design (proposal of TEI) and, on the other hand, the development, the prototype, the validation and the production are carried out jointly (in other words, at the same time as it develops, it applies). Having a two-phase cycle makes, for example, very difficult to know which part of the TEI corresponds to the development and which part to the application. This causes the majority of teachers to associate excessive cost and effort to perform a TEI.

Technological innovation, in any industrial sector, has standard procedures and common indicators for its management [15]. These procedures and indicators are not applicable to the TEI due, among other things, to their specific characteristics.

One of the few methods created to apply TEI is the MAIN method (Method of Application of Educational Innovation) [9]. This method has been applied in numerous courses and conferences, and its validity has been verified through perception surveys taken to the university professors who participated [7].

The objective of this article is to apply the MAIN method for the planning of TEI projects to mitigate the negative effect of the exposed characteristics. The specific objectives are:

- Measure teacher's perception of the feasibility of applying the MAIN method to make a proposal for a good teaching innovation practice.
- Measure the effort made by teachers to prepare the proposal for good teaching innovation practice in the different phases of the MAIN method.

Although surveys of perception of the MAIN method have already been carried out, the main new of this article is that in this case it is done to teachers who have already developed the proposals under the mentioned method.

## 2 Context

The model is applied in a case study conducted through a 40-hour teacher training course. 24 professors of the University of La Coruña participated in it. The course was carried out on-line and its structure was based on the realization, by the attendees, in group and individual activities. These activities were reviewed and evaluated and, based on the results of the activities, they were shared. The participating teachers developed a proposal for educational innovation. This proposal was elaborated following the phases of the MAIN method.

## 3 Description

The phases of the MAIN method can be considered as a guide for teachers to carry out a planning of a good practice of TEI. The first part starts from the specific need that teachers have in their course and then some guidelines are given so that, based on the identified need, a good TEI practice planning can be established. Next, each phase of the MAIN method is described.

Phase 1. Identification of the root problem

A root problem is a problem present in our courses originated by the educational model [4]. This problem is usually present in any subject independently, for example, of the quality of the teaching staff. Being common problems to the educational model, if teachers associate their particular situation with that problem, innovation goes from being a local solution to being a global solution.

Being a global situation, it is easier to get the cooperation of teachers to obtain a solution. The difficulty is located in formulating this solution based on measurable and transferable indicators (applicable in any course). The result of this phase is the generation of common and transferable indicators.

Phase 2. Association of the most appropriate innovation method to the previous phase

In many cases, TEI is associated to use the most advanced technologies or methods that are trending. This tends to make teachers focus more on "colorful" aspects than on finding the method that has a proven effectiveness with the indicators that will allow them to know the result of the innovation.

In this phase the set of indicators obtained in the previous phase is used, as filters to select the method or methods that have demonstrated their effectiveness with them.

Phase 3. Reverse engineering of "tortilla de patata" (potato omelette)

To understand this phase, a specific TEI must be associated with a "tortilla de patata". Often teachers observe an experience of TEI and look at the results of it (the "tortilla de patata"). However, this does not usually provide data to know the steps and effort to develop it.

On the other hand, if instead of observing the tortilla we analyze its ingredients (eggs, potatoes, oil, etc.) and the tools to be used (fork, pan, dish, etc.) and, in addition, we know the processes to be carried out with those ingredients and tools (the recipe), then we can know if we will be able to apply such innovation, to know the cost of the ingredients, the complexity of the technologies and the effort to carry out the processes. It could really be considered as a learning ecosystem, since different types of data, technologies, processes and users are involved.

The equivalence in a TEI regarding the ingredients, tools and recipe of the tortilla is based on the following:

• *Ingredients*. These are the types of content that this TEI method uses and knowing them allows us to know the possible transformation that must be carried out in the course to innovate. This also allows to know the cost of that transformation.

• Tools. They are the technologies and is important to know their functionality. In this way, the technology can be identified by its functionality and choose the one that can be used most easily, for example, one that is known or that makes the institution available to teachers. Therefore, it is not necessary to have the latest technology, but the one that best suits the function of it.

• Recipe. These are the activities that teachers and students must do with the types of technologies and contents. The activities are usually associated with the chosen method of innovation and, often, it is what distinguishes one method from another.

## 3.1 Phase 4. The strategies

There are at least three types of strategies that are usually associated with a TEI:

• *Role Change.* Any TEI involves certain changes in both teachers and students. The success or failure of innovation usually depends more on the effort to assume that role change than on the teaching innovation method itself [10]

• Good practice. There are indicators that are associated with a good teaching innovation practice: effectiveness, efficiency, sustainability and transferability [6]. Thus, the problem regarding TEI proposals is how to know that it will present these indicators if it has not yet begun to develop. For example, it is defined that for a practice to be considered as innovation it must last at least three years and for it to be relevant it must be able to expand outside its ambit [14]

• Scientific dissemination. One of the most consolidated external indicators to know the success or failure of a TEI is the dissemination in international congresses or in indexed scientific

journals. Both international quality congresses and indexed journals have protocols, filters and indicators to accept or reject the publication. Therefore, it is necessary to know the internationally accepted scientific processes and associate them with the planning of the proposal.

Table 1 shows the four phases of the MAIN method. In the first column the phase number is indicated, in the second column the main activities of each phase and, in the third column, the objective of each phase.

**Table 1. Phases, activities and objectives of the MAIN method**

| | ACTIVITIES | OBJECTIVES |
|---|---|---|
| **PH 1** | Root problem detection | Define the goal of innovation, applicable globally (to the entire education sector). |
| | Identification of improvement indicators | Design a mechanism to measure the effectiveness of TEI, facilitating its transfer. |
| **PH 2** | Association of the most suitable TEI method | Identify the most appropriate innovation method to achieve the goal of global innovation in our innovation (and demonstrate it). Optimize the effort in the development of the TEI. |
| **PH 3** | Reverse engineering of the "tortilla de patata" | Identify the type of content to work with. Identify the most appropriate ICT to innovate. Identify innovation processes Separate the development and application phases, assessing the effort and cost of each phase. Generate a cycle planning, through an organizational chart. |
| **PH 4** | Identification of indicators of good TIE practice | Demonstrate the effectiveness, efficiency, sustainability and transferability of the innovation to be carried out. |
| | Identification of methods of scientific dissemination | Design the practice of TIE so that it can be published in accredited scientific contexts (international congresses and scientific journals). |

## 4 Results

A survey was applied to all participants in the course, a total of 24 at the end of the course. A total of 16 people participated in the survey, that is, 66.66% of the participants. The survey consists of three questions:

Q1 Indicate your previous experience in educational innovation:
Q1.1 I don't know what it means.
Q1.2 I know it at theoretical level
Q1.3 I intend to carry out an educational innovation project
Q1.4 I am carrying out my first educational innovation project.
Q1.5 I have carried out at least one educational innovation project.

Q2 Express your degree of agreement with the following statements, by (1- I do not agree .... 5- I strongly agree). The MAIN method provides processes for ...:

Q2.1 ... identify indicators of improvement associated with teacher's own needs (activities 3, 4 and 5).

Q2.2 ... select the most appropriate innovation method to work with the identified improvement indicators (activity 6).

Q2.3 ... identify activities to be carried out prior to the application of the educational innovation and during its application

Q2.4. ... identify the activities that involve more effort and analyze the causes of it.

Q2.5. ... classify the activities to be carried out during the application of educational innovation, based on teachers, students and the results measure.

Q2.6 ... distribute, through a schedule, the activities to be carried out beforehand and during the application of educational innovation.

Q2.7. .. establish guidelines to know the effectiveness of the innovation to be carried out.

Q2.8 ... indicate guidelines to show the efficiency of the innovation to be carried out.

Q2.9. ... indicate guidelines to show the sustainability of the innovation to be carried out.

Q2.10. ... indicate guidelines to show the transferability of the innovation to be carried out.

Q2.11 ... know the different scientific methods used to disseminate educational innovation.

Q3 Indicate the degree of difficulty that you have been carrying out the activities of each phase (1- nothing to 5- much)
Q3.1. Identification indicators and root problem
Q3.2. Identification of the most appropriate innovation method
Q3.3. Ingredients, effort and schedule
Q3.4. Effectiveness
Q3.5. Efficiency
Q3.6. Sustainability
Q3.7. Transferability
Q3.8. Scientific dissemination

The following tables 2, 3, 4 and 5 include the answers to questions Q1, Q2 and Q3.

### Table 2 Answers to question Q1

| Question Q1 | |
|---|---|
| Q1.1 | 0 |
| Q1.2. | 10 |
| Q1.3. | 3 |
| Q1.4. | 1 |
| Q1.5- | 2 |

From this table, the results obtained in questions Q2, with the Mean and Deviation (table 3) and also for Q3 (table 4), are grouped according to the answers to question Q1. In this way the answers can be checked by level of experience and intentionality of applying educational innovation. Therefor 10 people know innovation at theoretical level (fourth double column of tables 3 and 4) and 3 people have the *intention* to apply innovation (third double column of tables 3 and 4) The results of questions Q1.4 and Q1.5 (total=3) are already grouped in both cases apply or have applied educational innovation and therefore have more *experience* than the rest of the sections (second double column of tables 3 and 4).

### Table 3. Answers to question Q2

| Q2 | Experience (n=3) | | Intention (n=3) | | Theoretical Level (n=10) | | General |
|---|---|---|---|---|---|---|---|
| | M | D | M | D | M | D | Mean |
| **Q2.1** | 4,33 | 1,15 | 4 | 1 | 4 | 0,81 | **4** |
| **Q2.2** | 4,33 | 0,57 | 3,33 | 1,15 | 3,8 | 1,03 | **3,93** |
| **Q.2.3** | 4,66 | 0,57 | 4 | 0 | 3,9 | 0,87 | **3,87** |
| **Q2.4** | 4,33 | 1,15 | 4,33 | 0,57 | 4,1 | 0,73 | **4** |
| **Q2.5** | 4,33 | 1,15 | 3,66 | 0,57 | 3,8 | 0,78 | **4,06** |
| **Q2.6** | 4,66 | 0,57 | 3 | 1 | 4,1 | 0,73 | **4,06** |
| **Q2.7** | 4,33 | 1,15 | 3,66 | 1,52 | 4 | 0,81 | **4,18** |
| **Q2.8** | 4,33 | 1,15 | 4 | 1 | 3,9 | 0,87 | **4** |
| **Q2.9** | 4,33 | 1,15 | 4 | 1 | 4 | 0,81 | **4,062** |
| **Q2.10** | 4,66 | 0,57 | 4 | 1 | 3,8 | 0,78 | **4** |
| **Q2.11** | 4,66 | 0,57 | 3,33 | 1,15 | 3,9 | 0,99 | **3,812** |

**Table 4. Results of question Q3**

| Q3 | Experience (n=3) | | Intention (n=3) | | Theoretical Level (n=10) | | General |
|---|---|---|---|---|---|---|---|
| | M | D | M | D | M | D | Mean |
| **Q3.1** | 2 | 1 | 2,66 | 1,15 | 3,1 | 0,87 | **2,81** |
| **Q3.2** | 2,66 | 1,52 | 2,66 | 1,15 | 3,2 | 0,91 | **3** |
| **Q3.3** | 3 | 1 | 3,33 | 0,57 | 3,4 | 0,69 | **3,31** |
| **Q3.4** | 2,66 | 1,57 | 3 | 1 | 3 | 0,66 | **2,93** |
| **Q3.5** | 2,33 | 1,15 | 3 | 1 | 3 | 0,66 | **2,87** |
| **Q3.6** | 2,33 | 1,54 | 3 | 1 | 3,1 | 0,87 | **2,93** |
| **Q3.7** | 2,33 | 1,15 | 3 | 1 | 3,1 | 0,87 | **2,93** |
| **Q3.8** | 3,33 | 1,54 | 3 | 1 | 3,4 | 0,84 | **3,12** |

The MAIN method has 4 phases. Questions Q2 and Q3 can be grouped by these phases, the equivalence between the phases of the MAIN method and the questions cited are shown in Table 5.

**Table 5. Phases and related questions**

| MAIN Phase | Q2 | Q3 |
|---|---|---|
| Phase 1. Root problem detection | Q2.1 | Q3.1 |
| Phase 2. Selection of the most appropriate innovation method | Q2.2 | Q3.2 |
| Phase 3. Reverse engineering of the "tortilla de patatas" | Q2.3 a Q2.6 | Q3.3 |
| Phase 4. Strategies | Q2.7 a Q.2.11 | Q3.4 a Q3.8 |

## 5 Conclusions

The results obtained are based on the perception of people who have developed proposals for educational innovation following the MAIN method, applying it to different methods of educational innovation. The objectives of the work measure the perception on the achievement of the mission of each phase to develop a good practice of educational innovation and on the effort in the development of the same.

Question Q2 has measured the student's perception of the fulfillment of the objectives of each phase of the MAIN method. The general average of the set of phases reaches a value of 3.99 over a maximum of 5 points which places the equivalent of notable. This perception is quite reliable since the participants in the course have made the proposal of educational innovation and it has been reviewed by the teaching staff.

However, if the general average of the set of phases is carried out according to the level of the intentionality of application of educational innovation: it is applying or has applied it, it intends to apply and only interests it at a theoretical level, the average changes in a way considerable. People with experience grant an average of 4.45, those who intend to apply it 3.75 and those who do not intend to apply it 3.93 all these values over 5. It can be concluded that people who have had experience in the application of educational innovation they perceive that the MAIN method fulfills the objective of each phase very satisfactorily.

Regarding the difficulty in carrying out the phases, an average of 2.98 is obtained for the set of phases, which is close to a medium difficulty. If the means are analyzed by the degree of involvement of educational innovation, it is observed that it is easier to perform as more experience and involvement has the teaching staff in carrying out educational innovation. Thus, the most involved people who carry out or have carried out educational innovation have a value of 2.58 and those who do not intend to apply it the level of difficulty is higher with a 3.16 out of 5.

From the point of view of perception, the phases that least achieve their objectives are phases 2, 3 and phase 4 the strategy on scientific dissemination. Likewise, the phases that have cost the most to implement the teaching staff are phases 2, 3 and the scientific dissemination of phase 4. Thus, it can be observed that in all phases whose perception of fulfillment of objectives is 4 or greater corresponds with a development effort less than 3. All those phases whose perception of compliance with objectives is less than 4 belongs to a development effort greater than 3.

It can be affirmed that the MAIN method can be applied in the preparation of proposals of educational educational innovation with high possibilities of being a good practice without entailing a high effort.

The samples related to people with experience in the realization of innovation and the intention to apply it have been very small compared to people who only wanted to have a theoretical knowledge without having the intention of applying it. Therefore, research should continue, mainly in the small samples profile. Although the results are considered satisfactory, the study shows the weakest point of the MAIN method, which is related to the preparation of educational innovation to be published in scientific contexts. Therefore, the process of formation of the method should be improved in this regard, as well as investigate the previous knowledge related to each phase, since this will allow to relate the reason why some phases can be more or less complicated to develop.

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