The role of scientific research in educational interventions

PID_00260220

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Recommended minimum time required: 3 hours
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The review of this UOC Learning Resource has been coordinated by the lecturer: Julio Meneses (2019)
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Introduction

This module aims to introduce students to some important issues related to the incorporation of professional competence in research as a key instrument for promoting quality in educational interventions. Taking the professional debates that have dealt with this issue during the last two decades as a starting point, we will explore the internal and external tensions that have led to the fact that educational research has taken the research conducted in the field of medicine as a reference. In this sense, this discussion will serve to challenge the notion that the research conducted in experimental settings and particularly, tests or randomised controlled trials (RCTs) must necessarily be the standard of reference for educational research and therefore be able to recognise the opportunities that the various available research methods can offer in providing the rationale and evaluation of educational interventions.

To do this, we will now present a brief approach to the scientific method which, beyond its canonical phases, will allow us to understand research as a cyclical or iterative process in which the various procedures available have in common the collection and systematic analysis of the data obtained, with the aim of improving our understanding of the phenomena under study. This approach will serve us later in addressing the results produced by this complex process; in other words, the scientific evidence that it is able to provide as a guarantee that the knowledge generated is in fact in line with what happens with the phenomena. As a result of the pragmatic approach adopted in this text, we will present general principles aimed at promoting quality in the development of the different research phases, a necessary but insufficient condition for assessing the strength or sufficiency of the evidence obtained to answer the research question.

Finally, we will put this discussion into play based on an example that will serve to illustrate the different types of research validity and that it is, in fact, difficult to meet all the requirements in a single investigation. In this sense, we will highlight the shared nature of the challenge posed by the joint construction of an improvement in the understanding of phenomena based on the accumulation of scientific evidence obtained in several independent investigations that supports the new knowledge generated. Finally, we will offer an annotated bibliography with some interesting references that may be useful for furthering the development of research competence beyond the limitations of this text.
1. The importance of professional competence in educational research

In general terms, we can define education as the process by which the acquisition of knowledge, skills and values in people who are part of a certain society is promoted. In this sense, as a human activity, education is based on the development of two fundamental practices, teaching and learning, in a more or less organised manner, which form part of the daily life of all societies for which, in historical terms, we have proof. Although it is not our responsibility here to explain the history of education, it is important to bear in mind the long shadow cast by the daily practices on which this process is based and, even more so, the ultimate objective pursued by education so that it can be placed within the scope of professional practice. We teach, but we also learn, to improve opportunities in people's lives, and it is in this sense that societies establish artificial systems to guarantee their own progress by improving the living conditions of the individuals that make up these societies. This idea of contributing to the common good, however, is not only crucial in understanding the professional practice of education as an essential public service, but, as we will see below, it also introduces the need to articulate competence in research as a key instrument in promoting quality in educational interventions.

Although the discussion about the education process is an issue that has occupied many thinkers throughout history, it was not until the constitution and, in particular, the universalisation of schools as educational institutions that we could recognise the context in which education professionals began to develop their role as we know it today. While it is true that the idea of grouping students and structuring their learning has its origins in ancient times, the establishment of modern educational systems from the 18TH century, and particularly the adoption of compulsory schooling to ensure access to education for the entire population, led to the development of a context in which, from the 19TH century, and especially the 20TH century, the professional educational practice was provided with the necessary tools to reflect on its own practices. Among others, the constitution of Pedagogy as an academic discipline, the articulation of the different trends in teaching and learning that we have today, the evolution of formal systems beyond the obligation to promote lifelong education and recognition of the importance of non-formal contexts as valuable educational spaces, shaped a rich and diverse professional field in which a multitude of professionals from different disciplines are involved.

In this context, education professionals have not only specialised to deal with the different areas of intervention in which they work, but have also embraced the requirement of justifying and evaluating their own practices so as to try to develop them in the best possible way. If education is one of the most im-
important tools of societies to progress in improving the living conditions of its members, it is not surprising that during the last few decades public interest has grown stronger on this issue which, in practice, has translated into a demand for transparency and accountability from the professionals involved. In this sense, it is not only expected that educators justify the teaching and learning practices they promote in the best possible way, but that they do so in accordance with the knowledge generated in the framework of scientific research. As has happened in other professional fields, the time when decisions were based on intuitions, beliefs or personal convictions has long gone. By contrast, there is a great consensus regarding the need for responsible actions that aspire to use, whenever possible, the methods and procedures supported by their outcomes and that, ultimately, educational interventions are also subject to scrutiny and systematic analysis that allow their evaluation.

It is important to bear in mind however, that there are many tensions to which educational research has been, and still is, subjected to, especially when it is used in the search for quality in the professional intervention. On the one hand, in terms of internal debates within the field of education, it is still possible to find some resistance that calls for distance between the professional world and the academic world, the difficulty of applying scientific knowledge in specific situations and the excessive focus on the results of interventions, while ignoring the importance that understanding the processes involved also provides for them to be achieved. On the other hand, taking into account the external pressures that have been caused by other areas, it is not difficult to find discourses that affirm that educational research has a nature that is excessively applied which limits the possibility of generalising the outcomes for other contexts, that does not always achieve the quality criteria demanded in other disciplines and that even the investigations that are carried out are not relevant for addressing the “real” problems in education or, when they are, they are still conditioned by a high ideological component. Many of these criticisms, however, often share a certain understanding of what educational research is or should be that should be borne in mind.

The extent of a profession based on the accumulation of evidence

A good way of understanding the debates around the role of research in the professional practice of education is by understanding its roots. In this sense, one of the authors who focused on the critical aspects of the discussion was David Hargreaves (1996) who, two decades ago, called for the need to transform the profession by incorporating the process of scientific research for the purpose of improving educational practices as medicine had done. See also Davies (1999) for a similar approach: making the same parallel with the field of medicine emphasises the need to carry out a systematic evaluation of the available evidence to adequately justify educational interventions.
Indeed, both internal and external debates regarding the role of research in education are often based on a comparison that, although biased, has not stopped gaining ground in the shared imagination of what educational research should be. If education, as an area of professional intervention, must be based on scientific research in order to justify and evaluate its practices, it should do so by following the norms established by other disciplines and, particularly, those that characterise the ones developed in the field of medicine.

This idea, highly restrictive and characterised by a positivist vision in relation to scientific knowledge, assumes that the quality of research is intrinsically linked to the method used to conduct it. According to this approach, the ideal research would match that produced in purely experimental settings and particularly using *randomised controlled trials* (RCTs). With a markedly quantitative approach, this type of research is characterised by strict control over the administration of the different treatments to the participants, so that the recipients are randomly assigned to the different experimental conditions with the aim of making the groups comparable. Only when a certain intervention has been tested in a controlled clinical trial of this type are its effects considered to have really been proven.

### What works in education?

Another important author in the debate on the role of educational research is Robert Slavin (2002 and 2008), defender of a strong position on the necessary relationship between research methods and the quality of the evidence that they provide which, ultimately, leads him to favour experimental research and the summary of the results it provides through the development of meta-analysis as the only way of advancing knowledge in this field. See also Olson (2004) and Chatterji (2008) to find an alternative view to this approach.

Although the possible variants from this general approach are very diverse, the truth is that this idea considers this method as the *gold standard* in the context of medical research and therefore, it would become a priority for any type of research, including the research that takes place in the field of education. The problem with these types of randomised controlled trials, however, is not only the difficulty in applying them in the contexts in which the educational professionals intervene but, moreover, in the fact that they are not necessarily the most appropriate for any kind of research question. In this sense, this procedure is optimal for obtaining evidence to determine the existence of causal relationships to the extent that it enables the effect of any other external factor to be controlled and, as such, should not be ruled out in any field of research. But that does not make it the only possible method, or one which that be favoured ahead of other available methods. Trying to determine what works by comparing different interventions is not the same as attempting to explain the reasons why it does so. However, even assuming that this was the objective of the research, there are other considerations that must be taken into account in the field of education.

As will be evident to students, education professionals work with materials and circumstances that are significantly different from those who work in medical practice. On the one hand, teaching and learning practices are not a cure for
any disease that can be diagnosed from a set of clearly defined signs and symp-
toms that have a known biological cause and evolution and which, therefore,
require a treatment. On the other hand, the professional practice of education
generally occurs in environments that have little to do with standardisation
that promotes the adoption of the multiplicity of protocols that structure the
activity of health personnel and the passage of people through their hands.
Also, the understanding of educational intervention can hardly be compared
with the administration of a specific treatment such as a medicine, in which
the composition and chemical properties and, moreover, the procedure and
dosage necessary for it to have the expected effects can be known with cer-
tainty. Finally, with regard to the evaluation of the results obtained once the
educational intervention has been carried out, the fact that it may or may
not be possible to verify an improvement in teaching and learning practices is
hardly comparable to the mitigation or cure of symptoms which, ultimately,
are proposed by medical professionals.

However, even if we were still in a position to find a certain parallel between
these two areas of intervention, what is even more important is that the diver-
sity of problems, contexts, actors involved and resources with which educa-
tion professionals operate, often make it difficult to comply with the require-
ments of experimental research and, particularly, randomised controlled trials
that would represent the ideal of medical research so as to be able to conduct
them with all the guarantees. In this sense, the contingency that characterises
the way in which improvements in teaching and learning practices are finally
implemented often makes it very complicated when comparing two or more
educational interventions carried out in different settings, or even at different
times, no matter how much they all share the same foundation. Also, it is not
common for education professionals to use more than one type of interven-
tion to make comparisons based on their success and, in any case, it is often
particularly difficult to include the condition that some of the participants do
not receive any and, as such, constitutes a control group. Moreover, assuming
that all this is really possible, practical or ethical limitations may, despite the
fact that the research question is pertinent and relevant, advise against there
being a random assignment of participants to the different experimental con-
ditions.

As a consequence of all this, it is not only necessary to question the idea that
randomised controlled trials promoted in the field of medicine should be the
standard of reference for educational research, but also that we should be able
to recognise the opportunities offered to us by the set of research methods
available. It is precisely for this reason that, if education professionals must
base and evaluate their own practices to try to develop them in the best pos-
sible way and thereby contribute to the common good, research competence
becomes a key instrument for promoting the quality of the interventions in
the different areas they are dealing with. In this sense, as we will see below, the
first step for the acquisition and development of this professional competence is understanding the characteristics and particularities of scientific research as a general procedure for producing knowledge.
2. A brief approach to the scientific research process

There are different ways of obtaining new knowledge about the world in which we live and about the phenomena that surround us in our daily activity. In an intuitive way, it is possible to describe some practices that, in one way or another, can be recognised by the way we relate to everything we want to understand. So, for example, sometimes we appeal to others to provide us with what they know, accepting and making new knowledge about what we want to understand our own, thanks to the trust we have in them. Either because we think that it must necessarily be true, as would be the case with beliefs or faith, or because we assume that this depends on the prestige or reputation of the people, as would be the case of knowledge based on authority; this way of understanding or explaining the phenomena that surround us is characterised by the fact that, as receivers, we are not direct participants, and we cannot become so if we propose it, of the process by which knowledge has been developed or constructed. Beyond the negative consequences that have emerged throughout history and that, in fact, still occur, this way of obtaining new knowledge about whatever we are interested in learning makes it very difficult to differentiate what, in reality, would be opinions, prejudices or false beliefs precisely because they cannot be testable or verifiable.

On the other hand, at other times, we assume an active role in the creation of new knowledge based on our own reasoning. This is the case, for example, with the use of the deduction process where, taking one or more premises as a starting point, we can reach a conclusion that will be true as long as we respect the rules of logic and that the starting premises are also true. Starting from general categories, this way of obtaining new knowledge allows us to draw conclusions about the particular cases that interest us without the need to have a direct experience. In contrast to this course of action, the induction process is a second way of participating in the generation of new knowledge where, based on our direct experience with phenomena, we use the results of our observations to arrive at a conclusion that, to a greater or lesser degree, will also be true. Unlike the process of deduction, this type of reasoning does not require that the premises derived from the experience with the phenomena we want to know are necessarily true; however, the strength or sufficiency of the proof or evidence that we obtain from the particular cases, which serve as a starting point, will determine to what extent the conclusion we reach may end up being accepted as true.
Finally, and what interests us in this manual, it is possible to identify a final way of obtaining new knowledge: the scientific method. Generally understood as a combination of the processes of deductive and inductive reasoning as has been explained above, the scientific method was developed in the context of experimental research as a rigid sequence of steps that can be briefly characterised in the following way. Firstly, the generation of new scientific knowledge begins with an observation of the phenomena that we propose to understand; this, according to the induction process, leads us to offer a tentative explanation. Whether as a product of mere observation from our direct experience, or from knowledge established in a theory previously developed following the scientific method, this tentative explanation leads us to formulate a hypothesis that, according to the process of deduction, now allows us to develop one or more predictions that can then be tested through experimentation. In this sense, the observation of the phenomena that we want to learn about in a controlled environment serves to collect information in an organised and systematic way that, once analysed, allows us to determine to what extent the results are coherent with the predictions derived from the initial hypothesis. Finally, the strength or sufficiency of the proof or evidence obtained through experimentation leads to the acceptance or rejection of this hypothesis and, again using the induction process, the conclusion we have reached serves to generate new knowledge from which it will be possible to develop new theories, confirming or refuting them.

In this sense, the markedly empirical nature of the scientific method also has some important implications that differentiate it from the other ways of obtaining knowledge, based on trust in others. On the one hand, the conclusions of any investigation must always be accompanied by the proof or evidence that can justify it, even provisionally, to ensure that the new knowledge generated is consistent with what actually happens with the phenomena we want to learn about. On the other, it is also essential that the proof or evidence provided as a result of this process is presented together with a clear and detailed description of the procedures carried out to obtain it, so that they can be verified by other people and, ultimately, can be reproduced independently to verify that they have been correctly developed and that they have not been subject to error.
This particular way of advancing scientific knowledge, where the results of research provide new hard evidence to refine it, makes it possible, at least ideally, to describe research as a systematic process of continuous improvement that continuously feeds back on itself and has the necessary mechanisms to self-correct thanks to the transparency of its procedures. This does not imply, however, that it is possible to grant a value of absolute certainty to the knowledge obtained through the scientific method. On the contrary, it should always be borne in mind that certainty depends not only on the strength or sufficiency of the proof or evidence on which the knowledge is based, which will make it more or less reliable, but that obtaining new proof or evidence can lead to the scientific knowledge being questioned, modified or even dismissed. In addition, this way of obtaining new knowledge adds some important assumptions regarding the type of phenomena that, in fact, can be approached with the scientific method. As will be evident to students, this way of proceeding implies that it is only possible to obtain scientific knowledge about those things that are essentially regular; in other words, that respond to a certain order, and that this order must also have the ability to be empirically discovered and contrasted. If this were not the case, the phenomena would simply be excluded from the possibility of being addressed through the scientific research process.

Although, as we said, there is not really a single way of meeting the requirements of the scientific method, the truth is that the great diversity of phenomena that can be addressed through the process of scientific research has led to the specialisation and improvement of procedures that we have at our disposal to meet the specificities in different areas of knowledge. However, for didactic reasons, it is common for the explanation of these procedures to be organised based on some classifications that, up to a certain point, are artificial in nature. Thus, on the one hand, a distinction is often made between basic and applied research when taking into account its purpose. However, this dichotomy is difficult to apply in practice, since almost all research is proposed, to a greater or lesser degree, both to obtain new knowledge about the phenomena that serves to generate some theory about them and so that this new knowledge can be used in some way for solving an applied problem. On the other hand, it is common to differentiate between quantitative and qualitative research when taking into account the type of information they use. To some extent, this distinction is also problematic since all quantitative research in some way involves some kind of qualitative judgement, just as all qualitative research also involves some type of quantitative judgement. In fact, the difficulty of maintaining this dichotomy has led to the development, in recent decades, of an alternative mixed approach based on the combination of both types of data.
Beyond the usefulness of these two classifications for imposing a sense of order in the multitude of practices with which the process of scientific research is carried out, it is important to keep in mind that their use often responds to a value judgement that more or less explicitly expresses a preference for a certain type of research. Given the diversity of procedures available for advancing knowledge in different areas, this vision favours basic research, given that its ultimate purpose would be the development of theories, which adopts a quantitative approach in the analysis of data obtained in experimental settings. In this sense, it places the hypothesis building and testing as an essential element of the research and defines its quality as the necessary consequence of strictly observing each and every one of the canonical phases with which the scientific method was originally characterised. The reality of scientific research, however, has been evolving over time; so depending on the field of knowledge it is possible to find quantitative research that is not based on experiments or that does not even pose hypotheses, as well as qualitative research that has taken them as a starting point but, obviously, does not comply with the control conditions required by experimentation. These decisions, in fact, usually have more to do with the degree of development and strength of the different fields of knowledge and, therefore, with having well-founded or not-so-well-founded theories for analysing the phenomena of interest.

Regarding the role of randomised controlled trials in the field of educational research, this supposed standard of reference is not always the best choice when we consider the different types of questions that can be posed, but that, even when it is, it is often very difficult to comply with the requirements established by experimental research in practice. For this reason, the debate over the quality of scientific research has led, during recent decades, to the emergence of a pragmatic approach that can adapt it to the complexity and diversity of problems that are particularly proposed for addressing social sciences. This approach, which we assume and make our own in this text, shifts the focus of the scientific method’s constituent elements as originally conceived towards the follow-up of some general principles with which it is essential to guide the practices and procedures that characterise scientific research. In this sense, this pragmatic approach explicitly recognises the contingency with which this process must be carried out in the different areas of knowledge and, therefore, gives value to the decisions that can be made the way in which it is conducted and its appropriate justification as determinants of the quality of the results that can be obtained in practice.

This brief approach to the process of scientific research as a general procedure for generating knowledge has served to highlight the fact that, although we often speak of the scientific method as if it were a single method, in reality there are many, very diverse procedures and practices that fit with its general logic and that, therefore, allow its requirements to be met. For this reason, as we said before, education professionals who intend to incorporate research competence as an instrument for the promotion of the quality of interventions in the different areas they deal with should be able to recognise the op-
opportunities that the different methods available offer them. With this recog-
nition, however, it is not enough. As we will see below, the second step for the
acquisition and development of this professional competence is understand-
ing the value of the results provided by scientific research.
3. The value of scientific evidence in helping the educational intervention

The consideration of scientific research as a cyclical or iterative process in which the systematic collection and analysis of the data obtained allow us to improve our understanding of the phenomena that we have proposed to understand not only reveals the empirical nature of this way of obtaining new knowledge, but puts forward the relevance of the results it provides to be able to do so. As we said, beyond the diversity of methods available to carry it out, scientific research advances knowledge thanks to the proof or evidence it is able to obtain to support its conclusions and, in this way, offers a certain guarantee that the knowledge generated is in line with what really happens with the phenomena we want to learn about. This proof or evidence is what, in this manual, we call scientific evidence that, as we will see below, plays a key role in helping the foundation and evaluation of educational interventions. Before continuing, however, it is important that we address a small terminological consideration.

On the one hand, with the term evidence we refer to the fact that the results obtained through the process of scientific research are nothing other than to support, even if provisionally, the new knowledge that it generates. On the other hand, we use the word evidence as an uncountable noun to reflect that an investigation rarely focuses its efforts on providing one single piece of evidence and that, in any case, there is never a single piece; rather, it is an accumulation of a set of evidence obtained in several independent investigations which really enables the advancement of knowledge held regarding the phenomena in the different areas. This use, however, does not fully correspond with the rather restrictive interpretation that has been made of this term in the field of medicine and that, generally, accompanies it even when it is used in other fields such as education.

A broader vision of scientific evidence

As a result of how this term has been used in the field of education, often linked to the intrinsically superior value of experimental research, some authors have opposed its use as a type of resistance. This is the case, for example, for Biest (2007 and 2010), with whom we share the critical approach but not the need to abandon the term; on the contrary, the convenience of giving it a different meaning that highlights the value of the results that, in a complementary way, can be offered by the different research methods. See also Eryaman and Schneider (2017) for a recent discussion on this issue.
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As a result of the privilege of experimental research, and particularly of randomised controlled trials that represent the standard of reference in medical research, this view assumes that the quality of the evidence obtained is always a necessary consequence of the method used to obtain it. On the contrary, as it derives from the pragmatic approach that we have adopted in this text, it is only possible to guarantee the quality of scientific evidence from the adoption of some basic principles that can guide the development of practices and procedures that characterise each of the methods available.

Although they do not have to be specific to educational research, these general principles are especially relevant for all education professionals who intend to incorporate research competence in response to the need to justify and evaluate their practices in the best possible way. In this sense, understood as a general frame of reference throughout the process, among those principles that can be useful in promoting quality in the conduct of different research phases and, therefore, of the evidence that allows us to assist the educational intervention, we can highlight the following:

- **Principle of opportunity** In a synthetic way, we can understand this general principle as the need to take a good definition and justification of a research question as a starting point that will guide the whole process and serve to meet a need. In this sense, a problem must be formulated that is relevant to educational practice, generally derived from direct experience with the phenomena of interest, which should allow for an initial assessment of the current situation and, subsequently, the rationale for a given intervention in relation to the knowledge established in a theory previously developed within the framework of scientific research.

- **Principle of coherence** Once the research question is articulated, the second principle refers to choosing the most suitable methodology to answer it. As a consequence of this reasoned choice, the chosen research method will serve as a frame of reference to guide all the decisions involved in determining the type of information needed (quantitative, qualitative or a combination of the two), the selection of the most appropriate techniques to systematically collect it, the identification and selection of the participants necessary to do it and, finally, the organisation of all the logistics involved in developing the necessary fieldwork.

- **Principle of rigour** As a result of the method adopted in the research, this general principle relates to the scrupulous fulfilment of the plan that has been previously drawn up with the objective of systematically collecting and analysing the information obtained during the fieldwork. Once the data are organised, their quantitative or qualitative nature will be decisive in choosing the most convenient analysis techniques that, once applied, will facilitate the precise processing of the data to obtain the results. These

The importance of reviewing the available evidence

If scientific knowledge is the result of a cyclical or iterative process in which the conclusions of different investigations provide new hard evidence to refine it, improving our understanding of phenomena not only requires us to launch new investigations, but always requires us to do so by following on from the results that others have obtained before. In this sense, we have some structured procedures, such as systematic reviews (Gough, Oliver and Thomas, 2017), where it is possible to collect, evaluate and synthesise the evidence and, in this way, obtain a more complete view of the phenomena, observe inconsistencies between investigations, better interpret the results of a particular investigation and detect new opportunities to expand on them. See also Gough and Thomas (2016) for a specific discussion on the role of systematic reviews in the field of education.
results, as we have said, constitute the evidence that will support the conclusions to which the investigation ultimately leads.

- **Principle of transparency** To close the cyclical or iterative process that characterises scientific research, the last general principle includes the unavoidable undertaking of rendering accounts in relation to each and every one of the decisions that lead to answering the initial question. In this sense, it is not only necessary to adequately present the conclusions from which the newly obtained knowledge is established, but, what is even more important, the evidence that can justify it and a clear and detailed description of all the procedures carried out to obtain it, so that the research process can undergo independent external scrutiny.

As a consequence of this pragmatic approach, the fulfilment of the basic principles that are derived from it is an essential condition for obtaining quality evidence, but the truth is that not all scientific evidence has the same value. If, as we said, the markedly empirical nature of the scientific research process makes it impossible to give a value of absolute certainty to the knowledge it provides, it is also important to remember that its relative certainty always plays a direct role in the strength or sufficiency of the proof or evidence that can be offered as a guarantee.

In this sense, the principles of opportunity, coherence, rigour and transparency that serve to guide the practices and procedures involved in research cannot lead us to overlook the fact that not all methods are equally appropriate for answering a certain question. As we have discussed before, aiming to determine what works, by comparing the results of different types of educational interventions, is not the same as trying to delve deeper into the reasons why it does so. In fact, the former would be a good example of a question where, whenever feasible, experimentation would be the method of choice, due to the control it can exert on the effect of any other factor external to the intervention. The latter, on the other hand, would be a good example of a question where non-experimental or observational research in natural contexts could provide details about the particular circumstances that explain the success or failure of the intervention.
To properly understand the difference between these two settings and the consequences in relation to the evidence they provide, it is necessary to briefly dwell on an important concept such as the validity of the investigations. Taking into account its etymological origin, the term *validity* is a derivative of the Latin adjective *validus*, which serves to reflect the property of strength, power or capacity of the things, people or ideas it describes. In this sense, with respect to the scientific research process that concerns us in this text, the validity would refer to the degree to which the evidence we can obtain, and on which it is based, reliably corresponds to what actually happens with the phenomena we want to learn about. Although it is possible to identify different types of validity, we will focus on the two most important types in this brief introduction. On the one hand, internal validity concerns the guarantees that certain research is able to provide in relation to the degree to which the observed relationships are, in fact, sufficient evidence for deducing the existence of causal relationships. On the other hand, external validity deals with the guarantees that we have that the results of the research are, in fact, sufficient evidence in relation to the degree to which it is possible to generalise the relationships observed in other people, different contexts or moments.

As you can no doubt see, these two types of validity have much to do with the two settings that we have just characterised, and it is precisely in the opposition between experimental and non-experimental research that we can understand their relationship from a concrete example. Imagine, for example, that the problem that concerns us was the incorporation of ICT in schools as an instrument in helping to improve student learning. In this sense, the systematic review and evaluation of the quality of the previous investigations would serve to determine that, indeed, there are a multitude of investigations that have proven that their introduction in the classroom leads to an improvement in the performance of the students. In fact, we even have a plethora of evidence that, in experimental settings, has demonstrated this effect over recent decades. Let us suppose, then, that we carry out an educational intervention based on this evidence and that we decide that, as has happened in educational administrations in other countries, it is appropriate to acquire the necessary equipment to make this improvement in our classrooms. Once the investment has been made, devices have been acquired and made available for teaching and learning purposes; however, suppose that the results of the evaluation of this fictitious intervention were not as expected and there is a need to understand why this happened. How is it that, although the evidence has supported the existence of a causal relationship between the incorporation of technology and the improvement of student performance, this effect has not materialised?

Consistent with a plethora of observational investigations also conducted during recent decades, what we would probably find is that it is not technology, but everything that surrounds its incorporation into the classroom, that explains its educational benefits. Having the appropriate knowledge to use it, the necessary technical and pedagogical support, as well as an adequate de-
sign of the learning activities, would be some of the factors responsible for the improvement in student outcomes. But this conclusion would not be the result of the experimental research that initially would have allowed us to justify our fictitious intervention upon. On the contrary, only by comparing the contexts in which the intervention has worked with those in which it has not, by developing new non-experimental research, could we come to understand in what circumstances it is possible, in fact, to verify the expected effects and, in this way, generalise the causal relationships that had originally been demonstrated in experimental settings. In this sense, what allows us to illustrate this example is nothing other than the need to raise the different research questions with which it is possible to address the same problem; the value of the results that different research methods can bring in line with these questions; and how, in the end, what allows us to advance our knowledge about phenomena is the accumulation of evidence obtained in several independent investigations developed in many different contexts.

Paraphrasing the poem by John Donne, no research is an island in itself and, although the advancement of our knowledge about phenomena depends to a large extent on the quality and the strength or sufficiency of the evidence obtained, the truth is that the degree of certainty that the scientific research process can provide us with is closely linked to our ability to adequately connect the results that, as partial answers to different questions, are offered by each and every one of the investigations carried out in the same field. By closing the circle of this complex process, it is only in this way that it will be possible to jointly build a better understanding of the phenomena based on the available scientific evidence which, in the case of the educational intervention that occupies us in this text, allows the different professionals involved to found and evaluate their own practices so as to develop them in the best way possible and, ultimately, contribute to the common good.
4. Annotated bibliography

Finally, before moving on to the other modules in this manual, it is important to keep in mind that for reasons of space it is not possible to deal in depth with each and every one of the aspects related to the design, management and communication of the results of research or, at least, do so with the degree of detail that other more specialised works can devote. On the contrary, what we have aimed for in this text is to provide a general overview, illustrated with some practical cases. Therefore, it is advisable that interested students complement our approach with other contributions that can help broaden the development of their professional competence in research.

In this sense, beyond the references that we provide throughout the different modules, we also have some manuals on research methods and techniques published in our context that would be interesting to consider such as, for example, those of Leon and Montero (2015), García, Alvira, Alonso and Escobar (2015) and Fàbregues, Meneses, Rodríguez-Gómez and Paré (2016).

Likewise, to close this module, below we offer a selection of some relevant contributions made in the international context that may be useful for acquiring a broader vision about educational research, the design of research projects and the preparation of results reports.


As a general introduction to the subject, this book is an excellent approach for those who have no previous experience in educational research. Organised into five parts, it reviews the context in which the research is produced, its organisation and planning, the different perspectives from which it is possible to carry it out, the strategies and instruments available to obtain the information and, finally, the different approaches to analysing the data obtained. Using accessible wording, the authors aim to offer a comprehensive view of all the details involved in the design and conduct of educational research, presenting the major debates that are still current, as well as their practical implications and, in addition, the text is accompanied by many examples and illustrations that facilitate their reading.


As a complement to the previous reference, this text also serves as a general introduction to many of the important issues that must be taken into account in order to design and evaluate educational research. Starting from a gener-
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In this section, we are presented with a detailed introduction to the field of educational research. The authors begin by explaining the specificities of this field of knowledge, focusing on some key concepts that are fundamental to understanding the nature of educational research. They then proceed to discuss the different research methods and techniques available, highlighting the analytical strategies that arise from these approaches. The final chapter is dedicated to the writing of projects and the reporting of results, providing a comprehensive guide for students.


The BERA/SAGE Handbook of educational research is a comprehensive compendium of contributions developed by different authors. It is structured into two volumes and offers a wide range of perspectives on educational research. The editors provide a general introduction to position the most significant debates on educational research and then cover fifty chapters that address key questions, planning, approaches, data collection, analysis, and evaluation of results. This text is a valuable resource for students and researchers alike.


*Doing your research project* is a practical guide that takes readers through the process of conducting research projects. It covers the essential steps involved in research: conceptualisation, planning, data collection, analysis, and reporting. The guide is structured to be accessible and user-friendly, making it an excellent resource for both students and researchers.


This guide is specifically tailored for conducting small-scale research projects. It provides practical guidance on the process, from conceptualisation to reporting, and is designed to be accessible to those with limited experience in research. The guide is written in an engaging and straightforward manner, making it an ideal starting point for those new to research.

These resources provide a solid foundation for understanding and conducting educational research. They offer practical guidance and theoretical frameworks that can be applied in various educational contexts.
whole process, the text structures the most important decisions in relation to choosing the method, the procedures derived to collect and analyse the data and, finally, ends with a discussion concerning the ethical implications and offers some recommendations for the preparation of reports and the and carrying out literature reviews of literature reviews. With a clear and direct style, the practical examples and checklists that accompany each chapter are very useful resources that facilitate the interpretation.


Finally, to close the selection of references that are structured around the decisions that need to be taken to develop research projects in social sciences, this manual offers a very comprehensive, panoramic view that allows the student to position themselves in relation to the different steps that must be followed and, particularly, the multiple difficulties that they will have to face when making their decisions. Starting from an initial chapter that serves to present the basic aspects of the research process, the text follows a familiar logic in which it addresses all the initial preparations, the development of the research question, the review of the available literature, the choice of method that will articulate the whole process and the techniques for obtaining and analysing the data and, finally, the challenge involved in communicating the results.


This is a classic reference on the communication of research results. Recently revised, this book invites researchers of all profiles to think about the audience who will receive their messages and, thus, places its focus on the skills and resources needed to find and evaluate the most appropriate sources, organise and properly construct the arguments and, therefore, anticipate the expectations and respond to the criticisms that the readers may make, as receivers, once they have the results of the investigations in their hands. In this sense, it is an exceptional complement to the conventional research method manuals, since it is full of practical recommendations and good advice that facilitate the effective dissemination of the results after so much effort.


In the range of manuals aimed at the preparation of results reports, this text is aimed at students, professionals and academics interested in making effective oral or written presentations on their research conclusions. In this sense, the recommendations offered can be useful not only in the academic context, but also in professional practice in public administrations, companies or the third sector, identifying the practices that can effectively contribute by adopting the scientific language as a form of communication, adapting this language to the
different formats and contexts in which the dissemination of the results takes place before the different audiences and addressing some important issues in this area, such as plagiarism, fraud, the translation of scientific texts and the relationship with the public using the media.


Finally, although it is not recent, this manual is very interesting because it allows us to understand in a simple way what the different products that can be developed from the research carried out in the field of education are, what characteristics they have and at whom they are aimed. Adopting a critical perspective, the author addresses the specificities of doctoral theses, funding requests, scientific articles, research reports, books and the relationship with the press, offering practical recommendations to be able to respond successfully to explicit and implicit quality criteria in each context, showing the most common errors and, therefore, meeting his goal of demonstrating what good research is, or what it should be, which can serve as an inspiration for us to carry out our own.
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Bibliography


