Educational research in the 21st century: challenges and opportunities for scientific effectiveness

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Educational research in the 21st century: challenges and opportunities for scientific effectiveness

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RESUMEN.
A través de décadas, la investigación educativa ha sido objeto de mucho debate sobre cuál debe ser el propósito en el desarrollo del conocimiento científico en el campo de la educación. El propósito de este trabajo es presentar los antecedentes históricos de la disciplina de la investigación educativa: enfoques, objetivos y estrategias para la investigación en el campo de la educación. Del mismo modo, se presentan los desafíos y oportunidades de la investigación educativa. Los desafíos de la investigación educativa se identifican en las siguientes áreas: la naturaleza política de la educación; El problema de la definición de la investigación educativa como ciencia y la dislocación entre la investigación educativa y la práctica de la educación. Las oportunidades pueden situarse en el contexto de las siguientes áreas: consenso sobre el conocimiento de la educación conducente a un paradigma hacia la alineación, utilidad del conocimiento en la práctica de la profesión para establecer su efectividad científica e investigación de las políticas educativas.

PALABRAS CLAVE.
Investigación educativa, retos y oportunidades, educación, aprendizaje, conocimiento científico, efectividad científica

ABSTRACT.
Through decades, educational research has been the subject of much debate over what should be the purpose in the development of scientific knowledge in the field of education. The purpose of this paper is to present a historical background on the discipline of educational research: approaches, goals and strategies for research in the area of education. Similarly, the challenges and opportunities of educational research are presented. The challenges of educational research are identified in the following areas: the political nature of education; the problem of definition of educational research as a science and the dislocation between educational research and practice of education. Opportunities can be placed in the context of the following areas: consensus on the knowledge of education leading to a paradigm towards alignment, the utility of knowledge in the practice of the profession to establish their scientific effectiveness and research of education policies.

KEY WORDS.
Educational research, challenges, opportunities, education, learning, scientific effectiveness

1. Introduction

Educational Research

There is no consensus on how to define educational research (Hedges & Hanis-Martin, 2009; Condliffe & Shulman, 1999; Ponce & Pagán, 2015; Ponce, Pagán-Maldonado & Gómez Galán, 2017). Although, Sierra Nieto, Caparrós Martín, Díaz Moreno (2016) stated that more than 30 years ago, John Elliot formulated the delimitation between research on education and educational research. The dominant position is to define it as "research in education." Educational research means investigating educational practices, the effect of these practices on learning and the study of education problems (Ponce, 2016; Green, 2010; Johannigmeier and Richardson, 2008; McMillan & Schumacher, 2005; Condliffe and Schulman, 1999; Segovia, 1997; Charles, 1988; Cohen & Manion, 1980). The interest in researching education emerges with the rise of public education during the industrial revolution and the desire to develop it scientifically (Green, 2010; Walters, 2009; Johannigmeier and Richardson, 2008; Condliffe, 2000). The argument was based on the fact that scientific research could improve public education as it had in other professions. From this interest emerges the term educational research to refer to research in public education issues (Johannigmeier & Richardson, 2008; Shavelson & Towne, 2002; Condliffe, 2000; Cohen & Manion, 1980).

At the beginning of the 21st century, the focus of educational research centered on the issues of public education was transformed. Educational research is now also trying to understand the relationship between education, schooling and university education with the development of society. From its beginnings, until approximately the 1960s and 1970s, educational research was considered a multidisciplinary field of study and a social science (Koichiro, 2013). The term "multidisciplinary field of study" was used to imply that education was a field where the knowledge of the natural sciences and social sciences were applied. In many European countries, the study of education was conceptualized as a social science. The focus of this science was to study the social and cultural dynamics that occur in educational systems to produce learning (Segovia, 1997). In the universities of the United States of America, education was understood as a particular study discipline, which was organized in Departments of Education. The first university professors employed in the Departments or Schools of Education came from the various disciplines of the Natural Sciences and Social Sciences. They brought research models from their academic disciplines and applied them to public education research (Ponce, 2016; Walters, 2009; Johannigmeier & Richardson, 2008; Condliffe, 2000). Much of the educational research until the 1970s was research in history, in psychology, in sociology, and in philosophy (Koishiro, 2013; Green, 2010; Walters, 2009; Johannigmeier & Richardson, 2008; Condliffe, 2000). Since then, educational research is a science that is debated in a field of knowledge between natural sciences and humanistic philosophies (Cantero & Reyero, 2014).

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Since the 1980s, many governments in different countries have begun to adopt neo-liberal philosophies and apply them to public administration. Ideals and concepts, such as having transparent governments in their public management, especially in finance, the use of principles of quality management and continuous improvement, accountability and evidence-based management, begin to permeate the public management (service) in all its divisions (Astin & Linsing, 2012; Hammersley, 2007; Earl, 2003; Huba & Freed, 2000). In the field of education, movements and neo-liberal philosophies took the form of educational reforms aimed at improving public education. The following educational reforms are associated with these political movements: (a) education based on quality standards, (b) the use of standards of accreditation for educational institutions, (c) evidence-based educational practice and (d) scientific methods to produce evidence (Ponce, 2014 [a]; Pring, 2007). As a consequence, "education" begins to shift from a philosophical field to a scientific field (Green, 2010; Pring, 2007).

At the beginning of the 21st century, the language of education has been replaced by business concepts (eg, standards of effectiveness rather than goals and objectives, indicators rather than achievements, accountability rather than evaluation, inputs-outputs). The transformation in the discourse of education has allowed us to change our understanding of curriculum, teaching and learning. Education in the 21st century shows the following characteristics and practices (Pring, 2007):

1. Learning was standardized to pinpoint the productivity and competencies that educators need to produce and meet expectations that define the standards. Traditional standards have been replaced by standards outside the profession. This brought a new language of education: (a) From reach a goal to achieve an educational product, (b) The educator is the one who makes the educational delivery of a curriculum that another designed and not the one that plans the teaching, (C) Teaching strategies have to be science-based or have been empirically validated (Green, 2010; Pring, 2007).

2. Education seems more a range of training than formal learning. Learning means showing behavior that resembles standards. Assessment is no longer to describe learning but to indicate how many achieve what is expected. The curriculum is no longer exposing the student to a strange world that others have attained. The teacher is no longer a mediator between the curriculum and the student. Evidence of learning changed to provide concrete evidence of whether or not the student has the required competencies (Pring, 2007).

3. Education in a global age is characterized by the standardization of public and university education (Ponce, 2014 [a]; Ravitch, 2014).

4. Education in the 21st century cannot be conceptualized in a way that is disconnected from other realities such as health, the environment or the technological means to understand its results (Lee, 2010).

5. In the 21st century, education has no institutional context because it is lifelong learning: Learning to know, learning to do, learning to live and work, learning to be and learning to learn (Lee, 2010).

6. Education became a unique discipline disconnected from psychology (Green, 2010) and from the other social sciences (Koishiro, 2013).
7. The call in the 21st century is for research-based education (Lysenko, Abrami, Bernand, Dagenais & Janosz, 2014) to help eradicate expert-centered models (Ravitch, 2014).

In the 21st century educational research is developed and defined as a unique and meritorious field of scientific research (Koishiro, 2013). As a field of scientific research, it seeks to develop its own theories that guide the practice of the profession (Green, 2010). In the reality of education for a global and technological age, educational research cannot be limited to the investigation of schooling (Lee, 2010). Educational research must generate the necessary policies to ensure success in the implementation of the scientific educational model (Pring, 2007). At this historical moment, educational research is incorporating technology into its scientific work. Technology is generating new data and understandings (Rice & Vastola, 2009; Smeyers & Depaepe, 2008). The core question that contemporary educational researchers are making about education is what knowledge can be generated from this field (Green, 2010) and what kind of research is useful for these purposes (Cantero & Reyero, 2014).

2. Development

The Field of Educational Research
In countries such as the United States of America, England and Australia, large amounts of money are invested in educational research with the aim of improving public education and eradicating its problems. Educational research is important because education is considered to be an essential component of a country's development (Koishiro, 2013; Scott, 2010; Walters, Lareau & Ranis, 2009; Johannigmeier & Richardson, 2000; Pring, 2000). Contemporary educational research is an institutionalized activity. From its institutionalization emerge the influences that define its scientific culture and its controversies: (a) Regulatory offices. (b) Universities, (c) Research Offices and Divisions in Educational Systems (d) Professional Educational Research Associations. € Professional journals for educational research; and (f) Consultancy offices and private for-profit organizations.

The aim of educational research
The aim of educational research is to make education an effective profession in shaping the new generations of citizens and professionals (Ponce, 2016; Green, 2010; Walter, Lareau & Ranis, 2009; Latorre, 2008; Elliot, 2007; Labarre, 2005; Carr & Kemmis, 1985). Historically, the discussion on the effectiveness of education has been related to the effect of teaching on learning, the nature of learning, the cost-benefits of schooling and sustaining a public education system, the school's role in reducing poverty, and how school can improve the country's productivity and economic competitiveness (Johanningmeier & Richardson, 2008; Cohen & Barnes, 1999). For education to be effective, educational research must achieve the following: (a) Generate the knowledge that the profession needs to develop (Ponce,

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2014 ª) in the particularities of each school or educational system (Latorre, 2008). (b) Establish what works and does not work in schools to be able to work and improve their effectiveness (Labaree, 2004). (c) Describe the conditions to develop a coherent and effective teaching-learning process in the different educational contexts that exist (Latorre, 2008; Eliott, 2007; Carr & Kemmis, 1985). (d) Identify the strategies used by educators in the various educational settings and validate these practices. This implies studying their beliefs about education in order to expose and direct them (Latorre, 2008; Pring, 2000; Carr & Kemmis, 1985). (e) To study the educational objectives, the teaching practices and the product of these practices to improve them if necessary (Green, 2010; Biesta & Burbules, 2003; Pring, 2000). (f) Assess the scope of education policies and determine if they achieve their role (Green, 2010; Biesta & Burbules, 2003; Pring, 2000). (g) Generate educational theories that inform the practice of the profession and the development of educational policies (Koishiro, 2013; Green, 2010; Shavelson & Towne, 2002; Pring, 2000, Carr & Kemmis, 1985). (h) Generating understanding in educators and helping them to remove limitations in their educational practices (Clark, 2011).

Distinctive of Educational Research
The focus of educational research is education that occurs in education systems and their effectiveness. The field of education revolves around five major areas that determine its effectiveness: (a) educational practices to teach students, (b) student learning, (c) social dynamics of education, (d) the problems of education and (e) the management of educational institutions to direct teacher's role to the achievement of educational goals and objectives. Let us examine these areas in order to delve into the work of educational research and the distinctive features that differentiate it from other forms of scientific research (Ponce, 2014; Ponce, 2014b; Koishiro, 2013; Green, 2010; Elliot, 2007; Pring, 2000; Kemmis, 1985):

1. **Research on educational practices.** The term educational practices is used to describe all the efforts, activities and dynamics that are generated to provoke students' learning. Good teaching is the essential element to produce learning (Cantero & Reyero, 2014; Pring, 2000). Educational practices are developed around the following components: (a) Educational goals and objectives. (b) curricular research-evaluation, and (c) the effectiveness of teaching and assessment strategies. The study of educational practices and their effectiveness makes educational research multifactorial or the study of many factors that interact simultaneously. Education has the distinctive of being multidimensional (Smeyers & Depaepe, 2008; Berliner, 2002). A multidimensional phenomenon means that it can be studied from different optics, produce different interpretations, and all have value from the optics that are generated. For example, a teaching technique, a curricular unit, or a program can be designed and validated from the foundation of a learning theory, but educators, students, or parents may question or catalog it as insensitive to the cultural context of a school and this affects its effectiveness. The complexity of having to study educational practices and their effectiveness in educational scenarios, in the presence of multidimensional interactions, requires that educational research resort to several methods and research models. Explaining the effectiveness of educational

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practices to produce learning is not always achieved from the standpoint of a single study or a single research model. This implies that the educational researcher needs to master a broad repertoire of research methodologies, if they wish to be effective (Ponce, 2014b; Labaree, 2004; Shavelson & Towne, 2002).

2. **Learning Research.** The purpose and product of education is student learning. Learning is examined as an individual phenomenon of students and as an institutional product. The research on learning as an institutional product has followed different approaches: (a) Standardized test programs to measure knowledge (Ponce, 2014a), (b) Research-evaluation of the effectiveness of programs/institutions (Greene, 2007; Mertens, 2005), (c) Phenomenological research-evaluation (Ponce, 2014b), (d) Assessment of institutional learning (Ponce, 2014a), (e) Research-evaluation of institutional products.

3. **Research on the influences of the educational contexts in the student.** Educational research is contextual because it occurs in educational institutions. Students' educational practices and learning are studied as individual changes and as an institutional product. To understand this, we study how students or groups of students interact in specific contexts such as classrooms, schools as social institutions or in communities where schools are located as scenarios of another range of social interactions. In these contexts it is a question of understanding how the educational practices, the curriculum or the programs affect the students. Educational institutions provide the context and setting for educational research. Educational research always has to keep in mind the range of factors that affect the functioning of educational institutions when explaining teaching and learning: the physical environment, the social, cultural and economic realities of its students and the political influences that Govern educational systems and regulate their functioning (Shavelson & Towne, 2002). For example, the phenomenon of school dropout is the same in any school, but the reasons for dropouts may be very particular to the social context of the school. One area that is possible to explore is whether the school is urban or rural. The educational researcher has to question what similarities and differences may explain learning among secondary school students in an urban school and a rural school. Explaining the particularities of educational contexts is a hallmark of educational research when studying teaching, learning and changes in students. This raises great challenges in comparing data on teaching, learning and student changes between schools or educational systems and generalizing them by the historical moment of the study, the school culture or the student population studied (Ponce, 2014b; Shelvson & Towne, 2002). Several topics of educational research are visible in explaining the effect of educational contexts on the student: (a) Research on the social dynamics of education, (b) Research on education problems such as student motivation, learning problems and desertion / retention.

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4. **Research on educational management.** Educational management is responsible for the functioning of schools. This includes from the management of finance, administrative and academic affairs, the organizational climate and creating working conditions that allow the work of teachers and student learning. Educational research has examined managerial practices, their effectiveness and educational technologies and their effects on institutional effectiveness.

5. **Research on educational policies.** Educational policies are the norms that institutions use to regulate their functioning. Policies are the "rules of the game" that define the expected behavior of members of the education system. Policies regulate the functioning of the education system by establishing the dates, procedures, responsibilities and duties of the personnel in the operation of the system processes. Policies define the vision that the human resource must follow for the success of the educational system and regulate all processes of the educational institution such as teaching-learning, student evaluation and relationships with parents and community. Since the 1990s, the study of educational policies has gained interest in the impact they have on the effectiveness of education.

Educational Research Strategies

Educational research uses six strategies to investigate education. These strategies are as follows: (a) to observe live educational events, (b) to interview, (c) to experiment, (d) to survey, (e) to study particular cases, (f) to study history.

Challenges of Effectiveness

At the beginning of the 21st century, three challenges are identified that affect the effectiveness of educational research:

1. **The political nature of education.** The problems of effectiveness of educational research begin with the political-partisan nature of education. Public education is a social construction that responds and is regulated by the government. It is difficult to investigate the social and political ideals that are embedded in educational systems in the form of educational objectives or standards. These ideals translate into ambiguous educational goals (Lysenko, Abrami, Bernand, Dagenais & Janosz, 2014) and are difficult to study, measure, and evidence (Johannigmeier & Richardson, 2008; Condliffe & Schulman 1999). Much of the publicly funded educational research responds to the criteria and requirements established by government agencies/offices. Investigating under government protection sometimes implies that researchers have to interpret and manage the demands that accompany these research requests. To be successful, researchers must be equally creative to turn these demands into educational research projects. Sometimes these studies generate data that contradict educational policies or political plans and this brings them problems (Diko & Bantwini, 2013). The changes of governments and their respective political platforms, in addition to the lack of a national educational research agenda, are detrimental to the effectiveness of educational research because there is no scientific continuity in research that finances educational issues and problems (Lee, 2010; Hammersley, 2007).

2. **The problem of lack of definition of educational research as a science.** From its beginnings, the expectation has been that educational research solves the problems of education and that prescribes its practice. To achieve this, educational research must generate understanding among educators to help them remove the limitations of their educational practices (Clark, 2011). It also has to generate data from local educational contexts to inform the decisions of politicians and other constituents of education (Ravitch, 2014). It must generate the data and theories to guide the practice of the profession and educational policies that counter the expert-centered models that are questioned in the 21st century, if it aspires to become a scientific field (Ravitch, 2014). During the 20th century, educational research was described as a problematic science (Clark, 2011), unlike others (Berliner, 2002) or elusive (Condliffe, 2000) in the face of its lack of effectiveness. From the outset, educational researchers have been debated in a field of knowledge between natural sciences and humanistic philosophies (Cantero & Reyero, 2014), which supported the study of education as a university discipline (Johannigmeier & Richardson, 2008; Condliffe, 2000; Condliffe & Schulman, 1999). As a science, educational research developed in an epistemological diversity of beliefs about education (e.g., utilitarianism-humanism), diversity of methodologies and research techniques (i.e., quantitative, qualitative, and mixed research methods) of knowledge about the field of education (e.g., objective-real vs. subjective-constructed). In its development, the epistemological diversity of educational research was understood by educational researchers as a constructive plurality (Walters, Lareau & Ranis, 2009; Hammersley, 2007) and not as a scientific relativity and the reflection of an imprecise science (Shelvson & Towne, 2002). For example, the epistemology of the natural sciences operates from the belief of pure objectivity and the neutrality of values, with the aim of controlling, predicting or manipulating the phenomena under study. From the humanities and philosophy, education is influenced by the diversity of subjective and relative postulates about the human being, the origin of knowledge and the possibility of knowing the social world. In the 21st century, it is evident that the roots of education in the natural sciences and in the social sciences have not allowed educational research or education to be a homogeneous community, although all seek political problems of education (Lee, 2010). The result of this diversity has been a scientific ineffectiveness because there has not been a uniform position on the nature of the knowledge that can be generated from education and how to investigate it. Educational research needs to be redefined before all conditions of education in the 21st century (Thompson, 2012). The problem of educational research in the 21st century is how the field of education is defined (Lee, 2010). The problems of effectiveness of educational research have to do with the nature of the data, their origin and how they emerge (Koishiro, 2013). For this, educational research needs a universal language to capture educational reality (Smeyers, 2013; Thompson, 2012).

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3. **The dislocation between educational research and the practice of education.** A third argument to explain the ineffectiveness of educational research lies in its relation to the practice of the profession. The argument focuses on the little influence that educational research has had on developing the practice of education in public schools (Hargreaves, 2007). For some, the relationship between research and practice has been controversial (Peñalva, 2014), imperfect and sometimes non-existent (Scheneider, 2014; Lysenko, Abrami, Bernand, Dagenais & Janosz, 2014).

Opportunities for Scientific Effectiveness

Several strategies are identified in the literature as opportunities for educational research to achieve scientific effectiveness:

1. **Consensus on the knowledge of education: towards a paradigmatic alignment.** Since the time of the Copernican revolution, scientific research has been understood as the search for knowledge. Science means knowledge (Thompson, 2012). This knowledge has to increase the effectiveness of the profession in the following way: (a) generate theories that explain the practice of the profession, (b) validate these practices, and (c) produce laws that precisely guide the profession towards its achievements. In this way, their professionals will be able to intervene, control or predict the events or their results. In this third expectation of science lies the challenge of the effectiveness of educational research. At the time of this paper, educational research has not found and has not been able to generate that universal teaching method that guarantees learning or that mechanism that makes it possible for all students to complete their studies. Between the 1980s and 2000s, a great deal of controversy was found among educational researchers about the nature of knowledge (Paul, 2005). This debate seems to continue for much longer, even if it does not lead to any solution (Fernandez-Ramirez, 2014). At the beginning of the 21st century, attention should no longer be to the nature of knowledge, but rather to identify what knowledge is needed in the field of education to make it effective (Green, 2010). To specify the knowledge needed in education can be a first step in the search for this paradigmatic consensus on educational research. In the past, neither the philosophical nor the methodological approaches to education and its research have produced that paradigmatic alignment needed at the beginning of the 21st century. The subject of knowledge can be a meeting point where paradigmatic diversity can be aligned which currently exists in educational research.

2. **The utility of knowledge in the practice of the profession: implications of scientific effectiveness.** The call in the 21st century is to an education based on the results of educational research (Lysenko, Abrami, Bernand, Dagenais & Janosz, 2014). The usefulness of knowledge emerges as a relevant topic on the effectiveness of educational research (Ranis, 2009). It is framed in the link that must have the educational research with the practice of the profession. Effective educational research in the 21st century is considered to be one that generates theory, guides practice in the profession, or informs its educational policies (Scheneider, 2014; Marley & Levin, 2007). The subject of the usefulness of knowledge has two considerations. The first consideration lies in the link between scientific research and

educational practices to generate useful knowledge. The usefulness of knowledge depends on the needs of the protagonists of education. Second, the usefulness of research to guide educational practices will depend on this alignment between educational research and the needs of education systems. The challenge lies in linking educational research with the practice of education and the usefulness of knowledge.

3. **Research of educational policies: science on ideology.** In the 21st century, the study of educational policies emerges as a relevant subject of educational research because of its impact on the effectiveness of education systems. The problem with educational policies in many countries has been their fragmentation, their politicization, and their irrelevance and distance from educational practice (Pedró, 2015; Woulfin, 2014). Nor does there seem to be a clear link between policies and research, despite the pressures that exist for their study (Pacheco-Méndez, 2015). Two objectives seem to dominate policy research: determining its effectiveness in improving education systems, and formulating science-based education policies that eradicate ideologically-oriented educational policies (Woulfin, 2014). The expectation is that educational research takes a critical role and assesses the scope of current educational policies (Ravitch, 2014; Koishiro, 2013; Green, 2010; Smeyers & Dapaepe, 2008). In a science-based educational model, it is necessary to understand how educational policies work, not in terms of cause and effect relationships, but rather on how these policies influence student performance and the performance of their teachers (Smeyers & Dapaepe , 2008). It is necessary to understand how educational policies affect the contexts of the public schools where they are applied (Diko & Bantwini, 2013). There is a need to better understand the philosophical, moral and value aspects of educational policies and the behaviors they entail and which they wish to impose or eliminate (Cantero & Reyero, 2014).

3. Conclusion

This work summarize the authors' reflections about the challenges and opportunities for scientific effectiveness of educational research in the 21 century from an historic and evolution perspective. As mentioned before, the aim of educational research, in general, is to make education an effective profession in shaping the new generations of citizens and professionals. The literature review allowed us to identify, some challenges of effectiveness in educational research and opportunities for scientific effectiveness that needed to be address to achieve that goal.

In general, the areas of challenges of effectiveness in educational research are linked to: the political nature of education; the problem of definition of educational research as a science and, the dislocation between educational research and practice of education. The main opportunities for scientific effectiveness in educational research are related to: consensus on the knowledge of education leading to a paradigm towards alignment; the utility of knowledge in the practice of the profession to establish their scientific effectiveness and, research educational policies.

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Our position is that as educational researchers we all are responsible to fulfill the needs of useful knowledge, for the protagonist of education, regarding to the following areas: (a) educational practices to teach students, (b) student learning, (c) social dynamics of education, (d) the problems of education and (e) the management of educational institutions to direct teacher's role to the achievement of educational goals and objectives. We understand that this knowledge, to improve the education process, eventually would impact effectively the development of any country.

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