



Article

Assessment of Entrepreneurial Potential in the Training of a New Generation of Change Agents in Spain

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Abstract: The development of entrepreneurial potential in the training of school-age pupils is relevant for carrying out projects of an innovative and transformative nature. Entrepreneurial training is enacted through Spanish educational regulations, in relation to the development of the key entrepreneurial competence. Thus, a training programme in entrepreneurial potential for school-age students, who are considered as agents of change, was evaluated under the approach of “enterprise education pedagogy”. For this purpose, an experimental research study, pre-test and post-test, with a control and experimental group, was designed. The sample consisted of 1036 participants from eight autonomous communities in Spain. The data analysis was carried out by means of a *t*-test to compare the mean before and after the application of the programme on the total number of participants, as well as on the subgroups with and without entrepreneurial intentions. The results show that the PEIEO programme had a positive effect on entrepreneurial potential. The experimental group, compared to the control group, significantly increased their total score in the *t*-test, as well as for each dimension of entrepreneurial potential. Similarly, the participants considered to have entrepreneurial intentions further increased their entrepreneurial potential compared to the group considered to have no entrepreneurial intentions. Consequently, the results indicate that entrepreneurship education, in a holistic sense, has a relevant impact on entrepreneurial potential in a programme aimed at training agents of change.

Keywords: entrepreneurial education; entrepreneurship education; agents of change; effectiveness of entrepreneurship education



Citation: Cárdenas-Gutiérrez, Antonio Ramón, Ana María Domínguez-Quintero, and Antonio Bernal-Guerrero. 2023. Assessment of Entrepreneurial Potential in the Training of a New Generation of Change Agents in Spain. *Social Sciences* 12: 680. <https://doi.org/10.3390/socsci12120680>

Academic Editors: Ana Castro Zubizarreta and Roberto Sanz Ponce

Received: 2 November 2023

Revised: 5 December 2023

Accepted: 7 December 2023

Published: 10 December 2023



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1. Introduction

The economic, social, environmental and geopolitical challenges that constrain full human development need to be met more rapidly in order to achieve the UN’s 17 Sustainable Development Goals (2015–2030). Among other factors, access to quality education is key to understanding the world and acting to improve it. From a capacities standpoint (Nussbaum 2011; Sen 2002), education is understood as a strong capacity, i.e., an opportunity with the capacity to promote new opportunities (Bernal-Guerrero 2017). Thus, education could be seen as the capacity with the greatest potential for transferability. In this sense, various human development reports ratify how education is an essential reference point for transforming the global challenges that we face (UNDP 2020, 2022). Considering the access to, and quality of, education implies paying attention to the opportunities that education offers each individual for their own personal development (Bernal-Guerrero 2022). When seen thusly, education is oriented towards the development of personal potential in order to achieve the full involvement of each human being. The organisation of education around the person implies the individuation of educational systems, with individuals prevailing over school homogenisation processes, so characteristic of the metaphor of school as a production line of students (Robinson and Aronica 2015). Educational individuation, which

implies a change in identity and not simply an accumulation of specific knowledge and skills, is a means that enables people to be agents and actors in their own lives. Education as agency formation involves the development of intentional actions in everyday activities, demonstrating the impact of people's behaviour on their environment.

According to their notion of personal initiative, [Lisbona and Frese \(2012\)](#) argue that certain people in the world can make things happen. For example, Malala Yousafzai, Nobel Peace Prize winner at the age of 17, for her activism in favour of the right of all children to an education, or Greta Thunberg, an environmental activist, who at the age of 15 started a school strike for the climate, managing to mobilise thousands of students in more than 270 countries. These examples are illustrative cases of children who are considered to be agents of change, that is, with the entrepreneurial capacity to transform the reality around them. In this respect, various international organisations, the UN, the OECD and the EU, propose a set of skills necessary for citizens to face the challenges of the 21st century. Among these, entrepreneurial capacity is a key factor in promoting proactive and innovative behaviour in the face of global change, and the uncertainty this entails. For some time now, a productive line of research has been consolidated around the educability of entrepreneurial skills, called "entrepreneurship education" ([Hägg and Kurczewska 2022](#); [Jones and Iredale 2014](#); [Tiberius and Weyland 2022](#)). This concept transcends the productive elements and links entrepreneurship education to behaviour regarding the generation, development and management of personal and social projects, based on the construction of responsibility and personal judgement. This more holistic and integrative concept of entrepreneurship education revolves around how entrepreneurial behaviour is shaped in children, for its subsequent transfer to diverse contexts where they can develop. The more profound nature of entrepreneurship education, anchored to the processes of constructing identity, requires special attention on our part. The greater neuronal plasticity of children lends increased relevance to training in this competence. Thus, the European Union's educational guidelines propose that entrepreneurship education should be taught from the earliest years of schooling. From childhood, basic training in entrepreneurship education may facilitate children to learn the autonomy and initiative needed to carry out personal projects with a capacity for innovation and transformation, in other words those elements that are typical of agents of change. Numerous explanations have been put forward as to why certain people are capable of acting to transform their reality, while others are not.

1.1. Entrepreneurial Potential

The European Union recommends to its member states, in various guidelines, training in key entrepreneurial skills, recognised as an essential achievement for students to progress successfully along their educational journey, and to face local and global challenges ([Bacigalupo et al. 2016](#); [European Commission 2013](#); Recommendation 2006/962/EC). In the case of Spain, the LOMLOE (Organic Education Law 3/2020, which amends Organic Law 2/2006), includes entrepreneurial competence as a comprehensive approach for activating ideas, through the planning and management of sustainable projects of social, cultural and economic-financial value ([BOE 2020](#)). In terms of training in entrepreneurial competence, entrepreneurial potential plays a major role, without which it would be difficult to realise the full development of entrepreneurial competence. Moreover, entrepreneurial competence, in turn, also feeds back into entrepreneurial potential. Based on the Theory of Planned Behaviour ([Ajzen 2011](#)), entrepreneurial potential is understood as a set of learned predispositions to respond in a systematic way, whether favourably or unfavourably, towards an object ([Ajzen 1987](#); [Ajzen and Fishbein 1975](#)). Previous research in the area of productive entrepreneurship explains that an entrepreneurial attitude is a reliable and valid predictor of behaviour. [Soomro et al. \(2021\)](#); [Deveci and Konuş \(2022\)](#); [Leffler \(2020\)](#); and [Krueger and Carsrud \(1993\)](#), proposed an explanatory model of how intentions towards a behaviour derive from attitudes towards that behaviour, which are generated by personal and socio-cultural factors. The interactions that occur between social norms, attitudes

and perceived behavioural control, oriented towards entrepreneurial behaviour, generate a potential for influencing entrepreneurial initiative (Krueger and Brazeal 1994). Transcending the limits of productive entrepreneurship, we conceive entrepreneurial potential as a more integral concept, as a latent construct constituted by capacities and attitudes that materialise in the possibility of acting to execute innovative projects with high added value. Entrepreneurial potential consists of an architecture of enabling dimensions of entrepreneurial intention and behaviour. Several studies have provided us with a certain dimensional structure on the attitudes that constitute entrepreneurial potential (Athayde 2009; Bernal-Guerrero et al. 2021; Oliver and Galiana 2015; Robinson et al. 1991). Beyond the specificity of productive entrepreneurship, and considering the transfer of entrepreneurial attitudes to social, cultural or political contexts, the most common dimensions in these studies are: creativity, achievement motivation, personal control and leadership. This minimum common set of attitudes is the object of the education on entrepreneurial potential in children considered as agents of change.

1.2. Educating Entrepreneurial Potential

The implementation of an entrepreneurial culture has been proposed for each educational stage. In the case of Spain, entrepreneurship was introduced as a basic skill in 2006. Since then, the Autonomous Communities have promoted, within the framework of their educational competences, various formulas to incorporate entrepreneurial skills at all levels of education. Initially, entrepreneurship was established in university and vocational training, developing skills for business creation and management. Subsequently, interest in entrepreneurship has extended to the earlier stages of the education system. In this respect, the education of entrepreneurial potential has materialised through “entrepreneurship education”. From this perspective, entrepreneurship education is essentially focused on the creation of companies and businesses (de Sousa et al. 2022). In general, entrepreneurship education in Spanish schools has been implemented through the design of business plans and the creation of educational mini companies. Among the most widely disseminated pedagogical experiences are Empresa Joven Europea and Emprender en mi Escuela, although an increasing number of proposals are emerging around “entrepreneurship education” at earlier stages of education.

However, in this research study we distance ourselves from this educational practice oriented exclusively towards business creation and management, focusing on a more comprehensive or holistic view of the education on entrepreneurial potential. Thus, we reinterpret the meaning of entrepreneurship education based on “enterprise education pedagogy” (Jones and Iredale 2010, 2014). This concept refers to the evolution of capabilities related to personal development and to an individual’s freedom to change, grow, act and adapt to contingencies and opportunities that may arise throughout their life. Enterprise education pedagogy is based on active and experiential learning, with the intention of cultivating individual abilities linked to the construction of personal identity. In this way, enterprise education pedagogy is conceived as a framework for educational action to cultivate an active, critical, informed and innovative populace, which is ready to face the challenges of the 21st century. In this sense, the education of entrepreneurial potential, from the perspective of enterprise education pedagogy, would be identified with the development of sustainable and transformative entrepreneurship, as a response to the global changes in today’s world (Mets et al. 2021; Seikkula-Leino et al. 2021). From this perspective, entrepreneurial education would participate in the formation of new generations of agents of change committed to creating a better world (Dodd et al. 2022).

1.3. Assessing Entrepreneurial Potential

It is true that there is a trend towards the promotion of entrepreneurial education in the earlier stages of the education system, through the implementation of various educational programmes. In a comparative study on entrepreneurial education programmes in Spain, 47 of these programmes were identified at primary and secondary education levels

(Montero-Pedrerá 2018). The concern to incorporate entrepreneurship into education is self-evident, although impetus is needed to evaluate its impact and the learning outcomes achieved, and to assess its implementation. The evaluation of entrepreneurship education in primary and secondary education is a problematic issue. In Spain, there are few studies on the effect of such programmes on the entrepreneurial education of students (Diego and Vega 2015); it seems that it is difficult to illuminate the black box of entrepreneurship education programmes referred to by Maritz (2017). Recent bibliometric research (Brüne and Lutz 2020; Lin et al. 2023) highlights the need for further efforts to define the effect of entrepreneurship education programmes on children, as this is a key developmental stage for training future agents of change. However, it also points to the multidimensional nature of entrepreneurship education in schools and the complexity involved in evaluating the effects of these programmes. The initial and ongoing training of teachers, the material and economic resources, and the school organisation itself are variables that can influence the effect of entrepreneurial education. Despite this, the evaluation of the effect of entrepreneurial education is essential to adjust the disparity between the goals set and the results obtained (Elert et al. 2015; Cardoso et al. 2018). In fact, one of the most recurrent criticisms is the disparity between the theoretical–normative discourse and the reality of educational practice.

Therefore, the objective that we set ourselves, derived from this issue, is to assess the effect of the PEIEO educational programme on the entrepreneurial potential of minors in the middle stages of education, in a holistic and integral sense.

2. Methods

In the following section, we contrast the two research hypotheses related to the impact of the PEIEO programme on entrepreneurial potential. In order to achieve this, we describe the context and research design, the participants and the research instrument. Subsequently, two data analyses are carried out: (1) using repeated measures *t*-tests to contrast the means by comparing the pre- and post-test in the experimental and control groups; and (2) dividing the experimental group into two sample subgroups, based on the consideration of entrepreneurial intentionality, and carrying out an intragroup and intergroup analysis by means of *t*-tests for the contrast of the means in the related samples.

2.1. Hypotheses

The evaluation of entrepreneurial education is characterised by the fact that it is applicable at multiple levels. In this study, the ontogenetic level is examined, specifically the set of attitudes that shape the entrepreneurial potential of those students considered as possible agents of change. In relation to the formation of entrepreneurial attitudes of minors participating in the PEIEO entrepreneurship education programme, we put forward the following hypotheses:

H1. *Training in entrepreneurial attitudes will significantly increase the entrepreneurial potential of the participating students.*

H2. *The formation of entrepreneurial attitudes will affect the entrepreneurial potential and each of its dimensions differently, depending on whether or not the students are considered to have entrepreneurial intentions.*

2.2. Research Context and the PEIEO Programme

The Recommendation of the Council of the European Union on key competences for lifelong learning (OJEU 2018) proposes fostering entrepreneurial competence, creativity and a sense of initiative among young people, by promoting opportunities for them to gain at least one period of practical entrepreneurship experience during their schooling. In the case of Spain, the adaptation of this recommendation has had the effect that, in the early and middle stages of the education system, entrepreneurial education programmes are

related to the creation of mini companies, focused mainly on entrepreneurial skills and knowledge. In Spain, responsibility for education is distributed among the Departments of Education for the 17 autonomous communities, with the exception of the cities of Ceuta and Melilla, which are assumed by the Ministry of Education and Vocational Training.

In this way, it can be seen that entrepreneurial attitudes require specific educational content for their development, as these topics are not sufficiently represented within the educational curriculum. This lack of content inhibits the development of entrepreneurial competence, which requires educational content that specifically addresses entrepreneurial attitudes. With this in mind, the PEIEO programme was created. Its general objectives are that students can: (1) generate ideas that facilitate the innovation process; (2) develop a proactive attitude in order to achieve their goals; (3) self-regulate their own behaviour; (4) be motivated positively to achieve preset objectives through their actions; and (5) be enabled to resolve uncertain situations. In order to achieve these objectives, the PEIEO programme was structured in fifty activities, ten for each of the five domains: creativity, leadership, personal control, achievement orientation, and problem-solving intuition. The teaching methodology was active and experiential, with the following methods implemented: cooperative learning, service learning, problem-based learning, and project-based learning. The PEIEO programme was implemented from January to June 2022. Those teachers responsible for its implementation also had responsibility for each participating class. They received training prior to the start of the programme and mentoring by the research team during implementation. The programme was carried out during school hours.

2.3. Research Design

In this study we used an experimental and descriptive research design to evaluate the entrepreneurial potential of the participating students (Montero and León 2007). The analysis of the impact of the PEIEO was carried out using a pre-test (time 1—T1—before the application of the programme) and post-test (time 2—T2—after the intervention) design, with a control and experimental group (Cohen et al. 2007). An equal number of experimental and control groups were balanced within the participating schools (Nabi et al. 2017).

2.4. Participants

The sample was obtained using stratified probability sampling (Rodríguez 1991). The stratification variables were: the Autonomous Community; the number of students enrolled in compulsory secondary education and in higher education (Vocational Training and Baccalaureate); the ownership of the school (private/public/subsidised); and the student's gender. Considering these variables, the number of schools that took part in the study is described in Table 1.

Table 1. Participating centres by Autonomous Community.

Autonomous Communities	No.
Andalusia	15
Castilla-León	5
Valencian Community	5
La Rioja	5
Basque Country	5
Community of Madrid	4
Castilla-La Mancha	1
Navarre	1

The study population is composed of 1,427,584 students, corresponding to the total number of students enrolled in the educational stages of the ESO, FP and Bachillerato in the 2019–2020 academic year (Ministry of Education and Vocational Training, Government of Spain). The total sample participating in the study consists of 1036 participants, with an age range from 12 to 18 years. In the case of Spain, the Ministry of Education and Vocational Training considers that school age is up to 18 years, with the completion of the Bachillerato. The control group consisted of students who did not participate in the entrepreneurship subjects, comprising 440 participants, while the experimental group consisted of 596 participants, who completed the test at T1 and T2. The demographic factors taken as control variables defining the sample profile were: sex, age, educational stage, school ownership and Autonomous Community (Table 2).

Table 2. Description of sample data.

Demographic Factors		Control Group		Experimental Group		Total	
		No.	(%)	No.	(%)	No.	(%)
Gender	Male	223	50.68	299	50.17	522	50.39
	Female	217	49.32	297	49.83	514	49.61
	Total	440	100.00	596	100.00	1036	100.00
Age	12–14	173	39.32	282	47.32	455	43.92
	15–16	169	38.41	212	35.57	381	36.78
	17–18	98	22.27	102	17.11	200	19.30
	Total	440	100.00	596	100.00	1036	100.00
Educational Stage	ESO	175	39.77	253	42.45	428	41.31
	Bachillerato	6	1.36	25	4.19	31	2.99
	VET int level	157	35.68	190	31.88	347	33.49
	VET higher level	102	23.18	128	21.48	230	22.20
	Total	440	100.00	596	100.00	1036	100.00
Ownership of the Educational Centre	Public	344	78.18	427	71.64	771	74.42
	Semi-private	91	20.68	112	18.79	203	19.59
	Private	5	1.14	57	9.56	62	5.98
	Total	440	100.00	596	100.00	1036	100.00
Autonomous Community	Andalusia	187	42.50	311	52.18	498	48.07
	Madrid	68	15.45	105	17.62	173	16.70
	Castilla y León	37	8.41	50	8.39	87	8.40
	Com. Valenciana	35	7.95	35	5.87	70	6.76
	Castilla La Mancha	0	0.00	21	3.52	21	2.03
	La Rioja	16	3.64	63	10.57	79	7.63
	Basque Country	97	22.05	11	1.85	108	10.42
	Total	440	100.00	596	100.00	1036	100.00

2.5. Research Instrument

The ATE-S (Bernal-Guerrero et al. 2021) was used to assess the entrepreneurial potential of the participants (Table S1). This instrument is a version of the ATE test (Athayde 2009) adapted for the Spanish population and is psychometrically validated. The ATE-S is made up of 22 items on a seven-point Likert-type scale (from 1 = do not agree at all to 7 = strongly agree). The constructs assessed using the ATE-S in this study are the following:

1. Creativity: attitude to generating ideas that facilitate the innovative process.
2. Personal control: attitude to managing and self-regulating one's own behaviour.
3. Achievement motivation: attitude towards perseverance, proactivity and goal achievement.
4. Leadership: attitude towards team building, decision making, negotiating and planning.
5. Problem-solving intuition: attitude to deal with uncertainty and instability.

The partial least squares (PLS) method was used to estimate the weights of each item in the formation of each of the dimensions, and the weight of each of these in the formation of the higher variable, namely entrepreneurial potential. PLS allows us to contrast the significance of these values in the formation of the dimensions or first-order variables, and in the formation of the higher variable. The choice of the PLS methodology (Roldán and Sánchez-Franco 2012) is mainly due to its suitability for modelling formative constructs. Table 3 reports the significance of the weights of each of the items corresponding to each of the dimensions, and the significance of the weights of each dimension in the formation of the higher order construct, namely entrepreneurial potential. According to Hair et al. (2018), the items in a formative construct should not present multicollinearity problems. Following their recommendations, in Table 3 we report the VIFs, which should all be less than 3.3 (Hair et al. 2009). In our case, this condition is met, indicating that there are no problems of multicollinearity between the items of each dimension, nor between the five formative dimensions of entrepreneurial potential. Finally, a standardized root mean square residual (SRMR) equal to 0.067, therefore lower than 0.08, indicates that the internal structure calculated for the entrepreneurial potential variable is adequate.

Table 3. ATE model assessment.

First Level (LOCs)	Weights	p-Value	VIF
Creativity			
I think that a good imagination helps me to function better in school.	0.042 n.s.	0.173	1.610
I like classes that make me develop my imagination.	0.321 ***	0.000	1.555
I think I show a lot of imagination in my school work.	0.446 ***	0.000	1.454
I enjoy classes where teachers do different activities.	0.190 ***	0.000	1.303
Personal control			
I believe that my future career success depends largely on what I do.	0.400 ***	0.008	1.362
I have confidence in my ability to succeed in my future career.	0.102 *	0.098	1.302
I think it is important to plan my future career.	0.025 n.s.	0.537	1.153
I am worried about not succeeding in my future professional life.	−0.184 **	0.028	1.553
I am as likely as anyone else to get a good job in the future.	0.654 ***	0.004	1.106
Achievement motivation			
I work very hard to achieve success in my projects.	0.129 ***	0.000	1.329
It is important to finish a project to the best of your ability.	0.247 ***	0.000	1.537
I am proud of my work this year.	0.442 ***	0.000	1.817
Working hard on projects is worth the effort.	0.075 ***	0.006	1.608
I feel great when a class project turns out well.	0.107 ***	0.003	1.851
Leadership			
I am good at motivating my classmates.	0.506 ***	0.000	1.693
I am good at persuading people to work in groups.	0.056 *	0.055	2.000
I think I can convince my classmates to agree on a plan.	0.254 ***	0.000	1.436
I take responsibility for organising my classmates when we work in groups.	0.164 ***	0.000	1.388
Problem-solving intuition			
I trust my own intuition to solve problems in class.	0.279 ***	0.000	1.192
Making mistakes is a good way to learn.	−0.366 ***	0.000	1.361
I try to find different solutions to a problem before I give up.	0.939 ***	0.000	1.610
My intuition helps me to solve problems as they arise.	0.148 **	0.012	1.616
Second Level (HOC)			
Creativity → ATE	0.183 ***	0.000	1.335
Personal control → ATE	0.350 ***	0.000	1.207
Achievement orientation → ATE	0.367 ***	0.000	1.451
Leadership → ATE	0.229 ***	0.000	1.283
Intuition →	0.122 ***	0.000	1.397
SRMR = 0.067			

Note. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$; n.s.: not significant.

2.6. Data Analysis

Two analyses will be carried out, one on the sample as a whole (control and experimental group) and the other on the two established sample subgroups, based on the consideration of the entrepreneurial intentionality of the experimental group (Table 4).

Table 4. Types of analysis.

Analysis	Sample	Statistics
First analysis	Control group: 440 Experimental group: 596	Repeated measures <i>t</i> -test
Second analysis	Group without entrepreneurial intentions: 516 Group with entrepreneurial intentions: 80	Simple Aggregate Mean Index <i>t</i> -test for contrast of the means in related samples

2.6.1. First Analysis

The first analysis is a repeated measures *t*-test to contrast the means comparing the pre- and post-test (T1 and T2). This aims to find out whether there are significant differences or not in the mean scores of the students who participated in the PEIEO programme (experimental group) compared to the control group who did not participate. To this end, the entrepreneurial potential, and each of its dimensions, were analysed: *creativity, personal control, achievement orientation, leadership and problem-solving intuition*.

2.6.2. Second Analysis

The second analysis focuses on finding out how the formation of entrepreneurial attitudes affects entrepreneurial potential differently, depending on the possible entrepreneurial intentionality of the participants in the PEIEO programme. To this end, the experimental group was divided into two subgroups, following the criterion of the entrepreneurial intention rate in Spain, set at 10% of the Spanish population, according to the latest Global Entrepreneurship Monitor Spain report (Fernández et al. 2022). Applying this criterion to the experimental group, two subgroups were established: a *subgroup with entrepreneurial intention*, with an entrepreneurial potential value above the 90th percentile, and a *subgroup without entrepreneurial intention*, with an entrepreneurial potential value below the 90th percentile (Table 5).

Table 5. Classification of the experimental group according to entrepreneurial intention.

Gender	Subgroup with No Entrepreneurial Intention (<P) ₉₀	Subgroup with Entrepreneurial Intention (>P) ₉₀	Total
Male	255	44	299
Female	261	36	297
Total	516	80	596

Having established the two sample subgroups, based on the consideration of the entrepreneurial intentionality of the experimental group, we analysed whether there are significant differences in the increase in entrepreneurial potential, and the weight in relative terms of each dimension in regard to their formation, comparing the subgroups *with entrepreneurial intention* and *without entrepreneurial intention*, subsequent to the application of the PEIEO programme. From this position, we used a Simple Aggregate Mean Index formula to analyse the value of the entrepreneurial potential after the application of the PEIEO programme (T2), with respect to the same value before the programme (T1). Examining further the same line of results, we carried out an intra-group analysis where we calculated the percentages represented by each dimension in the formation of entrepreneurial intention, before and after the application of the PEIEO programme. Subsequently, an

inter-group analysis was carried out, comparing the percentages between the subgroups without entrepreneurial intention and those with entrepreneurial intention. These intra-group and inter-group analyses were carried out using *t*-tests for the contrast of the means in the related samples.

3. Results

Below we present the results from the data analysed. Firstly, we address the hypothesis as to whether the training of entrepreneurial attitudes will significantly increase the entrepreneurial potential of the participating students. The descriptive results (Table 6) and the *t*-test show that the students who participated in the PEIEO programme have significantly developed their entrepreneurial potential and each of its dimensions. Table 7 describes the contrast between the mean scores of the control and experimental groups between T1 and T2. The first three columns show that there were no significant differences between the control and experimental groups at T1, i.e., all participants have the same initial level of both the overall measured entrepreneurial potential and all its dimensions. The last three columns show that at T2 the mean values are higher in entrepreneurial potential and its dimensions. The *t*-values results show that there are significant differences in entrepreneurial potential in all its dimensions between T1 and T2 in the control and experimental groups, thus confirming our first hypothesis.

Table 6. Mean values of entrepreneurial potential and its dimensions.

Indicators	Pre-Test Mean		Post-Test Mean	
	Control (n = 440)	Experimental (n = 596)	Control (n = 440)	Experimental (n = 596)
Creativity	15.69	15.90	18.58	19.14
Personal control	18.79	18.97	19.23	19.79
Achievement orientation	20.42	20.67	21.79	22.17
Leadership	14.02	14.09	14.98	15.48
Problem-solving intuition	16.12	16.04	18.34	18.91
Entrepreneurial potential	85.03	85.67	92.93	95.49

Table 7. Analysis of differences in mean values.

Indicators	T1			T2		
	Diff. Mean Control and Experimental	<i>t</i> -Values	<i>p</i> -Values	Diff. Mean Control and Experimental	<i>t</i> -Values	<i>p</i> -Values
Creativity	−0.216	−1.323	0.186	−0.552	−7.091	0.000 ***
Personal control	−0.182	−1.287	0.198	−0.569	−6.656	0.000 ***
Achievement orientation	−0.252	−1.336	0.182	−0.375	−2.606	0.000 ***
Leadership	−0.065	−0.349	0.727	−0.499	−2.976	0.000 ***
Problem-solving intuition	0.078	0.519	0.604	−0.568	−5.644	0.003 ***
Entrepreneurial potential	−0.637	−1.054	0.292	−2.562	−5.444	0.000 ***

Note. *** *p* < 0.001.

Secondly, we contrast how the formation of entrepreneurial attitudes will affect entrepreneurial potential and each of its dimensions differently, depending on whether the student is considered to have entrepreneurial intentions or not. The result of the Simple Aggregate Mean Index indicates that the entrepreneurial potential as a whole has grown by 12.88% compared to its initial values.

$$IMAS_{t/0}^{ATE} = \frac{\sum_i X_{2i}}{\sum_i X_{1i}} = 1.1288$$

In turn, we have analysed the repercussions for each dimension from this increase, observing that the dimensions that have contributed most to the increase in entrepreneurial potential were *creativity* (4.06%) and *problem-solving intuition* (3.62%), followed by an intermediate contribution by the dimensions of *achievement orientation* (2.08) and *leadership* (1.95) and, with the lowest contribution, *personal control* (1.17%) (Table 8).

Table 8. Impact of each dimension on the increase in entrepreneurial potential.

Dimensions	Impact (%)
Creativity	4.06
Problem-solving intuition	3.62
Achievement orientation	2.08
Leadership	1.95
Personal control	1.17
Total	12.88

Similarly, Table 9, looking at the impact of each dimension on the subgroups with and without entrepreneurial intention, shows that there are significant differences when comparing the increase in entrepreneurial potential and the impact of all the dimensions on the two subgroups with and without entrepreneurial intentions. However, the increase in entrepreneurial potential in the group without intention is 9.82%, while in the group with intention this value is 32.63%. In the group with intention, the dimensions that contribute most are *leadership* and *achievement orientation*, while in the group without intentions, the most important dimensions are *creativity* and *problem-solving intuition*, the same as we obtained when considering the whole experimental group.

Table 9. Analysis of the impact of each dimension on the groups with and without entrepreneurial intentions.

	Experimental Group (%)	Group with Intentions (%)	Group without Intentions (%)	Diff. Mean (without Int. with Int.)	t-Values	p-Values
ATE increase	12.88	32.63	9.82	−22.81	−12.99	0.000 ***
Creativity rep.	4.06	6.10	3.74	−2.36	−4.87	0.000 ***
Personal control rep.	1.17	4.70	0.63	4.07	−7.15	0.000 ***
Achievement orient. rep.	2.08	6.95	1.33	5.62	−9.75	0.000 ***
Leadership rep.	1.95	8.81	0.88	7.93	−13.66	0.000 ***
Problem-solving Intuition rep.	3.62	6.07	3.24	2.83	−6.99	0.000 ***

Note. *** $p < 0.001$.

In order to achieve greater robustness in the results from the H2 test, we calculated the weight of each dimension in the formation of intention and carried out a double analysis within and between groups. In the intra-group analysis, the measurement was repeated over time, taking into account T1 and T2, wherein we compared the percentages before and after the application of the PEIEO programme in each subgroup, using a *t*-test to contrast the mean in the related populations, to ascertain whether the differences observed were significant or not. Table 10 shows that, in the group with entrepreneurial intentions, the dimensions that significantly change their weight are *personal control*, *achievement orientation* and *leadership*, the latter being the dimension that clearly gains weight (from 15.9% to 18.65%) after the educational programme. In the group without entrepreneurial intentions, all the weights change significantly, with *creativity* (from 18.52% to 20.31%) and *problem-solving intuition* (from 18.72% to 20.01%) being the two dimensions that gain weight.

Table 10. Intra-group analysis of the differences in the weights of the dimensions in the formation of intention in the subgroups with and without entrepreneurial intention.

Dimensions	Subgroup with Entrepreneurial Intent					Subgroup without Entrepreneurial Intent				
	Mean % Pre-Test	Mean % Post-Test	Diff. % Mean	t-Values	p-Values	Mean % Pre-Test	Mean % Post-Test	Diff. % Mean	t-Values	p-Values
Creativity	18.75	18.74	0.01	0.023	0.982	18.52	20.31	−1.79	−14.324	0.000 ***
Personal control	22.47	20.44	2.03	5.660	0.000 ***	22.19	20.81	1.38	10.833	0.000 ***
Achievement orientation	24.10	23.43	0.67	2.488	0.015 **	24.11	23.15	0.97	7.176	0.000 ***
Leadership	15.90	18.65	−2.75	−7.207	0.000 ***	16.45	15.72	0.73	4.817	0.000 ***
Problem-solving intuition	18.77	18.74	0.03	0.129	0.897	18.72	20.01	−1.29	−10.818	0.000 ***

Note. *** $p < 0.001$; ** $p < 0.05$.

Finally, in the intergroup analysis, we compared the percentages represented by each of the dimensions in the formation of entrepreneurial potential between the subgroups without entrepreneurial intention and with entrepreneurial intention at T1 and T2, i.e., for the values before and after the PEIEO programme, using t -values for independent samples. The results in Table 11 at the time before the educational programme, T1, indicate that there are no significant differences in the weights of the dimensions if we compare the groups with and without entrepreneurial intention. On the other hand, when analysing the results after the educational programme, it is observed that all the differences are significant. The *leadership* and *achievement orientation* dimensions have a higher weight in the group with intention than in the group without, with a difference of 2.93 points for *leadership* and 0.28 for *achievement orientation*.

Table 11. Intergroup analysis of the differences in the weights of the dimensions in the formation of intention at T1 and T2.

Dimensions	T1					T2				
	MSIN	% MCIN	Diff % Mean	t-Values	p-Values	% MSIN	% MCIN	Diff % Mean	t-Values	p-Values
Creativity	18.52	18.75	−0.23	−0.853	0.394	20.31	18.74	1.57	26.91	0.000 ***
Personal control	22.19	22.47	−0.28	−0.990	0.322	20.81	20.44	0.37	3.778	0.000 ***
Orientation	24.11	24.10	0.01	0.046	0.963	23.15	23.43	−0.28	−4.378	0.000 ***
Achievement	16.45	15.90	0.54	1.713	0.087	15.72	18.65	−2.93	−33.397	0.000 ***
Intuition	18.72	18.78	−0.05	−0.230	0.818	20.01	18.74	1.27	19.666	0.000 ***

Note. *** $p < 0.001$. % MSIN: mean without intent and % MCIN: mean with intent.

4. Discussion

The aim of this research was to assess whether participation in an entrepreneurship education programme had an effect on the entrepreneurial potential of students under the age of 18 as agents of change. The evaluation of entrepreneurship education is key to understanding the effects of educational programmes related to entrepreneurship development in schools (Draycott and Rae 2011; Draycott et al. 2011). In contrast to higher education, the lower and middle stages of the education system present a gap in evaluative processes in relation to entrepreneurship education. In the case of Spain, the lack of rigorous evaluations to confirm the effect of entrepreneurship education programmes on students in primary and secondary education has been pointed out (Barba-Sánchez and Atienza-Sahuquillo 2016). Evaluations have mainly focused on mini-enterprise education programmes, which are largely centred on the performance of functional skills and knowledge for the implementation of business plans, and which do not have a clear effect on personal competences (Grewe and Brahm 2020). Without underestimating this perspective, our evaluation study sought to alleviate this deficit in evaluative processes, through the design of experimental research, pre and post-tests with control and experimental groups, in a significant sample of middle educational stages in the Spanish system, aimed at promoting entrepreneurial attitudes for the training of minors who are agents of change.

In line with previous research (Lackéus and Sävetun 2019; Luis-Rico et al. 2020; Manickam and Abd Rozan 2023; Schelfhout et al. 2016; Susantiningrum et al. 2023), the results obtained suggest that entrepreneurship education has a positive effect on participants in such education programmes. Specifically, the data on the first hypothesis (the formation of entrepreneurial attitudes will significantly increase the entrepreneurial potential of the participating students) revealed that, after implementing the programme, the scores for the experimental group had increased, and were significantly higher than those of the control group, for the five attitudes studied. This positive impact on all the attitudinal dimensions also led to a significant increase in the entrepreneurial potential scores for the experimental group, compared to the control group, after the end of the programme. Thus, the first hypothesis is confirmed, that there are significant differences in the entrepreneurial potential of the students (experimental group), after their participation in the programme. This reveals that the PEIEO programme fulfils its purpose of developing the entrepreneurial attitudes of the students considered as agents of change. These results are comparable with data from previous studies on entrepreneurial potential in both middle and higher education (Athayde 2012; Varamäki et al. 2015). However, the data contrasts with the results from more recent studies, which suggest that there are no significant differences, both at the dimensional level for each attitude, and at the overall level of entrepreneurial potential (Pepin and St-Jean 2018). Along the same lines, there is research that corroborates the lesser impact on entrepreneurial attitudes and potential in educational mini companies, which are extremely widespread in the Spanish context (Bernal-Guerrero and Cárdenas-Gutiérrez 2017; Cárdenas-Gutiérrez and Montoro-Fernández 2017). In the absence of future studies, the results obtained in this research indicate that the formation of entrepreneurial potential is more consolidated in entrepreneurship education programmes that are not strictly linked to productive entrepreneurship, but rather to entrepreneurial educational activities related to the social, cultural and personal spheres. Similarly, recent research by Lackéus (2020, 2023) proposes strengthening entrepreneurial capacity in schools through “Value Creation Pedagogy”. The implementation of programmes based on an “enterprise education pedagogy” would make it possible to increase the number of students with the capacity to undertake entrepreneurial behaviour related to spheres of human action other than the strictly economic one, which is typical of people considered as agents of change.

In relation to the second hypothesis (the formation of entrepreneurial attitudes will affect entrepreneurial potential and each of its dimensions differently, depending on whether the students are considered with or without entrepreneurial intentions), we divided the experimental group into two subgroups: with and without entrepreneurial intentions. The results obtained do not indicate that there are significant differences between the two subgroups. The effect of the educational programme is different depending on whether the participants belong to the subgroups with or without entrepreneurial intention. Thus, the entrepreneurial potential increased by 32.63% in the subgroup with intention, in contrast to 9.82% for the subgroup without intention. Consequently, the data indicate that entrepreneurial potential has a greater impact on participants with entrepreneurial intentions than on those without intention. These findings are in accordance with a broad line of research (Ajzen 2011; Athayde 2009; Krueger 2020; Krueger and Brazeal 1994; Santos et al. 2013; Ward et al. 2019) that corroborates the notion of entrepreneurial potential as an antecedent of entrepreneurial intention; that is, as a latent construct formed by dispositions that entail the possibility of acting and engaging in entrepreneurial behaviour. In relative terms, there are also differences in the contribution of each dimension to entrepreneurial potential depending on the subgroup to which one belongs. With the exception of *personal control*, the dimension that contributes least to entrepreneurial potential in both subgroups, the data reflect a change of order in the dimensional contribution in the subgroups. In the subgroup with entrepreneurial intentions, *leadership* (8.81%) and *achievement orientation* (6.95%) are ranked as the highest contributors to entrepreneurial potential, followed by *creativity* (6.10%) and *problem-solving intuition* (6.07%). However, in the subgroup without intentions, the order is reversed, with *creativity* (3.74%) and *problem-solving intuition*

(3.24%) being the dimensions that contribute most to entrepreneurial potential, followed by *achievement orientation* (1.33%) and *leadership* (0.88%). With the same orientation, the analysis on the contrast of the mean in related populations carried out on both subgroups confirms the following. Firstly, that all the dimensions show significant variations between both subgroups at the intra-group and inter-group levels. Secondly, that the dimensions of *leadership* and *achievement orientation* are those that contribute most to entrepreneurial potential in the subgroup with entrepreneurial intentions, and that the dimensions of *creativity* and *problem-solving intuition* are those that contribute most to entrepreneurial potential in the subgroup without intentions. These differences in dimensional contributions to entrepreneurial potential are in line with other research. The studies show a disparity in terms of which dimensions contribute most to entrepreneurial potential. Thus, according to their dimensional weight in the contribution to entrepreneurial potential, Athayde (2009, 2012) suggests that the dimensions with the greatest weight are: *leadership*, *creativity*, *achievement orientation* and *personal control*. Spagnoli et al. (2017) also define *leadership*, *creativity*, *achievement orientation* and *personal control*, while Steenekamp et al. (2011) describe *leadership*, *achievement orientation*, *personal control* and *creativity*. Taken together, these results regarding the second hypothesis lead us to accept that the effect of the educational programme has been different, both in absolute and relative terms, depending on whether the participants are considered to be with or without entrepreneurial intentions, although there is no consensus on the priority of attitudes with a greater or lesser impact on entrepreneurial potential.

5. Conclusions

The findings from this study show that the effect of the PEIEO educational programme on entrepreneurial potential has been relevant. Regarding the first hypothesis, we can conclude that the application of the PEIEO programme has increased the level of entrepreneurial attitudes related to *creativity*, *leadership*, *personal control*, *achievement orientation* and *problem-solving intuition*. This increase in the attitudinal dimensions had a significant effect on the entrepreneurial potential of the participants. With regard to the second hypothesis, we conclude that the formation of attitudes has a different impact on the entrepreneurial potential of the participants, depending on whether or not they are considered to have entrepreneurial intentions. The significant variations found indicate that the PEIEO programme increased the attitudes and entrepreneurial potential of the participants in general. However, when dividing the experimental group into participants considered with and without entrepreneurial intentions, differences were found in the contribution of the programme to participant attitudes and entrepreneurial potential. Thus, participants considered to be with entrepreneurial intentions obtained a higher level in both attitudinal dimensions and entrepreneurial potential. *Leadership* and *achievement orientation* were the attitudes that contributed most to the entrepreneurial potential of the participants with entrepreneurial intentions. With these findings, we conclude that the PEIEO programme had a significant effect on the participants, as the entrepreneurial attitudes of *creativity*, *leadership*, *personal control*, *achievement orientation* and *problem-solving intuition* have increased. In turn, this increase has helped to enhance entrepreneurial potential. Although the development of entrepreneurial attitudes and entrepreneurial potential has a significant impact on the participants, there are differences in terms of participants with entrepreneurial intentions, in contrast to those without entrepreneurial intentions.

5.1. Theoretical and Practical Implications

The findings from this study have theoretical and practical implications. Theoretically, the PEIEO programme is conceptualised under the approach of “enterprise education pedagogy” (Jones and Iredale 2010) focused on the individual freedom to change, grow, act and adapt to the opportunities or contingencies that may arise in the different contexts where the person develops. It is a more holistic approach that is not exclusively linked to the development of business plans, but to the formation of attitudes that favour entrepreneurial

potential in different areas: cultural, social, work and personal. Thus, the PEIEO programme is designed for the lower–middle stages of the education system, in favour of an education in basic or general entrepreneurial attitudes that would serve as a foundation for the development of more specific entrepreneurial attitudes, knowledge and skills in the latter stages. The formation of entrepreneurial potential in childhood may enable both the development of entrepreneurial behaviours by children in their immediate surroundings, and the implementation of future entrepreneurial behaviours aiming to create a better world.

In terms of educational practice, the content of the programme benefits from versatility, enabling implementation regardless of the stages, classes and subjects in secondary education where it is applied, since the PEIEO programme has been designed from an integrative pedagogical perspective. The pedagogical design is structured in five independent attitudinal dimensions widely used in entrepreneurial education programmes, favouring its implementation in a multidimensional or unidimensional way, depending on the training needs detected. Methodologically, the programme is based on active and experiential learning (Almeida et al. 2021), with activities related to real case studies that have a direct impact on the attitudinal domain. Finally, the evaluation of the effect of the programme through standardised tests allows us to ensure the validity of the results of the study, which can be taken into account by educational administration when making decisions.

5.2. Limitations and Future Lines of Research

Although our findings represent a contribution to the understanding of the development of entrepreneurial potential in secondary education, we recognise that the study has certain limitations. From a theoretical perspective, we have focused on the design and implementation of a programme applied in the classroom, although we have not taken into account that entrepreneurial attitudes can be fostered through other educational actions related to the immediate environment, for example: conferences with established entrepreneurs, meetings with entrepreneurial family members, visits to entrepreneurial projects of different kinds, or the establishment of relationships with organisations and institutions that promote entrepreneurial culture. In the future, it would be useful to investigate how these practices influence the configuration of entrepreneurial potential. On the other hand, we have focused on a model of entrepreneurial potential, and it would be possible to open up new lines of research to study the influence of other potential models and compare them with the model used. Empirically, the sample is made up of participants from eight Autonomous Communities in Spain. Similar studies should be carried out in other sub-samples of Autonomous Communities that have not participated in the PEIEO project, or in other countries with similar educational systems. This limitation forces us to be cautious in extrapolating the results. The study has not investigated how the programme affects the gender variable, and we believe that it would be necessary to develop studies on the effect of education on the entrepreneurial potential according to gender. It would also be necessary to extend the study of this programme by taking into account other control variables, such as entrepreneurial parents, parental level of study, family income, demographic situation of the educational centre, comparison between autonomous regions, and contrast between centres according to their ownership (Rodríguez and Lieber 2020). In addition to studying the immediate effect of participation in the PEIEO programme, it would be useful to investigate the impact of the programme in the medium and long term. In this sense, the development of longitudinal research would provide us with knowledge on the long-term effect of the programme, although we are aware of the difficulty of implementing longitudinal research in early and middle school stages due to the high dropout rate of participants, and due to changes of the stages and educational centres, and the completion of compulsory education. Longitudinal studies would allow us to know to what extent children have become real agents of change in adulthood, and to measure

the impact that the education on entrepreneurial potential has had on their career paths (Fellnhöfer 2018; Mitrovic Veljkovic et al. 2019).

Despite these limitations, this research is a valuable contribution for academics and middle school teachers, as it conceptualises and contrasts a model for the education of entrepreneurial potential. Our study is pioneering in providing empirical evidence on how the education of entrepreneurial attitudes shapes children's entrepreneurial potential. The formation of entrepreneurial potential in the PEIEO programme has been linked to educational practices related to innovation, transformation and the creation of added value in various fields, without being linked to strictly entrepreneurial educational practices. This research contributes to the debate on how to educate entrepreneurial potential without using a business education programme, such as mini companies, which is extremely popular for the development of entrepreneurial culture. This contribution may make it possible to reduce the reluctance and prejudices of teachers regarding the incorporation of entrepreneurial skills into the curricula of the lower and middle stages. Our findings could be used to design future programmes on entrepreneurial potential from a more holistic perspective in order to train agents of change, so they are equipped to face the challenges of the 21st century (Hardie et al. 2020).

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/socsci12120680/s1>.

Author Contributions: Conceptualization, A.R.C.-G., A.M.D.-Q. and A.B.-G.; methodology, A.R.C.-G., A.M.D.-Q. and A.B.-G.; software, A.R.C.-G., A.M.D.-Q. and A.B.-G.; validation, A.R.C.-G., A.M.D.-Q. and A.B.-G.; formal analysis, A.R.C.-G., A.M.D.-Q. and A.B.-G.; investigation, A.R.C.-G., A.M.D.-Q. and A.B.-G.; resources, A.R.C.-G., A.M.D.-Q. and A.B.-G.; data curation, A.R.C.-G., A.M.D.-Q. and A.B.-G.; writing—original draft preparation, A.R.C.-G., A.M.D.-Q. and A.B.-G.; writing—review and editing, A.R.C.-G., A.M.D.-Q. and A.B.-G.; visualization, A.R.C.-G., A.M.D.-Q. and A.B.-G.; supervision, A.R.C.-G., A.M.D.-Q. and A.B.-G.; project administration, A.B.-G.; funding acquisition, A.B.-G. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by State Research Agency, Ministry of Science and Innovation (Spain): This publication is part of the I+D+i project PID2019-104408GB-I00, funded by MCIN/AEI/10.13039/501100011033/.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the Hopstiales Universitarios Virgen Macarena and Virgen del Rocío (protocol code ABG21 and date of approval 16 January 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

Data Availability Statement: Data is contained within the article.

Conflicts of Interest: The authors declare no conflict of interest.

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