The role of creativity in entrepreneurship university courses

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Structured abstract

-Purpose
The objective of this paper is to analyse the creativity level of business administration undergraduates who have attended an entrepreneurship seminar in contrast to those that have not.
-Design/methodology/approach
Using two samples of Spanish students, the factors that condition the creation of new start-ups are analysed. A survey following the creativity items from the Kirton Adaption-Innovation Inventory was employed for a start-up seminar students and a control sample. Non-parametric tests were carried out on the responses.
-Findings
Our results show that students' entrepreneurial intentions are not conditioned by entrepreneurial courses, parental self-employment, or by their creativity level. However, there are differences in creativity level by genders for their future ability to start-up a company.
-Practical implications
There are no external constraints for not being an entrepreneur, who play a fundamental role in the future of a country and are a way to reduce current youth unemployment rates. Social and educational implications are also presented.
-Originality/value
The use of the Kirton's Adaptation-Innovation (KAI) inventory as a proxy of creativity index is original in our research. Moreover, this study contributes to a better understanding of the factors to become an entrepreneur, through exposure to creativity, growing up around businesses and awareness of individual creativity index. Integration of university courses with entrepreneurship actions will be of interest to the society development.

-Keywords: creativity, entrepreneurial education, entrepreneurial intention, KAI inventory, higher education, gender

Introduction

Entrepreneurship may be a solution to create new jobs for young people in times of crisis as the entrepreneurial behaviour of economic actors within an economy is supposed to potentially create new employment opportunities (Kuckertz and Wagner, 2010). Many governments boot entrepreneurial initiatives through new laws. In that same line, universities are offering nowadays more courses in entrepreneurship. However, some studies support the argument that the entrepreneurial attitude is greatly influenced by a country's cultural heritage (Benjamin Martz et al., 2003), as well as by sociological (Stanworth et al., 1989) and educational (Korhonen et al., 2011) determinants. In some countries such as Spain, one of the nations with the highest youth unemployment rate in the world, the culture of entrepreneurship is not generalised. Indeed, the early-stage entrepreneurial activity rate (TEA) between the ages of 18 and 65 is 5.5%, one of the lowest in Europe, according to GEM report 2014. This report also explains that the main motivation for avoiding entrepreneurship is the fear of failure. A total of 64% of failed entrepreneurs did not want to try again. Moreover, in Spain there is a low level of proactivity, related to their entrepreneurial intentions (de los Ríos et al., 2015).

Creativity is a fundamental trait for an entrepreneur. This spirit of innovation is intimately linked to originality and both are in relation with creativity, but only few universities prepare new professionals with those skills. Indeed there is a 'current narrow view on the role of universities in knowledge-based economies' (Van Der Steen and Enders, 2008). However, many university students could reject this issue of being entrepreneurs because they could feel that they are not creative, they do not have creativity.

Bearing all these things in mind, entrepreneurial initiatives for undergraduate students could alleviate youth unemployment while creating new ventures and jobs. Thus, the objective of this paper is to analyse an entrepreneurial course and the level of creativity on a sample of undergraduate students, focusing on their intentions to start-up a business and the factors conditioning their entrepreneurial intentions. Those intentions are likely to translate into subsequent potential entrepreneurial behaviour (Kuckertz and Wagner, 2010). We hypothesize a significant difference in the creativity level between the students enrolled in the entrepreneurial course and those that did not feel the need to start up a new business idea in line with Goldsmith and Kerr (1991). Other factors found in prior studies, such as gender or parental self-employment status, will also be studied. The used methodology is based on non-parametric testing.

The first contribution of this paper is that this research uses the Kirton's Adaptation-Innovation (KAI) inventory as a proxy of creativity index after a proposal of a creative activity. KAI is a cognitive style measure to explore and describe problem-solving, teamwork and creativity. Thus, it can be used as a creativity index, following Dr. Kirton's own definition of creativity as a capacity for initiating change (Kirton, 2003). Secondly, this study focuses on students, potential

entrepreneurs as the number of papers about this group is scarce. Thirdly, we test the KAI index of potential entrepreneurs as a creativity proxy after doing an entrepreneurial seminar, the initial stages of a start-up company, when more creativity is needed, for example, to define the purpose of the business. Finally, the results may be useful for policy-makers and university managers because there is a gap between real business and academic subjects in the entrepreneurial topic.

Theoretical background and hypothesis

Entrepreneurship has been for a long time a topic of study due to its positive implications for economic growth (Quadrini, 2000) and job creation (Malchow-Møller et al., 2011). Moreover, in a period of global economic stagnation, entrepreneurship plays a key role for many governments in boosting economic development. State universities, as centres of knowledge, should also 'contribute to the economic growth of the regions where they are located' (Rodeiro et al., 2012, p. 93). However, that profile is not common for universities in non-Anglo-Saxon countries, like Spain, more traditional and conservative teaching oriented, although this trend is changing and many European universities have technological and industrial centres in order to foster the start-up of spin-offs.

Furthermore, not only are start-up companies important for universities but the academic support of entrepreneurs is also significant (for a literature review about this topic see Baptista et al., 2012), so many universities offer entrepreneurial courses in their different bachelor degrees. The literature so far suggests that entrepreneurial education is a key factor to boost future successful entrepreneurs (Souitaris et al., 2007; Vij and Ball, 2010; Von Graevenitz et al., 2010) because they could demystify the fear of failing, problems to start a business up, legal barriers or bootstrapping (Politis et al., 2010). However, this link is not clear. For example, there is empirical evidence that there was a connection between university support of entrepreneurship and the entrepreneurial level of activity in Spain and UK in the 20th century (Tortella et al., 2011), while Corduras et al. (2008) find evidence of no significant statistical relationship between both variables in present times. A positive effect has been shown between entrepreneurial education and training and the entrepreneurial capacity but as an indirect enabler via cultural and social norms (Diaz-Casero et al., 2011); while a negative effect has been observed between entrepreneurship programs and the intention to become an entrepreneur (Oosterbeek et al., 2010) although students' attitude could be a modulator for a positive relationship (Packham et al. 2010). So now the challenge is to find out the kind of courses that universities should provide to boost, support and help young entrepreneurs to be successful like, for example, with courses closer to real life as some studies suggest (Nab et al., 2010; Taatila, 2010).

Yet, another important issue is that most of the academic research has been focused on adult entrepreneurs but not on students, who will be the future potential ones (Goldsmith and Kerr, 1991; Turker and Selcuk, 2009). Some critics argue that it

is not the same to have the experience to become an entrepreneur as to have the intention to become one although there is a consensus related to the link between the intention to start up a business and the behaviour to be an entrepreneur (Hamidi et al., 2008) according to the Theory of Planned Behaviour (Ajzen, 1991). There are many factors that condition entrepreneurial intentions (person's attitude, psychological, family, social…) and although it is difficult to specify all of them, it is only logical that entrepreneurship programs raise entrepreneurial intentions among the students because they develop the entrepreneurial skills and the necessary knowledge for entrepreneurs (Maiyo et al., 2016; Turker and Selcuk, 2009). However, this topic has yielded mixed results (Bae et al. 2014) with papers that show a positive relationship (for example, Souitaris et al., 2007) and others that do not (Murdok et al., 1993; Oosterbeek et al., 2010). Hence, our first hypothesis can be stated as follows:

H1: Students' entrepreneurial intentions are higher for those attending an entrepreneurship seminar.

Also, we are interested in analysing the influence of family support on their entrepreneurial intentions since the existing literature is not conclusive but although it is difficult to measure the impact of external influences on students' entrepreneurial intentions, there are some studies linking the role of family and the entrepreneurial leadership development of students (Bagheri and Pihie, 2010; Henderson and Robertson, 2000). Moreover, individual attachment to family business values are strongly formed concepts that motivate entrepreneurial direction (Tarling et al., 2016). However, there are some of those studies stating that the student's intention to become an entrepreneur is not affected by parents' self-employment status used as a proxy of family support (Chen et al., 1998; Wilson, Kickul and Marlino, 2007). The way to measure family support in this paper, following other studies, is the parental self-employment status. We hypothesize that students with at least one self-employed parent have near models to learn how to run their own business and this fact could condition positively their idea to be entrepreneur. Thus, our second hypothesis is:

H2: There are differences in entrepreneurial intentions depending on the parental self-employed status.

Currently, there is a worldwide trend in higher education to include creativity as a key content to make entrepreneurial courses effective (Lautenschläger and Haase, 2011) and to increase the level of entrepreneurial intention (Zampetakis and Moustakis, 2006). However, its effectiveness is questioned (Scott et al., 2004). There are thousands of definitions about creativity as it is a quite ambiguous concept, but there is a trend to consider creativity as a critical skill for the entrepreneur. In other words, 'creativity is now also deemed a core success factor with organizational creativity resulting in higher levels of quality and customer satisfaction' (Fillis and Rentschler, 2010, p. 64-65).

There are, at least, two schools of thought about creativity. According to one of them, creativity is a skill that is almost like a muscle that can be trained while the other one states that creativity is something we are or not born with and, in that case, efforts to improve it are almost futile. Following this first school, creativity can be affected by educational efforts (Hamidi et al., 2008) so that, due to the economic crisis and the lack of job creation from firms, entrepreneurial courses at universities are essential in order to boost students to self-employment. In spite of the importance of this skill, it is not clear the link between the entrepreneurial training in creativity and the fact of being more creative when starting a business up, although there are some interesting attempts (see for example the review in Kozlinska (2012) and her creativity map for entrepreneurial training). In Spain, this is crucial because 'the level of entrepreneurs with creative capability present values of a low magnitude' (García-Tabuenca et al., 2011). Usually, universities neglect the creativity value in the degrees syllabus as 'it is a mystical phenomenon involving a spiritual process which does not sit comfortably with academic scrutiny' (Fillis and Rentschler, 2010, p. 51). Indeed, entrepreneurial creativity courses at universities are relatively scarce.

There is evidence that students who enrolled in an entrepreneurship course perceived themselves as more creative after the course and did better on generating more and a greater range of ideas than students not enrolled in the course both in pre and post-tests (Schmidt et al., 2012). However, empirical evidence also shows that creativity is not directly associated with the viability of the business idea although it is fully mediated by those opportunity search strategies that are creative and based on knowledge acquisition (Heinonen et al., 2011). Finally, innovative business behaviour can be depicted as an act of creativity, so a connection is established between entrepreneurship and innovative business practices. Hence, our third hypothesis is the following:

H3: The level of students' creativity depends on their intentions to be entrepreneurs.

Additionally, some papers point out that the creativity level is related to gender although results are not conclusive (see, e.g. the review of Baer and Kaufman, 2008 or Sanz de Acedo and Sanz de Acedo, 2012). Some studies highlight a kind of stereotype about the perception that to be an entrepreneur is a masculine characteristic (Ahl, 2006) and this stereotype could condition the entrepreneurial intentions of men and women (Gupta, et al., 2008). In fact, one of the ideas with the greatest support in recent literature is that there is no gender difference but the environmental and cultural effect can explain it whenever those differences exist (Cheung and Lau, 2010; Matuz et al., 2007). In consequence, the fourth hypothesis of our study is:

H4: There are no differences in creativity level depending on gender.

In order to attain our objective, we first make the assumption that in the

business context, creativity is often translated into idea development, new product innovations and adapting or improving existing innovations (Kirton, 1976; Ward, 2004). That is, creativity is related to originality and innovations (Kleiman, 2008) so the Kirton Adoptation-Innovation (KAI) inventory will be used to measure the creativity of undergraduate students. Moreover, as intentions are the most important predictor of behaviours (Ajzen and Fishbein, 1977), entrepreneurial intentions of current university students are keystones to future self-employment development.

Study

The setting

We conducted the test study with second-year undergraduate students from the Business Administration Degree all enrolled in the compulsory subject of Management Accounting, randomly assigned in two groups: one did an entrepreneurship seminar while the other group did not. The seminar took place once every fortnight during a two hour session with the students split in halves, so one hour with half of the enrolled students and another hour with the other half.

The objective of the entrepreneurship seminar, included as an assignment on the subject, was to develop a project of a company start-up during the semester, taking into account all the theoretical topics learnt in class (business plan, budget, break-even-point...). The seminars' contents were:

- Seminar 1: Entrepreneurship and entrepreneur. What and who.
- Seminar 2: Management accounting for entrepreneurship.
- Seminar 3: Company creation (part I): 1)Company´s name; 2) Place; 3) Business description: Products and services; 4) Draw the value chain; 5) Establish objectives; 6) Identify potential courses of action; 7) Evaluate alternative strategic options; 8) Select alternative courses of action.
- Seminar 4: Company creation (part II): 1) Revenue drivers; 2) Costs; 3) Organizational structure; 4) Cost centres; 5)Inventories valuation; 6) Customers description; 7) Competitors description.
- Seminar 5: A real company budget from a speech of a director manager of Ferrovial (an important and large Spanish facility service company)
- Seminar 6: The company's budget with 1)Sales forecast for three years; 2) Manufacturing costs; 3) Products inventory valuation; 4) Raw Materials purchasing forecast; 5)Raw materials inventories valuation and 6) Break-even point
- Seminar 7: Business plan
- Seminar 8: Oral presentation of the projects about a new start-up companies, evaluated by an entrepreneur.

The sample

The convenience sample finally consisted of 78 second-year undergraduate students enrolled in two classes of Management Accounting taught by the same lecturer, to avoid lecturer-bias.

All students attending the last session of the subject were asked to complete a paper-and-pencil test containing sections on demographic data (gender and age) and transition to entrepreneurship (parents' self-employment and also intention of starting their own company), together with the 32 items from the KAI Inventory. This assesses the creative style of a person (adaptors vs. innovator) during problem solving, since it offers valuable clues about people's risk-taking propensity and opportunity discovery (Kirton, 1976, 2003). Only 36 students (46% of the final sample) out of 55 enrolled students in the test group attended that final session. A control group of also second-year students from the same degree and year was considered, but only 42 (54% of the total sample), out of the originally 64 enrolled students attended the last session. None of the present students refused to answer the questionnaire, being 55% male, with average age 20.47 years (s.d. = 1.74 years).

Missing data at both the item and variable levels of the KAI inventory pose a problem (Roth, 1994) so standard analysis techniques cannot immediately be used to analyse an incomplete data set because most statistical procedures require a value for each variable/item (Allison, 2000). In our case, missing values from multiple-item scales were replaced using the person mean substitution approach, which substitutes the mean across remaining scale items for that individual, but rounded to the nearest integer (Huisman, 2000). Scores were not computed where more than 25% of scale items were missing and therefore two respondents' results were excluded from the analysis.

Measures

As it was previously mentioned, the students filled in a questionnaire where they were asked whether their parents were self-employed and also whether they would like to start their own company to measure the intention to entrepreneurship. All of those are dependent variables together with the student's demographic data (age and gender).

We also measured and controlled for an individual's propensity to innovate addressing the required cognitive capabilities recognizing entrepreneurial opportunities and we considered them as independent variables. To do so, we resorted to the well-known KAI inventory, developed by Michael Kirton in 1976, comprised of 32 items measuring the degree of difficulty that such a task would entail on a 5-point Likert-type scale from very easy to very hard. The KAI inventory is an instrument to analyse characteristics of people that produce qualitatively different solutions to seemingly similar problems. Indeed, following Kirton (1976, p.

622) 'adaption-innovation is a basic dimension of personality relevant to the analysis of organizational change, in that some people characteristically adapt while some characteristically innovate'. KAI inventory has been tested in other papers (Marcati et al., 2008) but, to our best knowledge, not related to creativity. The KAI inventory differentiates individuals on the basis of adaptive and innovative cognitive styles. Whereas adaptors are characterized as doing things 'better' (incremental improvements), innovators try to do things in a creative way, 'differently' (radical improvements). Although both characteristics may be assumed to be important in creative professions, the innovative style may be thought of as the more closely related to creativity of the two. Moreover, this 'concept' of creativity as a cognitive characteristic can be learnt while creativity as a personal characteristic cannot. That is the reason why we do not use other creativity index such as Torrance Test of Creative Thinking (Torrance, 1974) or the Test for Creative Thinking- Drawing production (Urban and Jellen, 1996).

In the current global business world, changes are continuous and quick so managers, or future managers in our case, should know not only how to adapt to the social and economic environment but also to innovate in order to achieve competitive advantages to continue in the market.

Reliability was tested using Cronbach' alpha measure. Alpha's results were 0.836 for our test group while it was 0.83 for the control group, so they both show a high consistency.

Statistical methods

Results for each Likert-type item, like the present case, may be analysed separately or item responses may be totalled to create a score for a group of items. There are many approaches available to test differences between groups on small independent samples with unknown distribution such as Wilcoxon-Mann-Whitney test, Wilcoxon signed-rank test, or Kruskal–Wallis test (Cohen et al., 2000). In our case, we want to analyse responses to the KAI items with groups (students who did the entrepreneurship seminar vs. the control group) being the independent variable so the Wilcoxon-Mann-Whitney test at 0.05 significance-level will be used. This test provides the same type of results as a t-test for independent samples, but based on the ranks and not the means of the responses, as they would have no statistical meaning being Likert-type responses.

In the case of analysing the answers to KAI items across the students' entrepreneurial intention (with the five possible answer options: Definitely will, Likely to, Do not know, Likely not to and Definitely will not) Kruskal-Wallis test had to be used. This test provides the same type of results as an analysis of variance, but based on the ranks.

Finally, when the effects of more than one categorical independent variable (also called factors) are considered together over and a single normally distributed interval dependent variable, a factorial ANOVA may be used. Factorial ANOVA also enables us to examine the interaction effect between the factors. An interaction effect is said to exist when differences on one factor depend on the level of other factor.

Results and discussion

Theoretically, KAI scores may range from 32 to 160, but the minimum value for the 76 students of our sample was 55 and the maximum value 126, so the subjects do not occupy the full spread. Besides, their mean score was 82.29, much smaller than the theoretical one of 96 (Kirton, 1976) and also smaller than the first study about KAI and entrepreneurship with 102.3 (Goldsmith and Kerr, 1991). Therefore the respondents were in mean value more adaptor-inclined than expected, a fact that may explain the lack of entrepreneurship spirit in Spain, in line with the GEM report as we mentioned before. Also students who did the entrepreneurship seminar and those who did not show a similar result (see table 1), the ranges being the main differences.

Insert table 1 here

As figure 1 shows, those values are affected by several outliers even though seminar KAI values distribution is more peaked (seminar kurtosis = 3.603 while non-seminar kurtosis = 1.994).

Insert figure 1 here

Results for the Wilcoxon-Mann-Whitney test were obtained using R (v. 2.1.5.) for each of the items individually considering the two groups, those students who did the entrepreneurship seminar and the control group, obtaining the result that neither any of the items nor the KAI turn out to be significant (see table 2). Therefore hypothesis 1 (H1) is rejected, that is, students' entrepreneurial intentions are not higher for those attending an entrepreneurship seminar. This result is in line with other studies such as Oosterbeck et al. (2010) in The Netherlands although with opposite results as the seminal paper of Goldsmith and Kerr (1991). However, there is empirical evidence that individuals with a university education are more likely to recognize good business opportunities (Ramos-Rodriguez et al., 2010).

Insert table 2 here

Trying to find an explanation about factors that condition entrepreneurial intentions, it is interesting to point out that, in our sample, there are no differences in the median value of KAI index (W-statistic = 0.9308, p-value = 0.6279) between students with self-employed parents and those employed. Hence, we also reject the hypothesis two (H2), there are not differences in entrepreneurial intentions depending on the parental self-employed status. Our results contradict some studies as Bagheri and Pihie (2010) or Tarling et al. (2016) that link the role of family in entrepreneurial leadership development of university students, while they are in line with Chen et al. (1998) and Wilson et al. (2007) that state student's intention to be entrepreneurs are not affected by the family situation. This point is very interesting

for boosting undergraduates to be entrepreneurs because parents' status –a non-decided situation from students- does no matter in order to start up a business.

In the case of analysing the answers to KAI items across the students' entrepreneurial intention as it can be seen (in bold) in Table 3, the p-values turned out to be significant (smaller than 0.05) only for items 1 (Has original ideas), 16 (Is methodical and systematic) and 19 (Is consistent). Analysing the answer values for each significant item, they are higher for students who did the entrepreneurial seminar than for those who did not in item 1, while the opposite occurs for items 16 and 19. This may mean that students who have attended the entrepreneurship seminar could realize that having original ideas is more important than for those who have not attended the seminar. Our results are aligned with Politis et al. (2010) that gives evidence that in a university milieu there are more formal possibilities for engaging in creative and flexible ways of acquiring resources. Nevertheless, the students who have not done the entrepreneurial seminar are more consistent, methodical and systematic than those who have. It may be that to start-up a company you need to be less methodical and systematic than to be working for others.

Insert table 3 here

So we cannot reject the null hypothesis of the medians being equal across the groups of different entrepreneurial intentions for most of the items of the KAI and we conclude that the four groups are identical populations at 0.05 significance-level with just slight differences. This means that there are not significant differences in the creativity index by entrepreneurial intention, so H3 is also rejected. In other words, there is no impact of students' creativity level on intentions to be an entrepreneur. This result is opposite to the paper of Zampetakis and Moustakis (2006) and Schmidt et al. (2012).

The first three analysed hypotheses consider the course attendance, the parental self-employed status and the different entrepreneurial intentions separately, although all three factors might affect the KAI value simultaneously. In fact we can see in figure 2 that there is interaction between the three factors because the simple effects of one change as the levels of the other factor are changed (the lines connecting the points are not parallel).

Insert figure 2 here

As the independent variable (KAI values) is normally distributed ($W = 0.9439$, p-value = 0.002155) and variances are homogeneous (Bartlett's K-squared = 0.5457, df = 1, p-value = 0.4601), a factorial ANOVA was run. It can be seen in Table 4 there are no significant main effects (we had already rejected H1, H2 and H3) and no significant interaction. Therefore there is no simultaneous effect of the three factors on the KAI value.

Insert table 4 here

In relation with hypothesis 4 (H4), women, with a mean score of 78.64 (s.d. 9.55) were in average more adaptor-inclined than men, whose mean was 85.33 (s.d. 11.91). As figure 3 shows, those values are affected by a male respondent outlier even though male KAI values distribution is right skewed (male skew = 1.23) while female distribution is left skewed (female skew = -0.31).

Insert figure 3 here

Results for the Wilcoxon-Mann-Whitney test were obtained for each of the items individually by gender (see Table 5). Only four items turn out to be significant (p-values smaller than 0.05), which are (in bold): 9 (Likes to vary set routines at a moment's notice), 13 (Prefers changes to occur gradually), 27 (Likes the protection of precise instructions) and 30 (Likes bosses and work patterns which are consistent). Hence we reject the null hypothesis of the medians being equal across the genders for those four items. Analysing results for each significant item, we find that male values are higher than female ones. It means that male students love changes in their routine although they prefer those changes to occur gradually. Our results show a gender bias related to innovative behaviour, in line with Reuvers et al. (2008) and Stolitzfus et al. (2011).

Insert table 5 here

Besides, the p-value of KAI value is also significant, so we can conclude that the genders are non-identical populations at 0.05 significance-level. In fact the mean value of KAI index for females (78.64) is lower that the male one (85.33). Therefore, male students are in mean value more creative than the female students, in line with other studies (Phipps, 2011; Wilson et al., 2007). This is unfortunate news concerning women because novel and useful ideas are the lifeblood of entrepreneurship (Ward, 2004). Thus, we accept hypothesis four.

Conclusions, limitation of the study and further research

The objective of this paper was to analyse the relation between entrepreneurial intentions and some conditionings that undergraduate university students from a Business Administration Bachelor degree may have in order to start up a company when they finish their studies. The main conclusion is that students' entrepreneurial intentions are not conditioned by entrepreneurial courses, parental self-employment, or by their creativity level. It means that there are no external constraints for not being an entrepreneur. However, there are differences in creativity level by genders. In particular, creativity teaching efforts should be oriented to female students as they are more adaptor-inclined. This means that

mixed gender groups of undergraduates could work together in order to put entrepreneurship projects into practice. Moreover, it is interesting to point out that parents' self-employment status is not a determinant in order to become an entrepreneur. This result could be a boost to many students in their move to entrepreneurship because their parents' work status and their level of creativity are not restrictions to start up a business.

Our results shed light on interesting implications for all the stakeholders involved in entrepreneurship. Perhaps new syllabus could be readjusted to boost creativity in undergraduate university students. Universities may enhance performance and encourage entrepreneurial motivations in a creative and innovative learning environment as part of an essential education for a new era. Indeed, intervention at the undergraduate level provides a different perception of entrepreneurship for future business experience and hence could alter the labour market. Business/entrepreneurship incubators should play a pivotal role fostering university students to self-employment. Additionally, when students practice business plans, budgets, and legal contracts as in real life, they could gain more self-confidence in order to become entrepreneurs if they have more skills to interact with current dynamic market.

Finally, this survey could be a help for university lecturers and managers in order to offer more effective creativity courses at higher education level mixing student groups by gender. This course may break the 'vicious circle' whereby some undergraduate students, perceiving themselves as less creative, do not have any intention of engaging in an entrepreneurial activity, which requires creativity. Lecturers' interventions could be also focus on reducing gender stereotypes (Sweida and Reichard, 2013).

This paper is not out of limitations although it provides an opportunity for future research, which could examine the generality of the results through a bigger sample, with more countries and different area undergraduate student. A longitudinal study could also provide evidence on the changing patterns over time. Furthermore, the KAI index is a tool to value creativity but there are others, such as personality tests and exercises of creativity. In future research, a mix of creativity values will be used. Cross cultural aspects should be taken into account and students from different countries, will be analysed.

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