

# The impact of entrepreneurship education on innovative start-up intention: the mediating role of entrepreneurial mind-sets

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## Abstract

**Purpose** – Entrepreneurship education at universities aims to create entrepreneurial thinking and spread the culture of entrepreneurial awareness, skills and attitudes to students to stimulate their entrepreneurship intentions as graduates. This study investigates the impact of entrepreneurship education on innovative start-up intention as well as the mediating role of entrepreneurial mind-sets of university students.

**Design/methodology/approach** – Structural equation modeling (SEM) was used for analysis with ( $n = 204$ ) valid questionnaires collected from university students.

**Findings** – The main findings show that entrepreneurial mind-sets mediate the relationship between entrepreneurship education and innovative start-up intention.

**Originality/value** – This study contributes to the body of knowledge by its application in a higher educational institution and enriches the literature with new evidence that entrepreneurship education could enhance innovative start-up intention.

**Keywords** Entrepreneurship education, Innovative start-up intention, Entrepreneurial mind-sets, Social education, Extracurricular programmes, Curricular programmes

**Paper type** Research paper

## Introduction

Entrepreneurship education began in 1947 at Harvard University (Katz, 2003), after which it rapidly spread globally. Many researchers started to study this term, because of its effect on skills, behavior and mind-sets of young people toward developing their own ventures. Curran and Stanworth (1989) defined Entrepreneurship Education as a training process aimed at creating and instilling the entrepreneurial skills and knowledge needed by the entrepreneur. According to Gibb and Durham Univ. (United Kingdom) (1992), the behavioral aspects of entrepreneurship skill are: “opportunity seeking, initiative taking, problem-solving and risk-taking, ability to cope with or enjoy uncertainty and ambiguity, self-awareness, self-confidence, creativity, perseverance, persuasiveness, resourcefulness amongst others.” That is, it is a process aimed to change the current situation of young people by enabling them to create innovative products and services that increase economic value.



Recently, universities have increased budgets for designing entrepreneurial education programmes, as part of the learning process which has a significant impact on the future career choices of students. Therefore, the process of entrepreneurship education is one of the most important tools to develop and change the behavior of students toward work (Hien and Cho, 2018). According to Fritsch (2011), intention to start up is a direct antecedent of entrepreneurial behavior: greater entrepreneurial intention leads to greater entrepreneurial behavior, which in turn depends on the student's self-efficacy. Zarefard and Cho (2018) defined innovative start-up's intention as the intention of individuals to establish projects aimed at producing new and innovative products through seizing opportunities and taking risks.

Every year thousands of students graduate from universities in Jordan, start their hard journey in searching for a job; because they face difficulties in finding a job, the unemployment rates are increasing day by day. According to a report prepared by the Jordanian Department of Statistics in 2019, the unemployment rate reached 19.2%, which is a large percentage compared to other countries. To solve the unemployment problem, many countries have adopted entrepreneurship education in universities to prepare students and motivate them to become entrepreneurs. Salihu (2016) found that these business incubators have an important role in encouraging young people to be entrepreneurs.

According to Cope (2005), entrepreneurship education aims to provide students with the necessary skills and mind-sets to launch innovative projects; other researchers called for studying the impacts of entrepreneurship education on future intention (Hien and Cho, 2018; Jabeen *et al.*, 2017). In the same vein, it is important to examine the relationship between entrepreneurial mind-sets and intention (Cui *et al.*, 2021). Accordingly, this study contributes to current entrepreneurship education literature by shedding light on one enabler, the entrepreneurial mind-set, through which entrepreneurship education contributes to innovative start-up intention. It also examines the direct relationship among the dimensions of entrepreneurship education, entrepreneurial mind-sets and innovative start-up intention. This contribution will help universities to identify the key components that they should work on and into which to invest their limited resources to achieve the desired outcomes. The findings also contribute to the debate on the issue of understanding the enablers that could lead to having more innovative start-up intention, particularly in the context of education in Arabian settings.

## Literature review

The current era is characterized by many fast-paced cognitive and technological variables, which have implications for personal, community, political and artistic life and all aspects of human life (Hanandeh *et al.*, 2017). Therefore, governments have begun to promote and support new ideas, recognizing that entrepreneurship is the key to survival because it invests in ideas that develop the economy and increase the amount of self-employment, reducing the unemployment rate (Solesvik *et al.*, 2013). To clarify, entrepreneurship is the process of transforming ideas to a business and organizing its human resources (Walter and Block, 2016). The entrepreneur is the person who engages in entrepreneurship and is preoccupied with the idea of saving a product or service in the business and carrying it through to the actual application (Regni, 2010). In fact, entrepreneurship is one of the main and encouraging forces for economic and social growth in many countries. Many studies have shown the extent to which they contribute to increasing economic growth by creating employment opportunities, reducing unemployment and encouraging innovation (Okoye, 2017).

Others, Kirby (2004) suggest that entrepreneurship can be taught as it increases students' skills and helps them become entrepreneurs. In the same way, teaching entrepreneurship in universities can increase the entrepreneurship orientation (Kimani, 2017). Moreover, Piperopoulos and Dimov (2015) argue that university graduates are more demanding of entrepreneurship and self-employment than non-educated people. However, the European Commission argued that there was no difference between those who attended entrepreneurship courses and others who did not (Pouratashi, 2015), and that teaching entrepreneurship does not necessarily increase the appropriate skills.

Therefore, universities realized the importance of moving toward the mental thinking of entrepreneurship (Maresch *et al.*, 2016) through: creating a culture of entrepreneurship education in the classroom, represented as explicit knowledge, facts and fixed equations (Ahmad, 2020; Klofsten, 2000). Accordingly, entrepreneurship education at universities aims to deepen entrepreneurial thinking and spread the culture of entrepreneurship awareness, skills and attitudes of students to stimulate their intentions to entrepreneurship as a career (Solesvik *et al.*, 2013). Entrepreneurship education aims to enable students to analyze opportunities and find new solutions to existing problems through new ideas. On the other hand, starting their own business and employing themselves contributes to the development of society and reduces unemployment (Mathews, 2017). Overall, the curriculum programmes should have features that help students compete by being able to innovate, choose and be flexible (Piperopoulos and Dimov, 2015). As a result of previous studies, universities have absorbed the need to move toward entrepreneurship education (Ndou *et al.*, 2018; Rafiq, 2019). Their teaching depends on three main factors: the curriculum, extracurricular programmes and social education (Cui *et al.*, 2021).

Moreover Vanevenhoven and Liguori (2013), entrepreneurship education stimulates students' start-up intentions; Sánchez (2013) argues that entrepreneurship programmes also promote students' self-efficacy, pro-activity and a tendency toward risk, stimulates their innovative start-up intention. To illustrate, entrepreneurship intention is about attitudes to starting a business with innovative ideas for the future and is considered the first step in self-employment. The second start-up step refers to the process of preparing for self-employment through serious training and trying to grasp the opportunities (Mamun *et al.*, 2017).

In fact, entrepreneurs are the driving force for global and national development (Gamede and Uleanya, 2018). On the other hand, many recent studies suggest that entrepreneurial intention should be studied as an important and meaningful input to the knowledge of actual entrepreneurial behavior. The importance of studying entrepreneurial intent is stressed in recent studies as the heart of understanding the entrepreneurship process to create new businesses (Gold and Rodriguez, 2018).

Typically, the curriculum should have features that help students compete to be able to innovate, choose and be flexible (Piperopoulos and Dimov, 2015). The curriculum is the content and methods of classroom teaching and causing teaching aids and assessment methods appropriate to keeping abreast of current changes and developments for future of society, directed by an individual in line with the requirements of his time to achieve his personal goals and the goals of the community (Stein *et al.*, 2007).

The extracurricular programme is the activities that train students in the art of living and working together, representing practical and educational experiences that students have gained through their own study (Linton and Klinton, 2019). Indeed, universities understand the importance of extracurricular programmes, which represent training courses, seminars and experiments because they deepen the practice of innovative start-up ventures (Iglesias-Sánchez *et al.*, 2019). In addition, social education, the mainstream of experience and practical experience, is the supportive environment for new ideas and a source of opportunities for entrepreneurs (Solesvik *et al.*, 2013). Therefore, the core value of social education is divided

into four main areas which enrich and strengthen the basic and extra-classroom curricula (Zhu *et al.*, 2017):

- (1) Experiences and knowledge sharing such as exchange of entrepreneurial experiences (Eesley and Roberts, 2012), support for any new ideas of students and provision of seminars that enhance students' skills will ease the tension of launching a new business (Gompers *et al.*, 2006).
- (2) Guidance through the provision of the best understanding of the market, providing management consultancy and advising on ways to solve problems and potential difficulties (Eesley and Wang, 2017; Soomro *et al.*, 2020).
- (3) Providing financial support, as the local community is one of the biggest supporters of entrepreneurial ideas and, through funding, will reduce any potential risks in starting a business (Standish-Kuon and Rice, 2002).
- (4) Building relationships, which may help in attracting the best qualified human resources, in turn helping to achieve the objectives of the business (Eesley and Wang, 2017).

From the above, the following hypotheses are proposed:

- H1. There is a statistically significant impact of curricular programmes on the innovative start-up intention.
- H2. There is a statistically significant impact of extracurricular programmes on the innovative start-up intention.
- H3. There is a statistically significant impact of social education on the innovative start-up intention.

Many studies have argued that with the tremendous technological advances, teaching entrepreneurship has become a priority in universities (Alsaad, 2018; Boocock *et al.*, 2009). Moreover, Curricular programmes include entrepreneurial culture and mental toughness as well as promoting capacity development that will encourage the entrepreneurial mind-sets (Ndou *et al.*, 2018). In addition, the Keen Theory of Change sees curricular programmes as: classroom didactics, courses, modules and case studies to provide the educational experiences to develop a success-oriented mind-set (Kriewall and Mekemson, 2010).

Extracurricular entrepreneurship courses and programmes include business plans, experimental opportunities, technology experience and internship, that is learning outside the classroom so that students will understand through real-life experience that will motivate their entrepreneurial mind-sets (Arranz *et al.*, 2017).

Focusing on social educational programmes is designed to motivate students' entrepreneurial abilities and provide them with the different skills required in entrepreneurship mind-sets, such as positive thinking, transformational leadership, communication and communication skills, teamwork, learning how to learn and seeing real cases, recognizing the opportunity to start and manage successful businesses and promoting the personal development of the entrepreneur (Defourny and Nyssens, 2010). Therefore, the researchers propose that:

- H4. There is a statistically significant impact of curricular programmes on the entrepreneurial mind-sets.
- H5. There is a statistically significant impact of extracurricular Programmes on the entrepreneurial mind-sets.

- H6. There is a statistically significant impact of social education on the entrepreneurial mind-sets.

Based on [Trivedi \(2016\)](#), there are still doubts and scarcity of research that proves the ability of the university environment to create entrepreneurial mind-sets in order to provide innovative start-up intentions leading to new venture creation. On the other hand, [Jabeen et al. \(2017\)](#) argue that entrepreneurial mind-sets foster the platform to encourage the innovative intention leading to innovative ventures.

As entrepreneurship mind-sets are related to behavior, universities began to teach entrepreneurship, contributing to the creation of a new generation of entrepreneurs, gaining the skills and knowledge needed to launch and develop new businesses ([Costin et al., 2018](#)). Others ([Zampetakis et al., 2011](#)) proved that entrepreneurship intention needs attendance of entrepreneurial behavior. Also, the intention to start an innovative venture does not come by chance, but is a series of steps that start with education and then alertness and a search for opportunities to start a new project ([Pouratashi, 2015](#)). This leads to the following hypothesis:

- H7. There is a statistically significant impact of entrepreneurial mind-sets on the innovative start-up intention.

Entrepreneurial mind-sets are the individual's ability to convert and transform ideas into reality, covering creativity, innovation, risk-taking, as well as the ability to plan and monitor projects in order to achieve goals ([Secundo et al., 2016](#)). [Ngek Brownhilder and Neneh \(2012\)](#) argue that entrepreneurial mind-set characteristics include trying to find and seize new opportunities and seriously following up these opportunities with full commitment, start-up implementation and sharing everyone's energy in their field. In addition, the important role of entrepreneurial mind-set is in linking and manipulating entrepreneurial education with the start-up intention because entrepreneurship education programmes develop alertness to opportunity, seek new opportunities and take risks to start with the intention of setting up a new project ([Sandri, 2016](#)).

However, [Gompers et al. \(2006\)](#) argue that success is not only creating a new venture, but the success of entrepreneurship education lies in creating an entrepreneur and fostering the entrepreneurial mind-set, which in turn summarizes and integrates a mix of gained experiences and scientific and social studies. Likewise, the entrepreneurship centers and incubators are a place that can integrate these factors and help the student to be aware of the mind-set that will effectively contribute in supporting the student's innovative start-up intention ([Secundo et al., 2015](#)).

Based on [Cui et al. \(2021\)](#) the entrepreneurship education with all three types of curricular and extracurricular programs and social programs will develop the entrepreneurship mind-sets among students and will help them develop their cognitive skills of new ideas and how to exploit them in the best ways. [Secundo et al. \(2015\)](#) summarized the importance of entrepreneurial mind-sets in starting a new venture because it helps the student in taking risks, motivation, positive learning from mistakes and working intelligently with all the surrounding developments. In this vein, we suggest that:

- H8. Entrepreneurial Mind-Sets mediate the relationship between curricular programmes and innovative start-up intention.
- H9. Entrepreneurial Mind-Sets mediate the relationship between extracurricular programmes and innovative start-up intention.
- H10. Entrepreneurial Mind-Sets mediate the relationship between social education and innovative start-up intention.

## Methodology

The researchers used a quantitative approach to investigate the relationships between independent and dependent variables (Bell *et al.*, 2018; Thornhill *et al.*, 2009). They developed a structured questionnaire to collect data on each of the variables included in the proposed framework, relying on well-developed items from prior research to measure the proposed variables. As the population of this study is Jordanian, non-English native speakers, the researcher translated the questionnaire from English into Arabic to make it easier to understand, following the recommended way of instrument translation (Brislin, 1986). In addition, the researcher obtained expert opinions from academia to ensure content validity.

The population of this study was Amman Arab University students. As reported by registration of the university, the total number of students is 1,758, and a simple random sampling technique with a confidence level of 95% was used to distribute the questionnaire, to 316 students. 225 questionnaires were returned, and we excluded incomplete responses and those that suffer from extensive missing values (Hair *et al.*, 2010). The final number of the valid responses was 204.

## Item measurement

- (1) *Entrepreneurship education*: was measured by three constructs using a five-point Likert scale:
  - Curricular programmes: the researchers adopted five questions developed by prior researchers (Arranz *et al.*, 2017; Oyugi, 2014; Sheta, 2012; Tessema Gerba, 2012). For example, curricular entrepreneurship education programmes are well organized at my university.
  - Extracurricular programmes: four questions (Dohse and Walter, 2010), for example, Extracurricular programmes are well organized at my university.
  - Social education: four questions (Bornstein *et al.*, 2004; Roudaki, 2009), for example, “ur society has an environment that promotes entrepreneurship.
- (2) *Innovative start-up intention*: the researchers adopted five questions measured on a five-point Likert scale, each adapted from validated and reliable instruments used in extant research (Hien and Cho, 2018; Zarefard and Cho, 2018), for example I hope to start an innovative business someday.
- (3) *Entrepreneurial mind-sets*: Entrepreneurial mind-sets are operationalized as a second-order construct, with ten questions (measured on a five-point Likert scale and adopted from previous research (Ndou *et al.*, 2018; Ngek Brownhilder Neneh, 2012; Olokundun *et al.*, 2017; Solesvik *et al.*, 2013), for example I can distinguish between profitable opportunities and non-profitable opportunities.

The demographic data of the 204 respondents is reported in Table 1. 57.8% were male, almost half (49%) were aged between 20 and 25 and the university cohorts were widely spread: 8.2% in the first year at university, 24% in the second year, 35.3% in the third year and 32.4% in the last year.

## Data analysis

The data analysis was conducted using structural equation modeling (SEM) and was guided by the two step-approach as recommended by Anderson and Gerbing (1988). The

**Table 1.**  
Demographic variables

No	Model	R	Frequency	Present
1	Gender	Male	118	57.8%
		Female	86	42.2%
2	Age	<20	31	15.2%
		20 to 25	100	49%
		26 to 30	34	16.7%
		>30	39	19.1%
		First year	17	8.3%
3	Year at university	Second year	49	24.0%
		Third year	72	35.3%
		Fourth year	66	32.4%

psychometric properties of the measurements were assessed in the first step and the structural model was assessed in the second step. The psychometric properties including validity and reliability were analyzed during confirmatory factor analysis (CFA). As shown in [Table 2](#), the reliability assessment showed that each construct had satisfactory internal consistency with a composite reliability and Cronbach's alpha exceeding the recommended 0.7 threshold ([Hair \*et al.\*, 2010](#); [Nunnally, 1978](#)). The assessment of convergent validity also revealed that item loadings were significant and ranged between 0.52 and 0.80 on their hypothesized construct, signifying convergent validity ([Anderson and Gerbing, 1988](#); [Wright](#)

Construct	Composite reliability	Cronbach's alpha	Item	Loading
Curricular programmes	0.842	0.829	Q1.1	0.725
			Q1.2	0.736
			Q1.3	0.78
			Q1.4	0.726
			Q1.5	0.619
Extracurricular programmes	0.812	0.799	Q2.1	0.764
			Q2.2	0.791
			Q2.3	0.783
			Q2.4	0.529
			Social education	0.875
Q3.2	0.766			
Q3.3	0.775			
Q3.4	0.871			
Innovative start-up intention	0.836	0.877		
			Q5.2	0.715
			Q5.3	0.801
			Q5.4	0.575
			Q5.5	0.714
Entrepreneurial mind-sets	0.875	0.836	Q4.2	0.608
			Q4.3	0.76
			Q4.4	0.681
			Q4.5	0.721
			Q4.6	0.718
			Q4.7	0.521
			Q4.8	0.632
			Q4.9	0.59
			Q4.10	0.598
			Q4.1	0.568

**Table 2.**  
Reliability and  
convergent validity  
assessment



*et al.*, 2012). We also examined the extent to which the underlining constructs were statistically distinct from each other. This was done by constraining each of the pairwise construct covariance to a value of 0 and then comparing the constrained model with the default model using the chi-square difference test. A significant difference between the models indicates that two constructs are distinct and different (Segars, 1997; Wright *et al.*, 2012). Table 3 shows the chi-square difference test of the constrained and default models. The figures suggest that all of the constructs were distinct and different and thus signify discriminant validity (Segars, 1997; Wright *et al.*, 2012). Accordingly, the psychometric properties of the measurements (internal consistency, convergent validity and discriminant validity) were supported. The CFA also showed that the data fit the measurement model very well. The fit indicators of the measurement model (chi-square = 573; degree of freedom (d.f) = 370; chi-square/d.f = 1.689; comparative fit index (CFI) = 0.908, mean root square error of approximation (RMSEA) = 0.059, and standardized root mean square residual (SRMR) = 0.062) exceed the suggested threshold values (Byrne, 2005).

We further utilized a common method factor (CMF) during CFA to quantitatively assess whether the instrument would bias the study's outcomes. We compared the default model with a constrained model that includes and relates CMF into all observed items. The fit indicators indicated that CMF marginally and insignificantly increases the model fit (chi-square = (chi-square = 534.774; d.f. = 312; chi-square/d.f. = 1.601; CFI = 0.926; RMSEA = 0.055)). Accordingly, the instrument would not bias the outcomes of this study.

Next, we assessed the hypothesized relationships between the underlying variables using maximum likelihood with Amos. As the suggested model contains a mediating variable, the structural model was analyzed in a step-by-step manner to provide a detailed picture of our results and to test all the hypotheses comprehensively. Initially, we started the analysis by focusing only on the relationships between the dimensions of entrepreneurship education and innovative start-up intention. The results indicated that the data adequately fit the model (chi-square = 174.596; d.f. = 129; chi-square/d.f. = 1.353; CFI = 0.972; RMSEA = 0.042; and SRMR = 0.048). As shown in Table 4, the result indicates that curricular programmes have a significant positive influence on innovative start-up intention (path coefficient = 0.469,

Constructs comparison	DF	Chi-square difference	<i>P</i>
Curricular programmes vs extracurricular programmes	1	109.714	0.000
Curricular programmes vs social education	1	30.003	0.000
Curricular programmes vs entrepreneurial mind-sets	1	50.968	0.000
Curricular programmes vs innovative start-up intention	1	50.665	0.000
Extracurricular programmes vs social education	1	28.995	0.000
Extracurricular programmes vs entrepreneurial mind-sets	1	31.614	0.000
Extracurricular programmes vs innovative start-up intention	1	57.392	0.000
Social education vs entrepreneurial mind-sets	1	25.947	0.000
Social education vs innovative start-up intention	1	44.047	0.000
Entrepreneurial mind-sets vs innovative start-up intention	1	36.225	0.000

**Table 3.**  
Discriminant validity  
using chi-square  
difference test

Dimensions of entrepreneurship education	Estimate	S.E.	C.R.	<i>P</i>
Curricular programmes	0.469	0.200	2.906	0.004
Extracurricular programmes	0.035	0.134	0.227	0.820
social education	0.181	0.070	2.126	0.034

**Table 4.**  
Estimation of the direct  
relationships between  
the dimensions of  
entrepreneurship  
education and  
innovative start-up  
intention



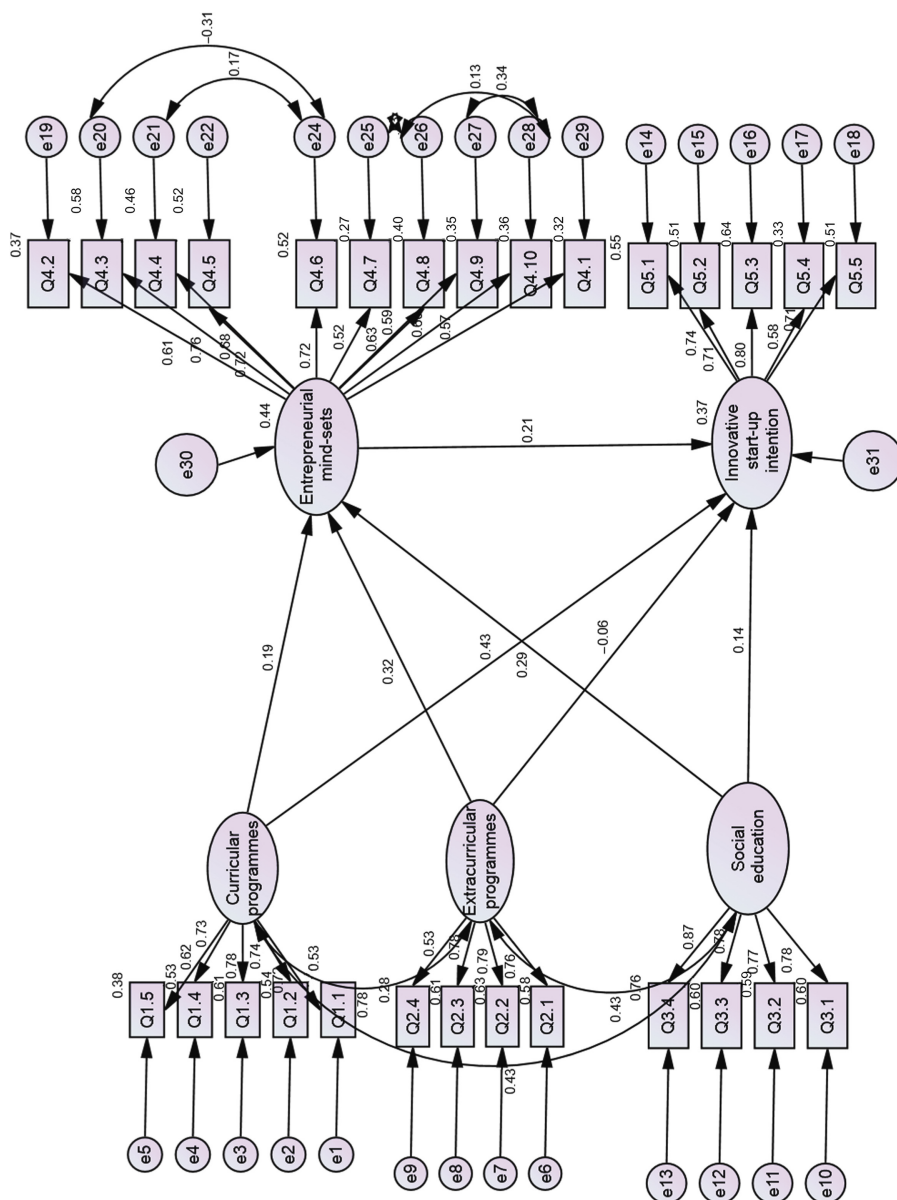
$p < 0.01$ ), signifying that students will demonstrate innovative start-up intention when they receive curricular programmes. Accordingly, hypothesis [H1](#) was accepted. Surprisingly, extracurricular programs have weak and insignificant impact on innovative start-up intention (path coefficient = 0.035,  $p > 0.05$ ), so hypothesis [H2](#) was rejected. As predicted, social education has a significant positive influence (path coefficient = 0.181,  $p < 0.05$ ), signifying that students will demonstrate innovative start-up intention when they receive social education. Accordingly, hypothesis [H3](#) was accepted.

Subsequently, we assessed the full structural model including the mediator and the associations between the dimensions of entrepreneurship and entrepreneurial mind-sets and the direct association between entrepreneurial mind-sets and innovative start-up intention. Then, we tested the mediation effect of entrepreneurial mind-sets, following the general recommendations given by [Baron and Kenny \(1986\)](#). [Figure 1](#) depicts the estimated model. As shown in the figure, the model explained about 44 and 37% of the variance in entrepreneurial mind-sets and innovative start-up intention, respectively. This implies that the suggested model had a good explanatory power. The results also indicated that the data sufficiently fit the model (chi-square = 534.774; d.f. = 363; chi-square/d.f. = 1.592; CFI = 0.922; RMSEA = 0.06; and SRMR = 0.055). As shown in [Table 5](#), the result indicates that curricular programmes have an insignificant influence on entrepreneurial mind-sets (path coefficient = 0.145,  $p > 0.05$ ). Accordingly, hypothesis [H4](#) was rejected. Meanwhile, extracurricular programmes have a positive and significant impact on entrepreneurial mind-sets (path coefficient = 0.204,  $p < 0.05$ ). Accordingly, the hypothesis [H5](#) was accepted. As predicted, social education has a significant positive influence on entrepreneurial mind-sets (path coefficient = 0.171,  $p < 0.05$ ), signifying that this increases when students receive social education. Accordingly, hypothesis [H6](#) was accepted. Moreover, entrepreneurial mind-sets have a positive and significant impact on innovative start-up intention (path coefficient = 0.288,  $p < 0.05$ ). Therefore, hypothesis [H7](#) was accepted.

All the above results offer an important insight into testing the mediation effect of entrepreneurial mind-sets. As suggested by [Baron and Kenny \(1986\)](#) and stated by [Preacher and Hayes \(2008\)](#): “Variable  $M$  is a mediator if (1)  $X$  significantly accounts for variability in  $M$ , (2)  $X$  significantly accounts for variability in  $Y$ , (3)  $M$  significantly accounts for variability in  $Y$  when controlling for  $X$ , and (4) the effect of  $X$  on  $Y$  decreases substantially when  $M$  is entered simultaneously with  $X$  as a predictor of  $Y$ .” The above results indicated that only social education satisfies conditions 1 and 2 (see [Table 4](#) and [5](#)), and entrepreneurial mind-sets satisfies condition 3 (see [Table 5](#)). Accordingly, hypotheses [H8](#) and [H9](#) were rejected. Moreover, the association between social education and innovative start-up intention was reduced significantly and became insignificant when controlling for social education. Accordingly, we can conclude that entrepreneurial mind-sets fully mediates the effect of social education on innovative start-up intention, and thus hypothesis [H10](#) was accepted.

**Table 5.**  
Estimation of the  
full model

Independent variable	Dependent variable	Estimate	S.E.	C.R.	$P$
Curricular programmes	Entrepreneurial mind-sets	0.145	0.102	1.422	0.155
Extracurricular programmes	Entrepreneurial mind-sets	0.204	0.086	2.369	0.018
Social education	Entrepreneurial mind-sets	0.171	0.049	3.525	0.000
Entrepreneurial mind-sets	Innovative start-up intention	0.288	0.143	2.013	0.044
Social education	Innovative start-up intention	0.117	0.073	1.613	0.107
Extracurricular programmes	Innovative start-up intention	-0.051	0.130	-0.390	0.696
Curricular programmes	Innovative start-up intention	0.470	0.160	2.946	0.003



**Figure 1.**  
Pictorial  
representation of  
the model

## Discussion, implication and future research direction

Entrepreneurship education at universities aims to deepen entrepreneurial thinking and spread the culture of entrepreneurship awareness, skills and attitudes to stimulate graduates' intentions of entrepreneurship or increase their consideration of entrepreneurship as a career (Solesvik *et al.*, 2013). Therefore, this study sought from the beginning to verify the extent of entrepreneurship education at universities in enabling graduates to rely on the skills learned to create their own innovative business start-ups and to support the national economy.

The results of [hypotheses 1-3](#) showed that curricular programmes and social education play a vital role in creating intention for students to start their own ventures, as concluded in prior empirical studies (Klofsten, 2000; Ndou *et al.*, 2018; Piperopoulos and Dimov, 2015; Mathews, 2017). Contrary to our expectation, the result shows that extracurricular programmes have no impact on the intention of students to start their own ventures, which contradicts the results of some previous studies (Arranz *et al.*, 2017; Hien and Cho, 2018). This presents the university with evidence for concentrating on the extracurricular programmes in the future.

The results of [hypotheses 4-6](#) stated that curricular and extracurricular programmes and social education all play an important role in shaping students' entrepreneurial mind-sets, consistent with previous studies (Arranz *et al.*, 2017; Ndou *et al.*, 2018). The results of [hypothesis 7](#) show that entrepreneurial mind-sets impact the intention of students to start up their own innovative businesses, which is consistent with previous studies (Costin *et al.*, 2018; Jabeen *et al.*, 2017).

Overall, this study concentrated on the mediating role of entrepreneurial mind-sets in strengthening the relationship between entrepreneurship education and the intention of students to create their own innovative ventures. The results of [hypotheses 8-10](#) show that entrepreneurial mind-sets mediated the relationship between entrepreneurship education dimensions and innovative start-up intention for students in Amman Arab University, consistent with previous studies (Cui *et al.*, 2021). Our study also extends the existing body of knowledge and is complementary to Western studies (Alzghoul *et al.*, 2018).

In conclusion, the results of this study can act as a solid base for universities to continue and develop their approach to the subject of entrepreneurship education, especially extracurricular programmes, enabling business incubators to do their work more professionally. The results lead toward achieving the vision of universities in building a knowledge society.

For future research, scholars are encouraged to revisit the same study model in different settings in order to validate the outcome of this work. We also encourage future investigation of the role of learning experience in entrepreneurship education. Another research avenue might be to examine the role of universities and business incubators in motivating students' intention to initiate start-ups. It would also be useful to conduct future studies using a qualitative method to encapsulate more factors related to entrepreneurship education and innovative start-up intention.

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