

Conceptualising impact measurements of entrepreneurship education outcomes: A scoping review



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Orientation: Research has highlighted the significant role of entrepreneurship education and training (EET) in transforming individual lives, communities and nations.

Research purpose: The purpose of the study was to explore the impact measurements of entrepreneurship education outcomes by exploring its indicators and methodological approaches and its associated challenges.

Motivation for the study: The impact measurement of entrepreneurship education is an under-researched area of study. This study intends to close this gap.

Research design, approach and method: A scoping review was conducted on 80 articles and dissertations using the Arksey and O'Malley framework to explore the extent, range and nature of literature on the impact measurements of entrepreneurship education.

Main findings: The study found three leading impact measurement indicators of entrepreneurship education – the subjective, objective and institutional-framework. The most commonly utilised methods of measuring the impact of entrepreneurship education are the pre and post-test or post-test, longitudinal and experimental designs. The findings also reveal that the primary challenge of impact measurement studies is self-selection of individuals who participate in EET programmes because of their desire to pursue entrepreneurial activities.

Practical/managerial implications: The impact measurement indicators of entrepreneurship education should be tailored to a specific audience and stakeholders' perspectives and also assess the participant's development, society and the national economy. The article, situated on the premise of the constructivists' recommendation that learners are not tabula rasas; the measurement of the impact of entrepreneurship education should instead focus on ex-post results and not pre-post results.

Contribution/value-add: The study could assist entrepreneurship education curriculum evaluators to understand the various indicators and methods of measuring the impact of entrepreneurship education.

Keywords: entrepreneurship; education; impact measurements; methodological approaches; scoping review training.

Introduction

Globally, researchers have highlighted the significant role of entrepreneurship education and training (EET) in transforming individual lives, communities and nations (Arruti & Paños-Castro 2020; Ndofirepi 2020; Ngerem & Ngozi 2016). The significant role of EET has led to the introduction of entrepreneurship programmes and courses in educational institutions to reduce unemployment and inculcate competencies and intentions that promote self-employment among graduates (Ndala 2019; Konig, Juric & Koprivnjak 2016). As part of the strategy to comply with the first of the United Nations Sustainable Development Goals (SDGs), namely to reduce poverty, the Government of Ghana, for instance, introduced entrepreneurial education in 2003 as an option for all programmes offered at the tertiary institution of higher learning. However, there is no consensus regarding the effectiveness and the impact of the EET programmes because of the universal variations in the length of the programme, the targeted audience and the course content (Ismail, Sawang & Zolin 2018; Fox & Kaul 2017; Gafar, Kasim & Martin 2014; Rideout & Gray 2013).

Over the years, governments and stakeholders have made substantial investments in financing and providing other resources in teaching, learning and promoting research in entrepreneurship

education within higher educational institutions (Ndala 2019; OCED 2018). There is therefore the need to understand whether EET programmes are worth the investment and understand what is working (or not) in EET, the purpose, the conditions and the outcome, the resultant economic changes or benefits, and the behavioural changes of the EET recipients (Byabashaija & Katono 2011).

Aside from the relevance of EET in terms of its viability in economic development and quantum of investments by governments and other stakeholders, researchers have indicated a dearth of rigorous research and the existence of methodological gaps on the impact of EET studies (Nabi et al. 2017; Johnson & Christensen 2014; Rideout & Gray 2013). Although there has been an increasing body of impact studies on EET, there seems to be inadequate knowledge and understanding, ambiguity and methodological challenges that need to be understood.

Research has indicated that several indicators have been adopted to measure the impact of entrepreneurship education with its associated criticisms (Nabi et al. 2017; Peterka, Koprivnjak & Mezulic 2015; Nasr & Boujeldene 2014). Peterka et al. (2015) believed that it is incredibly challenging to assess the impacts of entrepreneurship education because it is difficult to establish a relationship between students' entrepreneurial intentions and methods of entrepreneurial programmes with programme results. The authors further stated that it is difficult for researchers to compare the outcomes of entrepreneurship programmes because of the existence of different course contents, objectives and teaching methodologies (Peterka et al. 2015). They also argued that there are no established indicators that are applicable to the measurement of impacts of entrepreneurship programmes – whether the impact should be measured in terms of new ventures created by graduates of entrepreneurship programmes, entrepreneurial engagements, venture performance or one's satisfaction at the job place (Peterka et al. 2015). Nabi et al. (2017) also highlighted contradictory findings in entrepreneurship education's impact measurement because assessments often centre on short-term and subjective indicators (i.e. changes in students behaviour and entrepreneurial intentions), personal context and under-described concrete pedagogies, as well as moderators. This study sought to explore the impact measurements of entrepreneurship education outcomes by exploring its indicators and methodological approaches and its associated challenges using the scoping review approach. The specific study objectives are to explore the various indicators adopted to measure the impact of entrepreneurship education; analyse the usage and challenges associated with various methodological approaches to evaluate the impact of entrepreneurship education and draw implications for future research.

The article contributes to research on entrepreneurship education by synthesising the various approaches considered in measuring the impact of entrepreneurship education in a

single study. Therefore, it provides a springboard for entrepreneurship education curriculum evaluators to understand the various indicators applicable to measuring the different entrepreneurship education programmes, mainly because of their varied pedagogies and content. The contribution is in line with the argument of researchers that there is a dearth of studies that explicitly indicate the various approaches to measure the impact of entrepreneurship education because of the varied audience, contents and purposes of entrepreneurship programmes (Ismail et al. 2018; Fox & Kaul 2017; Gafar, Kasim & Martin 2014; Rideout & Gray 2013).

The following sections of the article present an empirical review of related studies, the methodology and the results and discussion. The implications for using the various impact indicators in measuring entrepreneurship education outcomes are drawn, while study conclusions are provided.

Literature review

Various entrepreneurship education programmes have been introduced to inculcate in products (i.e. students) of entrepreneurial curricula, competencies that are needed in today's ever-changing business environment. The emergence of the coronavirus disease 2019 (COVID-19) global pandemic and its effects on businesses emphasise the need to produce more entrepreneurial individuals to manage unforeseen situations in the business environment. Fortunately, many governments and institutions have invested heavily in entrepreneurship education over the years in an attempt to resolve some of these unforeseen circumstances. However, as some researchers (Ndala 2019; OCED 2018) have argued that entrepreneurship education is not worth its investment, others (Kavita 2020; Duval-Couetil 2013) believed that the inability to account for the crucial contribution could be attributed to the nonexistence of proper measurement indicators. Therefore, the prime focus of this study was to identify the indicators used and the associated challenges in assessing the impact of entrepreneurship education. Issues on impact measurement in entrepreneurship education are reviewed in this section.

Impact measurement of entrepreneurship education

Literature indicates that there are several approaches by which the measurement of the impact of entrepreneurship programmes could be performed (Ismail et al. 2018; European Union 2015). Some of the suggested indicators and approaches include business practice indicators, business performance indicators, psychological indicators, the totality of publications by institutions' faculty, the number of programmes and courses offered, alumni involvement and the outreach of scholars (Vesper & Gartner 1997). Other indicators suggested include the impact of the programme on society or national development (European Union, 2015; European Commission, 2012), created innovations, alumni start-ups (Ismail et al. 2018), academic standards of students, technology

transformation and participant satisfaction (Ruskovaara 2014; Mwasalwiba 2010). For instance, Mwasalwiba (2010) suggested that the measurement can be carried out by measuring the advancement in entrepreneurship education as a discipline of study and measuring students' advancement against predetermined variables resulting from their participation in the entrepreneurship programme. Contrary, Vesper and Gartner (1997) stated that because the criteria in establishing the effectiveness of entrepreneurship education are challenging to standardise, the impact indicators of entrepreneurship education should include (but are not limited to) the totality of publications by the institutions' faculty, the number of programmes and courses offered, the courses' influences on the development of society, created innovations, alumni involvement, the outreach of scholars and the number of alumni start-ups.

Again, while Ismail et al. (2018) recommended that as most EET programmes are offered to existing businesses, the postintervention impact should be used, the European Commission (2012) also recommended four main assessment indicators based on entrepreneurship key competence, intentions towards entrepreneurship and the individual's employability, as well as the impact on society and the economy. Ismail et al. (2018) maintained that indicators of successful entrepreneurship education should include business knowledge and practices, business performance and psychological indicators. The business knowledge and practices indicator entails competencies in record-keeping, management of household and business incomes, maintaining separate business accounts, improving marketing strategies, strategic orientation and inventory practices. The indicators of business performance are made up of the entrepreneur's income and profits, sales, number of permanent wage workers, stock, productivity, increased hours of work and increased staff performance. Other business performance indicators were saving habits, business survival and business growth. The psychological indicators include competencies in decision-making, confidence and teamwork.

The four assessment indicators suggested by the European Commission (2012), as indicated here, include the impact on entrepreneurship key competence, intentions towards entrepreneurship, individual's employability and impact on society and the economy. In measuring the impact of entrepreneurship education on entrepreneurial key competencies, the European Union (EU) argued that while the impact on the entrepreneurial competencies should be measured in terms of acquired knowledge, attitude and skills after one's participation in an entrepreneurial education programme, impact on intentions towards entrepreneurship should be measured in terms of one's desire to engage in entrepreneurial activities and desire for paid employment or self-employment.

Again, in using graduate employability as an indicator to assess the impact of entrepreneurship education, the EU argued that employability should be measured in terms

of job experience, innovative behaviour, job satisfaction and annual income. On the other hand, the impact of entrepreneurship education on society and the economy, as an indicator, was expected to be measured using graduates' initiative in engaging in voluntary and noncommercial activities; engagement in business start-ups; number of entrepreneurship graduates who are entrepreneurs; business history; size and ambition of graduates after completion of entrepreneurship programmes; and annual income. Subsequent discussion will centre on the methodology adopted for the study.

Research methods and design

This section explains the research design, data collection procedure and the data analysis procedure adopted for the study.

Study design

This study employed scoping review methodology. Data involved in the study were collected from varied perspectives without necessarily evaluating the quality of the articles in an attempt to develop the data in a more systematic, meaningful and transparent way (Tricco et al. 2018). The purpose was to address the exploratory nature of a scoping review (Burga & Rezania 2015). The review followed systematic steps, as Arksey and O'Malley (2005) recommended. The following steps, which involved identifying research questions, identifying relevant studies, study selection, data charting, collating, summarising and reporting the results, and adopting consultation (optional), were integrated into the study.

Data collection

Data were obtained from electronic databases of EBSCO, Emerald Journals, JSTOR, ScienceDirect, SCOPUS, Sage, Wiley, Taylor and Francis Group, Springer, etc. The databases were searched to identify and obtain the most relevant studies in the area. In an attempt to supplement the electronic search, an issue-by-issue search was conducted in some journals (Soares & Perin 2019) in entrepreneurship, entrepreneurship education, management, management education and innovation, among others. Examples of these journals include the *Journal of Small Business Management*, *European Economic Review*, *International Journal of Management Education* and *Academy of Management Learning and Education*. Again, references and citations from relevant publications also served as a reference point in locating additional information. A total of 104 articles published between 1991 and 2020 were retrieved from the databases. However, 80 articles were identified and analysed after checking for duplication. Unpublished works were obtained from Google Scholar and databases of theses and dissertations, such as Sci-Hub, Open Access Theses and Dissertations (OATD), Publons, etc. The keywords examined were 'impact', 'effects', 'influence', 'outcomes', 'measurement', 'impact measurements', 'entrepreneurship education', 'enterprise education', et cetera (etc).

Data analysis

This study identified the extent and nature of literature on impact measurement in entrepreneurship and summarised the significant findings. The data included 80 published and unpublished qualitative, quantitative and systematic reviews about impact measurement. In line with this objective, the quality of the studies selected in the review was not appraised (Kourgiantakis et al. 2020; Burga & Rezania 2015). The available articles were subsequently reviewed and manually scanned, with the help of two research assistants, to ensure that duplicated studies were removed (Vemuri et al. 2020). Data were extracted into a tabular form which was developed for this study. The chart covered elements such as the article title, authors, research context, research design, analysis method, instrument, respondents, suggested indicators and the name of the publisher or journal (see Table 1 for examples of work analysed for the study).

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of KwaZulu-Natal Humanities and Social Sciences Research Ethics Committee, reference number: HSSREC/00000011/2019.

Results

This section is dedicated to presenting findings in line with the study objectives. The results presented were in line with the various impact indicators and associated challenges identified through the scoping review and implications for future studies or research.

Indicators for measuring the impact of entrepreneurship education

The study found that three main domains of impact measurement dominate in EET impact research, as shown in Table 2. The summary of some impact indicators reported in the literature is presented in Table 2.

These domains include the subjective domains or indicators (Karimi et al. 2016; Mwasalwiba 2010; Solesvik 2013; Fayolle & Gailly 2008), the objective domains or indicators (Kozlinska 2016; European Union 2015; Gilbert 2012; Amoros 2013; Ojastu et al. 2011) and the institutional-framework domains or indicators (Babatunde 2016; Rahim et al. 2016; Rovira et al. 2010; Vesper & Gartner 1997). However, the usage of any of these domains for impact measurements in EET cannot be justified unless the assessment is linked to the development of the participant, the society or the national economy (Moberg et al. 2014). For want of space, subsequent discussions on the domains or impact measurement indicators would be based on the subjective domains or measure indicator, the objective domains or measure indicator and the institutional-framework domains or measure indicator. The effects on national economy as impact indicator were ignored in this study because it is the impact of EET on the individual that transforms into entrepreneurial behaviour and practice.

The subsequent section discusses the three main impact measures of EET – the subjective, objective and institutional-framework domains or indicators.

Subjective indicators

The subjective or indirect impact measurement indicators measure EET impact in relation to changes in self-efficacy, attitudes, skills and knowledge (i.e. what is considered as entrepreneurial competencies in subsequent discussions) (Nabi et al. 2017; Mwasalwiba 2010; Fayolle & Gailly 2008; Lüthje & Franke 2003). A study by Fayolle and Gailly (2008) concluded that the most common evaluation criteria for measuring EET impact are knowledge, specific skills or tools, level of interest, awareness and intention and attitudes. The assessment of the impact of EET in this manner therefore emphasises a measurement that involves tracing significant changes in the behaviour of participants. Following the proponents of the constructivist learning theory's (CLT) argument that learners construct their learning, it implies that participants or graduates of EET are likely to experience changes in their psychological traits. These changes enhance their entrepreneurial spirit in terms of their attitude, interest, confidence, perceptions, abilities, skills and self-efficacy. Developing skills, attitudes and knowledge is vital in promoting entrepreneurial behaviour and mindset within a target group (Kozlinska 2016; Mwasalwiba 2010; Fayolle & Gailly 2008; Lüthje & Franke 2003).

Objective indicators

The objective or direct impact measurement domain deals with the measurement of entrepreneurial competencies according to changes in business knowledge and practices of nascent entrepreneurs, that is, the number of established enterprises or start-ups by the products of EE and performance indicators that are traceable in the entrepreneurship domain (Kozlinska 2016). The advocates of this indicator trace the involvement of participants of EET in new venture creation or start-up activities or graduate spin-offs and changes in entrepreneurial practices. Related to this, Smith (2015) argued that routine data on business start-ups and self-employment could be used as an impact indicator when measuring EET programmes' impacts. Smith's (2015) argument is in line with Kozlinska (2016), who contended that the number of graduates who venture into self-employment and start-ups is a universally accepted measure of the impact of EET. Similarly, a study by the European Commission in 2012 on the effects and impact of entrepreneurship programmes in higher education measured the impact of the EET on society and economy and graduate employability. The impact of EET was measured based on the number of new firms or start-ups and involvement in business start-ups as by-products of EET programmes. However, the EU in 2015 also maintained that in the absence of new start-ups, demonstrated entrepreneurial behaviour of graduates, especially within corporate organisations, and intrapreneurship could be considered in measuring the impact of EET programmes.

TABLE 1: Extract of some studies on impact of entrepreneurship education.

Author(s)	Study title	Research context	Research design	Method of analysis	Instrument	Respondents	Suggested indicators	Publishers or journal
Vesper and Gartner (1997)	Measuring progress in entrepreneurship education	Universities in United States of America, Canada and other parts of the world	Quantitative	Descriptive	Questionnaire	Faculty (311)	Institutional-framework domain courses offered, totality of publications, number of programmes, course influence on society, created innovation, alumni involvement and start-ups	<i>Journal of Business Venturing</i> (12), 403-421
Mwasalwiba (2010)	Entrepreneurship education: A review of its objectives, teaching methods and impact indicators	Article review	Semisystematic	Qualitative	Secondary data	Published articles (108)	Start-ups by graduates or self-employment, psychological constructs, intentions, alumni satisfaction, resulting innovativeness, academic stands of students, as well as contribution to society	<i>Education + Training</i> 52(1), 20-47
Oosterbeek, Van Praag and IJsselstein (2010)	The impact of entrepreneurship education on entrepreneurship skills and motivation	Netherlands	Quantitative	Descriptive	Questionnaire (pre- and post-test)	Students (treatment and control groups) (562)	Personality changes and intentions	Tinbergen Institute discussion paper
Lange, Maram, Jawatar, Yong and Bygrave (2011)	Does an entrepreneurship have lasting value? A study of 4000 alumni	North America	Longitudinal study	Binary logistic regression analysis	Questionnaire	Graduates (4000)	Entrepreneurial intentions and start-up	<i>Journal of Business and Entrepreneurship</i> 25(2), 1-31
Fayolle and Gailly (2015)	The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence	France	Pre and post-test design	T-test multivariate regressions	Questionnaire	Students (158)	Subjective outcomes	<i>Journal of Small Business Management</i> 53(1), 75-93
Martin, McNally and Kay (2013)	Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes	N/A	Experimental design	Meta-analysis	Secondary Data	42 published articles	Subjective and objective measurement	<i>Journal of Business Venturing</i> 28(2), 211-224
Vanevenhoven and Ligouri (2013)	The impact of entrepreneurship education: introducing the entrepreneurship education project	Global	Longitudinal	Exploratory factor analysis	Questionnaire	Graduates (over 18 000)	Entrepreneurial intention	<i>Journal of Small Business Management</i> 51(3), 315-328
Rideout and Gray (2013)	Does entrepreneurship education really work? A review and methodological critique of the empirical literature on the effects of university-based entrepreneurship education	N/A	Qualitative	Review	Systematic review	12 published articles	N/A	<i>Journal of Small Business Management</i> 51(3), 329-351
Nasr and Boujedene (2014)	Assessing the impact of entrepreneurship education	High Institute of Business Administration of Sfax, Tunisia	Quantitative	Descriptive	Questionnaire	Students (not stated)	Entrepreneurial profile and working life	<i>Procedia Social and Behavioural Sciences</i> , 109(2014), 712-715
Lackeus (2014)	An emotion-based approach to assessing entrepreneurial education	Europe	Mixed methods	Mixed – questionnaire, interview	Students (3)	Subjective measure – attitudinal learning outcomes	Entrepreneurial intention	<i>The International Journal of Management Education</i> 12(2014), 374-396
Mwiya (2014)	The impact of entrepreneurship education on the relationships between institutional and individual factors and entrepreneurial intention of university graduates: Evidence from Zambia	Africa	Mixed methods approach	Descriptive	Questionnaire and interview	Students (452) and stakeholders (13)	Entrepreneurial intention	University of Wolverhampton
Piperopoulos and Dimov (2015)	Burst bubbles or build stream? Entrepreneurship education, entrepreneurial self-efficacy and entrepreneurial intentions	United Kingdom	Postintervention survey	Ordinary least squares regression	Questionnaire	Students (114)	Subjective outcomes – intentions and self-efficacy	<i>Journal of Small Business Management</i> 53(4), 970-985
Rauch and Huisink (2015)	Putting entrepreneurship education where the intention to act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behaviour	Europe (Erasmus University)	Quasi-experimental, pre- and post-test comparison	One-way ANCOVA	Questionnaire	Students pre-test (153) and post-test (142)	Subjective measurement	<i>Academy of Management Learning & Education</i> 14(2), 187-204
European Union (2015)	Entrepreneurship education: A road to success. A compilation of evidence on the impact of entrepreneurship education strategies and measures	Europe	Mixed methods	Mixed	Mixed	Not stated (NS)	Start-ups, social inclusion, economic impact	European Union

Table 1 continues on the next page →

TABLE 1 (Continues...): Extract of some studies on impact of entrepreneurship education.

Author(s)	Study title	Research context	Research design	Method of analysis	Instrument	Respondents	Suggested indicators	Publishers or journal
Smith (2015)	Measuring the impact of enterprise education and entrepreneurship support in higher education. Can routinely collected data be of use?	Europe	N/A	N/A	Secondary data	HE-BCI and DLHE reports (2008–2013)	Business start-ups and self-employment	<i>Industry and Higher Education</i> 29(6), 493–503
Kozlinska (2016)	Evaluation of the outcomes of entrepreneurship education revisited. Evidence from Estonia and Latvia	Europe	Mixed methods approach	Mixed (content analysis and inferential)	Questionnaires and interview	Entrepreneurship Educators (16) Students (559)	Employability and entrepreneurship	University of Tarku
Gielnik et al. (2017)	Boosting and sustaining passion: A long-term perspective on the effects of entrepreneurship training	Africa	Quantitative approach	N/A	Questionnaire	Students (784)	Subjective measure – entrepreneurial inspiration and passion	<i>Journal of Business and Entrepreneurship</i> 32(3), 334–353
Nabi et al. (2017)	The impact of entrepreneurship education in higher education: A systematic review and research agenda	Europe	Systematic review	Qualitative	Secondary data	Published articles (159)	Short-term and subjective outcomes	<i>Academy of Management Learning and Education</i> 16(2), 277–299
Longva (2019)	The impact of entrepreneurship education on students' career reflections	Norway	Mixed methods approach	Mixed	Questionnaire and secondary data	145 Published articles Students (210, 99)	Career intentions	The Arctic University of Norway

HE-BCI, Higher Education Business and Community Interaction Survey; DLHE, Destination of Leavers from Higher Education; ANCOVA, Analysis of Covariance.
Note: Please see the full reference list of the article, Mensah-Williams, E. & Derera E., 2023, 'Conceptualising impact measurements of entrepreneurship education outcomes: A scoping review', *Acta Commercii* 23(1), a1053. <https://doi.org/10.4102/ac.v23i1.1053>, for more information.

Institutional-framework indicators

The third domain or impact measurement indicator, which for lack of an appropriate word is termed the institutional-framework indicator in this work, deals with the assessment of EET within an educational institution in relation to its content, influence on graduate employability and the totality of publications by academics of entrepreneurship programmes, specifically where teaching and learning of entrepreneurship programmes or courses occur. Within this context, the impact of EET is, to an extent, associated with the description of entrepreneurship courses, debates on what entails good EET content and the evaluation of the economic influence of entrepreneurship education on graduates' employability by comparing graduates who acquired entrepreneurial training and those who did not (Fiet 2001; Chrisman 1997; Gorman, Hanlon & King 1997; Vesper & Gartner 1997). In a related study, Vesper and Gartner (1997) propounded that an impact indicator in entrepreneurship education should include the totality of publications by the institutions' faculty, the number of programmes and courses offered, the courses' influences on the development of the society, created innovations, alumni involvement and the outreach of scholars.

Methodological approaches and challenges of measuring the impact of entrepreneurship education

Generally, this study reviewed 80 research works, comprising published articles, theses and conference articles; however, not all the studies were considered during this aspect of the review. This was because some of the studies reviewed and reported on past published articles that did not directly use methods associated with measuring the impact of entrepreneurship education. Table 3 highlights major methodological usage and common challenges in measuring the impact of entrepreneurship education identified in the review.

The use of any of these indicators is mostly identified with a particular methodology. Literature has indicated that researchers who argue for the subjective or the indirect impact measurement mostly adopt the use of either pre and post-test or post-test approaches to assess what the participant had developed and/or acquired from participating in EET. The advocates of the pre- and post-test approach collect information about participants prior to and after their participation in EET. The two pieces of information are then collated to determine whether there were significant changes in the participants' behaviour. A study conducted by Rauch and Hulsink (2015) adopted the pre- and post-test approach to examine the impact of EET on master's students at the Rotterdam School of Management, Erasmus University. Other researchers such as Radu and Loue (2008), Olomi & Sinyamule (2009) and Rideout and Gray (2013) also adopted the use of post-test approach to determine behavioural changes in entrepreneurial competencies of participants after their participation in EET programme.

TABLE 2: Impact indicators in measuring entrepreneurship education.

Impact indicator or measure	Author(s)	Number of studies
Subjective indicators		
Entrepreneurial intention	Armstrong (2014), Bernhofer & Han (2014), Nasr and Boujelbene (2014), Chang and Rieple (2013), Chen et al. (2015), European Commission (2012), Fretschner and Weber (2013), Fayolle and Gailly (2015), Galloway et al. (2015), Von Graevenitz et al. (2010), Hattab (2014), Heuer and Kolvereid (2014), Karimi et al. (2016), Karlsson and Moberg (2013), Lange et al. (2011), Lepoutre et al. (2010), Longva (2019), Mwakujonga and Bwana (2013), Mwiyia (2015), Nabi et al. (2017), Newbold and Erwin (2014), Oosterbeek et al. (2008), Silangen (2016), Piperopoulos and Dimov (2015), Rauch and Hulsink (2015), Slavtchev, Laspita and Patzelt (2012), Solesvik et al. (2014), Sukavejworakit, Promsiri and Virasa (2018), Vanevenhoven and Ligouri (2013), Weber et al. (2009)	33
Entrepreneurial competence development	Bandera, Collins and Passerini (2018), Boukamcha (2015), Brink and Madsen (2015), Burrows and Wragg (2013), Canziani et al. (2015), European Commission (2012), Harms (2015), Hietanen (2015), ILO and UNESCO (2006), Kenny (2015), Klapper (2014), Lackéus (2014), Oosterbeek et al. (2008), Peterka et al. (2015), Piperopoulos and Dimov (2015), Rigley and Rönnqvist (2010), Solesvik (2013), Stamboulis and Barlas (2014), Vorley and Williams (2016) and Weber et al. (2013)	18
Objective indicators		
New venture creation or start-up	Charney and Libecap (2000), European Union (2015), Gielnik et al. (2015), Gielnik et al. (2016), Ojastu et al. (2011), Poblete and Amorós (2013)	9
Self-employment	Nasr and Boujeldene (2014), European Commission (2012), Galloway et al. (2015), Kozlinska (2016) and Smith (2015)	
Society or economy	European Commission (2012), Martin et al. (2013) and Rigley and Rönnqvist (2010)	
Institutional framework indicators		
Content	Bridge (2017), Moberg (2014), Moberg et al. (2014), Nabi et al. (2017), OECD (2018), Ruskovaara (2014), Vesper and Gartner (1997), Williamson et al. (2013) and Lyons and Zhang (2017)	20
Influence on graduate employability	Babatunde (2016), European Union (2015), Galloway et al. (2015), Gray et al. (2020), Kim et al. (2020), Kinash et al. (2016), Rahim, Zainal Abidin and Rosly (2016), Rovira et al. (2010) and Stiwe and Alves (2010)	
Institutional funding	Charney and Libecap (2000) and Vanevenhoven and Ligouri (2013)	
Teaching methods	Hahn, Minola Van and Huybrechts (2017), Henry and Lewis (2018) and Mwasalwiba (2010)	
Total number of articles		80

Note: Some articles considered more than one impact measurement indicator and are likely to appear more than once in the table. However, they were counted once in the first instance under a particular indicator.

Please see the full reference list of the article, Mensah-Williams, E. & Derera E., 2023, 'Conceptualising impact measurements of entrepreneurship education outcomes: A scoping review', *Acta Commercii* 23(1), a1053. <https://doi.org/10.4102/ac.v23i1.1053>, for more information.

TABLE 3: Common methodology and weaknesses in entrepreneurship education and training impact measurement.

Impact indicator or measure	Common methodology	Common weaknesses
Subjective indicators		
Entrepreneurial intention	Pre- and post-test approach	<ul style="list-style-type: none"> Control groups without exposure to entrepreneurship Self-reported measure Self-selection bias
Entrepreneurial competence development	Control and treatment groups	<ul style="list-style-type: none"> Self-reported measure Self-selection bias
Objective indicators		
New venture creation or start-up	Longitudinal approach	Self-selected bias
Self-employment		Self-reported measure
Society and economy		Self-reported measure
Institutional framework indicators		
Content	Longitudinal approach	<ul style="list-style-type: none"> Poorly prescribed intervention Diversities in stakeholders, target audience, aims, content
Influence on graduate employability		Self-selection bias
Institutional funding		
Teaching methods		Inadequate measurement of exposure to EET

EET, entrepreneurship education and training.

Alternative to these methods is the use of control groups – the treatment group (mostly participants in EET programmes) and the control group (nonparticipants in EET programmes). Using this methodology, researchers or assessors compare the performances or traits of individuals who participated in the EET programme(s) against others who did not participate in any EET programme(s). A study conducted by Fayolle and Gailly (2015) adopted a control group to study the effects and impact of entrepreneurship programmes in higher education. The study, conducted among 158 master-level management students in France, showed a positive impact of EET on the development of entrepreneurial competencies. Piperopoulos and Dimov

(2015) conducted a similar comparative study among 93 undergraduate students and 21 postgraduate students in a British university after they participated in entrepreneurship courses.

Other researchers have used longitudinal designs to conduct impact studies in EET programmes. The longitudinal design involves the use of respondents who are followed consistently over a period of time and have their behaviour measured systematically (European Union 2015). Researchers have argued that a fundamental drawback in EET impact studies is the scarcity of longitudinal research design (Martin et al. 2013; OECD 2009; Rideout & Gray 2013). Longva (2019) argued that for the experimental design in the EET impact study to be considered strong, the longitudinal approach should be adopted to control for variables that threaten internal validity. Some impact studies that embraced the use of the longitudinal approach include but are not limited to Gielnik et al. (2017), Lackéus (2014), Lange et al. (2011) and Vanevenhoven and Ligouri (2013).

It is crucial to understand that impact measurement of EET programmes is fraught with controversies, to some extent. These controversies often result from the diversity in entrepreneurship education in terms of the variety of stakeholders and target audience, aims and content. These diversities account for the inadequate number of research studies regarding entrepreneurship education's impacts on evaluation and assessment practices (Fayolle & Gailly 2015; Pittaway & Edwards 2012; Draycott, Rae & Vause 2011; Pittaway et al. 2011; Fayolle & Gailly 2008). As a result of the diversities in entrepreneurship education, researchers appreciate the need to consider many sides when measuring the impacts of EET programmes (Fayolle & Gailly 2015; Johannsson, Landstrom & Rosenberg 1998).

There seem to be methodological reasons why research on the impacts of entrepreneurship education has not generated consistent assessments. Researchers (Carpenter & Wilson 2021; Costa et al. 2018; Sukavejworakit et al. 2018; Von Graevenitz, Harhoff & Weber 2010; Gorman et al. 1997; Block & Stumpf 1992) argued that insufficient research adopts pre-post or ex-post design, sometimes encompassing the selection of control and self-selected respondents with a pre-determined and biased result favouring educational interventions but with a predisposition towards EET programmes. Their arguments are not different from that of Martin et al. (2013), who argued that the accuracy of positive claims in impact studies in EET are reduced because most studies rely on only post-test measurements and fail to use control groups.

It was also seen that the use of an objective approach in impact assessment lacks, to some extent, credibility and results generalisation, as most participants who pursue entrepreneurial activities after participation in EET programmes had already established intentions to engage in entrepreneurship. The argument then follows that the selection criteria would only involve self-selected individuals who participate in EET programmes because of their desire to pursue entrepreneurial activities (Carpenter & Wilson 2021). The resultant effect of the selection biases would be a skewed argument and response favouring EET programmes.

Discussion

The assessment of the impact of EET through the subjective approach therefore emphasises a measurement that involves tracing significant changes in the behaviour of participants. Following the proponents of the CLT argument that learners construct their learning, the participants or graduates of EET are likely to experience changes in their psychological constructs (Kozlinska 2016; Mwasalwiba 2010; Fayolle & Gailly 2008; Lüthje & Franke 2003). These changes include shifts of interest, attitudes, confidence, perceptions, abilities, skills and self-efficacy of students or enhancement in entrepreneurial spirit (developments of skills, attitudes and knowledge vital in promoting entrepreneurial behaviour and mindset) within a target group, as suggested by Fayolle and Gailly (2008), Kozlinska (2016), Lüthje and Franke (2003) and Mwasalwiba (2010). Nevertheless, it is not easy to define entrepreneurial competencies (Duval-Couetil & Long 2014).

It is also relevant to note that the impact measurement strategies (subjective, objective and institutional-framework approach) identified in literature often provide room for methodological controversies surrounding the impact of entrepreneurship education. These controversies cannot be totally erased from impact measurement in entrepreneurship education because of differences in the content, purpose, stakeholders and aim of entrepreneurship education (Duval-Couetil & Long 2014). However, in addressing the controversies in measuring the impact of EET, researchers argued that there is the need to assess and understand what

is working and what in entrepreneurship education is very crucial (Ruskovaara 2014; Pittaway & Cope 2007). Again, it is of the essence to understand that the influence or impact of entrepreneurship education cannot be the same in every context; hence, relevant studies should distinguish situations under which entrepreneurship education could be effectively measured (Dohse & Walter 2012). The variations in the results have been argued from the point that the impact of EET may differ with different individuals and in varied learning situations (Rideout & Gay 2013).

In examining the impact of EET on the number of established firms or start-up by graduates, for instance, it is recommended that EET's effectiveness be measured in the context of the entrepreneurial ecosystem of the potential entrepreneur (Mwiya 2014). The argument stems from the fact that research indicates that entrepreneurial engagements by graduates occur when graduates have worked with other corporate entities and have obtained the experiences necessary to pursue entrepreneurial venture (Azoulay et al. 2020). This therefore makes it difficult to establish causal effects of the entrepreneurial intervention on graduates' entrepreneurial engagements.

In addressing issues of selected biases associated with the use of the objective measure, it is argued that entrepreneurship education cannot meet its mandate by only focusing on individuals who desire to be entrepreneurs. In achieving this, it is incumbent on educational institutions to ensure mandatory teaching of EET programmes at all phases of the educational system so that individuals will develop an interest in engaging in entrepreneurial and intrapreneurial activities at the infancy stage. It is against this background that some researchers argue for the introduction of EET programmes in primary schools and to the socially and economically excluded individuals of society (Lackéus 2014; Blenker et al. 2011).

Implications for future research in entrepreneurship impact studies

The general principle of education posits that any meaningful educational programme must ensure a change in the behaviour of learners. This implies that the purpose of assessing or evaluating educational programme outcomes should centre on changes within the learner. Following this argument, it must be understood that what researchers (e.g. Nabi et al. 2017) consider as the indirect measure, with particular emphasis on behavioural changes in participants of the EET programme, in the educational assessment sense, is arguable. The argument emanates from the fact that a key measure of the outcome of an educational intervention is the change in participants' behaviour. Hence, this article is positioned to argue that, generally in education, the subjective or indirect indicator used in EET impact measurement to include changes in behaviour of participants must be the number of new firms or start-ups established by graduates of such programmes, while objective or direct indicators (Kozlinska 2016), which connote the number of new firms or

start-ups, must rather be the changes that occur in the behaviour of the participants. However, if the purpose of the EET programme is meant to ensure the development of start-ups, then the latter could be considered the direct impact.

Again, the use of pre- and post-test surveys to assess changes in the behaviour of participants would not provide any meaningful outcome(s) different from what an assessor or researcher would obtain if he or she adhered only to the use of a post-test survey. The constructive theory propounds that learners construct competencies (knowledge, skills and attitude) and always possess prior competencies in any educational programme. As a result, the assessor must only be interested in the competencies participants acquired or developed (change in behaviour) from their participation in EET programmes and not their prior competencies in EE. The use of pre- and post-test survey questionnaires becomes much useful when the pre-test would be used as a need assessment tool, and the EET programme would be considered an intervention to address the needs of participants.

This article also argues that the use of control groups in conducting impact studies must be looked at. This article reasons that assessment of the impact of EET cannot be considered as valid when control groups have different characteristics and most often have not experienced any form of exposure to EET programmes. The resultant effects of such a study would be the use of mismatched feedback or responses from the treatment group and the control group to determine the impact of EET (Kozlinska 2016). In general, if the purpose of the study is to ascertain the effect of EET on participants, then there is no need to use a control group or groups. However, if the study seeks to find out the differences in competencies between participants of EET and nonparticipants, then the nonparticipant should be used as the control group.

The use of a longitudinal approach or design also needs to be considered when conducting impact studies because of the varied aims of EET programmes. Researchers have argued that using longitudinal design in EET impact studies becomes more challenging because of difficulties in isolating roles played by a single variable regarding its influence on outcomes to be measured (Duval-Couetil & Long 2014; Fayolle, Gailly & Lassas-Clerc 2006). It stands to reason that the longitudinal design would not be applicable when the assessor intends to use the subjective indicators (changes in behaviour) within the short period or when the aim of the EET programme is to promote changes in the behaviour of participants. Even when the EET programme aims to ensure changes in practising measurement outcomes such as new ventures, the varied entrepreneurial ecosystems and economic considerations imply that the longitudinal approach would not be applicable everywhere as these factors and more influence one participation in entrepreneurial activities (Mwiya 2014).

The article is also situated to argue that because there is an over-reliance on only students for the indirect measurement

approach, the perspectives or views of the three main independent stakeholders, namely teachers, employers and graduates, should always be gathered through using appropriate methodological approaches when obtaining information to measure the impact of entrepreneurship education. The use of only students or participants makes the evaluation result one-sided and biased, especially where students or participants involved in EET impact studies are individuals who were interested in EET programmes and have the desire to pursue entrepreneurial activities (Longva 2019). However, as teachers and human resource managers are all stakeholders in curriculum implementation and design, their views would serve as solid feedback in impact evaluation.

Conclusion

This article aimed to examine the impact measurements of entrepreneurship education outcomes by exploring the various indicators and methodological approaches adopted to measure them. It also offered implications for future research considerations. A scoping review was conducted on 80 articles and dissertations using the Arksey and O'Malley (2005) framework to explore the extent, range and nature of literature on the impact measurements of entrepreneurship education. The study found three leading indicators for measuring entrepreneurship education impacts: subjective, objective and institutional-framework. Besides the objective measurement approach and over-reliance on students for the subjective measurement approach, the article argues that more researchers should consider the institutional-framework indicators to measure entrepreneurship education impact. The study also found that the commonly utilised methods of measuring education impact are the pre- and post-test or post-test, longitudinal and experimental designs. The controversies associated with the indicators and methods of measuring entrepreneurship education impacts are primarily because of the diversity of entrepreneurship education, societal context and targeted audience.

The impact measurement indicators in entrepreneurship education should be tailored to a specific audience and stakeholders' perspectives. In this article, situated on the premise of the constructivists' recommendation that learners are not *tabula rasas*, the measurement of the impact of entrepreneurship education should instead focus on ex-post results and not pre-post results. The impact measurement indicators and associated methodologies should assess the participant's development, society and the national economy.

The article represents one of the few studies synthesising the various approaches considered to measure entrepreneurship education impact and the related methodological approaches in a single study. It therefore provides a springboard for entrepreneurship education curriculum evaluators with the opportunity to understand the various indicators and methods applicable to different entrepreneurship education programmes, their content and varied pedagogies.

Amid the challenges and inadequacies (e.g. mismatched control and treatment groups, diversified target groups, programme content and purpose) that have characterised studies on the impact of EET, there have been some recorded positive impacts of EET, especially on graduates, in terms of acquiring the rightful entrepreneurial competencies that enable them to secure jobs in corporate environments and self-employment (graduates' employability in totality). It is therefore argued that using any of the assessment indicators in EET impact measurement cannot be valued without first assessing and understanding the impacts of EET on the participants. This is because it is only when the impacts on participants are well understood that a better understanding of the impact of EET on the national economy or institution can be measured. It is therefore argued that for future research on impact studies in entrepreneurship to be rigorous: (1) the control and the treatment groups should have the same characteristics; (2) learners should be seen as individuals who possess prior competencies; (3) the impact assessments should focus on behavioural changes; (4) the assessors should appreciate the varied roles played by entrepreneurial ecosystem and economic factors; and (5) the purpose of the entrepreneurship programme should be clear. Again, as the discussion of the impact studies was limited only to the three indicators, as proposed by the researchers, efforts should be made to address other individual indicators in future research, especially the institutional-framework approach, which has been ignored in several research studies.

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E.M-W. and E.D. were involved in the conceptualisation, methodology, formal analysis, investigation, writing of original draft and review, and editing of the article.

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Data availability

The authors confirm that the data supporting the findings of this study are available within the article.

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