



Core Entrepreneurial Competences of Chinese College Students: Expert Conceptualisation Versus Real-Life Cases

Zhaohui Yin¹ · Zihan Liu¹ · Peiru Tong¹

Accepted: 2 March 2022 / Published online: 30 March 2022
© De La Salle University 2022

Abstract Core entrepreneurial competence (CEC) is an important prerequisite for the success of college student entrepreneurs. Although there are plenty of studies on student entrepreneurs' competences, most of these have been conducted in Western developed countries. Thus, their findings may not be generalisable to other cultural contexts, such as Asian emerging economies such as China. The present study fills this gap by investigating the CECs of Chinese college students using a mix of the Delphi method and case studies. Two research questions are addressed: How do key stakeholder groups in China understand the CECs of college students? And what are the discrepancies between conceptualised CECs and the actual practices of Chinese student entrepreneurs? The findings suggest that the CECs of college students extracted from Chinese experts' opinions overlapped but were not completely consistent with the competence frameworks found in the literature. Such an inconsistency might be attributed to China's distinct sociocultural context and developmental stage. These conceptualised competences were also at odds with the real-life practices of student entrepreneurs. Three conflicts were identified: (1) innovation vs. transformation of ideas, (2) winning entrepreneurial competitions vs. starting/running an actual business and (3) establishing vs. sustaining teams. The findings suggest that the

understanding of CECs should be enriched and sharpened to help entrepreneurs address real-life challenges.

Keywords Chinese college students · Core entrepreneurial competence · Entrepreneurship education · Innovative spirit · Delphi method · Case study

Introduction

Entrepreneurs play a critical role in improving a society's economic development and competitiveness through the creation of new activities (Robles & Zárraga-Rodríguez, 2015). Related to this, entrepreneurial performance is often influenced by core entrepreneurial competences (CECs; Man et al., 2002). For college students who lack social and financial resources and experience, their CECs have a direct and essential impact on the success (Wong et al., 2005) and sustainability (Bird, 1995) of their business start-ups. Thus, it is important to gain a deep understanding of college student entrepreneurs' CECs so that higher education institutions (HEIs) can better facilitate their development (Robles & Zárraga-Rodríguez, 2015). Although many conceptual frameworks concerning entrepreneurial competences (ECs) and CECs have been studied in the literature, some inconsistencies in the components of these frameworks have been noted (Rezaei-Zadeh, 2014). Furthermore, how conceptualised competences work in real-life practice (Bacigalupo et al., 2016) has yet to be examined closely. These gaps point to the need to study CECs in accordance with specific purposes and contexts (Bacigalupo et al., 2016).

CECs and their importance to college students' entrepreneurship activities may vary across different

✉ Peiru Tong
peiru.tong@whu.edu.cn
Zhaohui Yin
yinzhaohui@whu.edu.cn
Zihan Liu
liuzh0120@163.com

¹ Institute of Education Sciences, Wuhan University, Wuhan 430072, China

cultural contexts because cultural factors (e.g. individualist vs. collectivist cultures) play a vital role in entrepreneurial activities (Pinillos & Reyes, 2011). Within the entrepreneurship literature, plenty of research have been conducted in the US and Western European countries, which means their findings may not be generalisable to other cultural contexts (Thomas & Mueller, 2000). Meanwhile, much of China's economic growth in recent years can be attributed to entrepreneurship (Liu et al., 2020). Thus, the current study investigates the CECs of Chinese college students whose characteristics of entrepreneurial education have been observed to differ from their counterparts in Western countries (Liu et al., 2020; Lyu et al., 2021).

Due to several factors, such as the global COVID-19 pandemic, Chinese college graduates face severe employment challenges. Against this backdrop, the Chinese government has introduced a series of measures and policies to encourage college students to start their own businesses. Colleges and universities have also initiated a new wave of entrepreneurship education and made noticeable progress in this area: among 2020 graduates, 820,000 are entrepreneurs, representing an increase of 11% compared to the previous year.¹ Although Chinese college students have shown increasing enthusiasm for entrepreneurship, their entrepreneurial activities are not always successful. According to a 2017 report, only 6.3% of Chinese college students started their businesses, which is far lower than the rate of 30% in developed countries (Yan et al., 2018). This indicates an urgent need for Chinese student entrepreneurs to further develop their CECs.

The current study, which aims to explore the CECs of Chinese college students and the challenges caused by a lack of or misconceptions about these competences, can widely inform research and practices in countries with similar cultural contexts or developmental stages. The findings will also contribute to the field of entrepreneurial education by enriching the theorisation of CECs with first-hand data from a context that has been insufficiently investigated in the literature.

Literature Review

Entrepreneurial Competence (EC)

EC is commonly defined as a set of abilities or characteristics, including scanning environments, selecting promising opportunities and formulating strategies for taking

advantage of those opportunities, that enable appropriate entrepreneurial behaviours (Boyatzis, 1982; Chandler & Hanks, 1994). Various scholars have reported a large variety in the list of ECs (e.g. Penchev & Salopaju, 2011; Bergevoet & Woerkum, 2006; Entrepreneurship Competency Model, 2010). For example, Rezaei-Zadeh (2014) reviewed 63 studies and provided a comprehensive list containing 83 ECs, whilst Reis et al. (2020) identified 130 competences clustered into 98 competences. Researchers have argued that the inconsistency in the range of ECs can be attributable to multiple factors, including different applications of competences; the development stage, size and context of the business; and different theoretical and methodological perspectives employed (Rezaei-Zadeh, 2014). However, Gartner (1988) stated that the startling number of competences would result in the portrait of someone full of traits and contradictions who would be seen as a sort of generic 'everyman' (p. 57).

Due to the vast varieties of ECs reported in the literature, some studies have attempted to classify them into broader groups using diverse categories that have their respective limitations. For example, Penchev and Salopaju (2011) proposed a two-sided model of EC: one side refers to the fundamental competences needed from the venture's starting stage and the other refers to the additional competences required for running an established company, thus echoing other studies that have made a similar distinction (Bird, 1995; Kellermanns et al., 2008; Wong et al., 2005). However, as Filatotchev et al. (2005) pointed out, the ECs necessary for launching and sustaining a business overlap because a founder's characteristics can be influential in the long run. Moreover, Rezaei-Zadeh's (2014) categorisation (attributes/traits, skills/abilities and knowledge/experience) presents overlapping across categories (e.g. 'opportunity identification, grasping and evaluation' are categorised as knowledge/experience rather than skills/abilities). The entrepreneurship competence framework (EntreComp), a conceptual model comprising three competence areas (ideas and opportunities, resources and action) developed by the European Commission, acknowledges that the categorised competence areas are so intertwined that the coupling between competence areas and individual competences does not have taxonomic rigour (Bacigalupo et al., 2016). Thus, the model developers recommended the establishment of new links amongst areas and competences to adapt them to fit specific purposes.

Although the literature has not reached agreement on the components and classification of ECs, it generally indicates that ECs comprise a multidimensional concept containing various elements. To conduct an efficient, systematic and meaningful discussion related to the competences identified in the literature, the current study draws on the model proposed by Zdošek Draksler and Širec's (2018) for

¹ Source:
http://www.moe.gov.cn/jyb_xwfb/s5147/202103/t20210301_515951.html (retrieved 27 February 2021).

studying ECs. This model was chosen for two reasons: its comprehensiveness based on previous models and its clear description of the behavioural focus and literature source of each competence area.² The congregated hybrid model consists of 17 competence constructs, which are shown in “Appendix A”. In the “Methods” and “Discussion” sections, the competences identified in the current study are discussed in relation to the components of this model.

Depending on the context, more emphasis may be placed on some of the competences and less on others (Bacigalupo et al., 2016), thus suggesting the need to consolidate the most essential ECs for specific entrepreneurial contexts. The next section will explain what constitutes the core ECs (i.e. CECs) in different studies and in the present research.

CEC

Unlike ECs that have been extensively explored in the literature, CECs are not an established concept (alternative terms are ‘key EC’ and ‘entrepreneurial key competence’). A review of the literature reveals that CECs are used for various purposes and are approached in different ways. Rezaei-Zadeh (2014) defined CEC as competences that distinguish entrepreneurs from non-entrepreneurs. However, at present, there is still a lack of consensus in relation to the most important competences. For instance, although Mill (1848) identified risk-bearing as the main characteristic of entrepreneurs that distinguishes them from managers, Schumpeter (1934) rejected the idea, arguing that risk-bearing is inherent in ownership rather than in all entrepreneurs. Schumpeter (1934) likewise highlighted the importance of innovation as a CEC. Moreover, whilst Martin (1982) believed that creativity is the core competence of entrepreneurs, Rasmussen et al. (2011) considered opportunity to be the heart of ECs.

Other studies have conceptualised CECs differently. For example, Reis et al. (2020) identified CECs by examining the most relevant relationships amongst them using a quantitative core–periphery analysis. However, the study fell short of explaining why certain competences are better connected (and thus more at the core) than others. Arafeh (2016) showed that key ECs are higher-order areas consisting of several lower-level competences. They are considered ‘key’ because they can predict or judge the overall

quality of ECs. Although these approaches are valuable, they are incompatible with the current research, which does not aim to explore the relationship or classification of competences.

In the present study, CECs are operationally defined as the most common competences essential to the success of entrepreneurship, as recognised by key stakeholder groups. We approach CECs by extracting top-tier competences collected using the Delphi method. Considering the need to generate context-sensitive CECs, this study adopts a bottom-up approach, which allows the experts to nominate competences ranked for frequency rather than a top-down approach that confines experts’ responses to a prescribed list of competence.

CECs of College Students

The notion of CECs has been employed in the field of entrepreneurial education to refer to the most distinct and irreplaceable features of successful student entrepreneurs (Yao, 2009). Izquierdo and Deschoolmeester (2010) noted that because undergraduates are assumed to be naïve in entrepreneurship and early-stage entrepreneurial development, there must be a basic set of competences that can facilitate the design of an educational intervention for these students. Research into student CECs has become relevant, especially in less developed nations, due to the inefficiency of academic institutions in helping students improve their entrepreneurship skills as a result of constraints pertaining to support and expertise (Lyu et al., 2021; Othman et al., 2012). Developments in students’ CECs are important because they can be the basis of their entrepreneurial intention and are inductive to their subsequent business success (Zdolšek Draksler & Širec, 2018).

Different stakeholders (i.e. academics, entrepreneurs and students) may have diverse opinions on the most pivotal ECs of college students (Rezaei-Zadeh et al., 2017). For example, Izquierdo and Deschoolmeester (2010) compared the opinions of entrepreneurs and academic experts and found that entrepreneurs paid more attention to practical issues (e.g. decision-making) when starting a business, whilst academics placed more emphasis on the abilities most frequently cited in the literature, such as identifying business opportunities. In contrast, Liao’s (2015) study, which was based on student entrepreneurs’ ratings, found that opportunity competences, rather than practical skills, were greatly valued. Gao and Su (2013) investigated the opinions of academics and administrators regarding college students’ ECs. They found that identifying opportunities was the most fundamental element of ECs for college students, whereas practical abilities, such as knowledge of procedures and regulations in company registration, were not an urgent need.

² Although EntreComp is also comprehensive and detailed, entrepreneurship as a competence is defined as a transversal key competence applicable by individuals and groups across all spheres of life, with a focus on value creation (Bacigalupo et al., 2016). Therefore, it has a broader scope and more general type of competences than what we are looking for in the current study. For instance, none of the three categories in the EntreComp includes market insights or market-forecasting abilities.

Given that stakeholders may emphasise certain EC elements and conceptualise the CECs of college students differently, it is necessary for relevant stakeholders to reach a consensus on the concept and its significance (Mitchellmore & Rowley, 2010; Rezaei-Zadeh, 2014). This idea inspired the use of the Delphi method in the current study.

Gaps in the Literature

The literature review identified three main gaps. First, inconsistencies between ECs and CECs in different contexts and by diverse stakeholder groups have been found in the literature. Applying the Delphi method can help address this issue by developing a consensus-based conceptualisation of CECs that is applicable to the Chinese context.

Second, most of the existing studies did not examine ECs and CECs against the real-life practices of college students. Thus, little is known regarding the extent to which the conceptualised competences are useful in conquering various challenges found in authentic entrepreneurial contexts. To fill this gap, we employed a case study approach and examined whether the conceptualised CECs were sufficient for guiding the practice of college student entrepreneurs.

Third, the majority of research in this field has been conducted in the U.S. and Western European countries; thus, the findings may not be generalisable to other cultural contexts (Thomas & Mueller, 2000). This is an important consideration because cultural factors (e.g. individualist vs. collectivist cultures) play a vital role in the conduct of entrepreneurial activities (Pinillos & Reyes, 2011). Thus, our study investigates the CECs of college students in China, where some unique characteristics of entrepreneurial education have been observed compared to the Western world (Liu et al., 2020; Lyu et al., 2021).

Research Questions

Based on the gaps identified above, the present research will answer the following questions:

- (1) How do the key stakeholder groups in China understand the CECs of college students?
- (2) What are the discrepancies between the conceptualised CECs and the actual practices of college student entrepreneurs in China?

Methods

The present study first used the Delphi method to identify the consensus-based CECs of college students. Then, we recruited college student entrepreneurs for the case studies. Their participation allowed us to identify the tensions between CECs at the theoretical level and their applications in real-life situations.

The Delphi Method

The Delphi technique is a widely accepted method for seeking consensus amongst experts within a certain topic area (Murphy et al., 1998). This is based on the principle that ‘forecasts from a structured group of experts are more accurate than those from unstructured groups or individuals’ (Jeste et al., 2010, p. 670). This method aggregates opinions from a diverse set of experts with no pressure from such experts when opinions are expressed. Although this method has been widely used to obtain collective ideas in studies about competences (e.g. Muñiz-Rodríguez et al., 2017; Seo et al., 2020), few studies have employed it to investigate the CECs of Chinese college students.

We integrated the opinions of a group of multiple stakeholders, including college student entrepreneurs,³ established entrepreneurs, directors of college student entrepreneurship programmes and researchers specialising in entrepreneurship education (see the details in “Appendix B”). The 27 experts recruited for this study were selected because they either had rich theoretical knowledge of entrepreneurship or practical experience in entrepreneurship and entrepreneurial education. They were also considered key stakeholders whose opinions had been researched extensively, although in separate studies (e.g. Gao & Su, 2013; Izquierdo & Deschoolmeester, 2010; Liao, 2015).

We conducted two rounds of expert consultations in which we used questionnaires to obtain information from the experts. Using both questionnaires, we collected details about the experts’ evidence for judgement and self-assessment of their familiarisation with the issue to determine the authority coefficient. In turn, this coefficient can indicate the trustworthiness of the experts’ opinions. The surveys were originally conducted in Chinese. The English version appended to the current article was translated by the researchers.

³ The college student entrepreneurs started their businesses when they were college or university students.

Round 1

The experts filled out the first questionnaire (“Appendix C”), in which they were asked to write down various aspects of CECs that they thought should be possessed by Chinese college students. The responses were summarised into the elements of CECs, which were ranked by frequency (“Appendix E”). The researchers first conducted the classification separately with reference to the competences identified in the literature, after which we discussed and resolved disputes together. Next, the top 10 items were extracted, with each item given a more abstract competence name for the second survey. We extracted the top 10 items for the following reasons. First, to generate a reduced list of competences deemed most critical for college students (i.e. core competences), it was necessary to select the top items mentioned more frequently than others, thus discarding one-off or infrequently mentioned competences. Second, it was necessary to retain sufficient competences to make meaningful comparisons with previous models. Third, considering the frequencies of all the items, the gap between the 10th and 11th items was relatively more significant. Hence, we deemed it most appropriate to extract the top 10 items to be included in the second survey.

Round 2

The second survey (“Appendix D”) asked the experts to rate each CEC (derived from the results of the first questionnaire) on a scale of 0–8 (0 = least important, 8 = most important). This was done to verify the experts’ opinions on the importance of the identified CECs. The mean, standard deviation (SD) and Kx (percentage of raters giving a full mark) values of each item were calculated, and Kendall’s coefficient of concordance, a measure of agreement amongst raters, was also conducted using SPSS 22.0.

We acknowledge that combining different abilities into competence areas might be subjective and restricted by our knowledge structure; furthermore, competences other than the top 10 may have been left out. Thus, we tried to mitigate these limitations by appending the full list of competences initially identified in Round 1 (“Appendix E”) to make our method transparent and to allow readers to interpret the results with more caution.

Case Study Method

The case study approach can supplement the Delphi method by providing insights into the real-life experiences of Chinese college student entrepreneurs, especially in terms of how they exhibit and exercise various competences and the challenges they frequently encounter.

To generate a holistic picture of college students’ entrepreneurship practices, the current research conducted case studies in three different types of HEIs: research- and teaching-based universities and higher vocational colleges.⁴ Two institutions were selected for each type of HEI, and two entrepreneurial cases were recruited from each institution. Thus, a total of 12 cases were recruited, as shown in “Appendix F”. The selected cases met two basic criteria. First, the student entrepreneurs all successfully started their own companies, generated business revenues and had good reputations in their respective institutions. Second, the sample included student entrepreneurs from diverse industries, including education, agriculture, IT and retail, thus ensuring the comprehensiveness of the results.

We conducted semi-structured interviews in Chinese with the student entrepreneurs to investigate their experiences and understandings of CECs. The translated interview protocol can be found in “Appendix G”. A thematic analysis was used to analyse the data in the following three steps:

Step 1 identifying the themes related to the competences that can explain successful entrepreneurship.

Step 2 identifying the themes related to the obstacles to entrepreneurship.

Step 3 contrasting the competences possessed by the informants with the challenges they faced before identifying how these challenges are related to the lack of or misconceptions about CECs.

The analyses in Steps 1 and 2 were inspired by the reflexive thematic analysis developed by Braun and Clarke (2006)—a widely cited qualitative approach foregrounding researcher subjectivity. The themes in their approach are defined as the patterns of shared meaning underpinning a central concept or idea. These can be identified through a rigorous process of data familiarisation, data coding and theme development and revision.

In the coding phase, we generated succinct labels that could identify important features of the data relevant to answering the research questions (i.e. competences that can explain the success of entrepreneurship in Step 1 and obstacles and challenges in Step 2). Data coding was conducted inductively because the codes were not identified by pre-existing competence categories isolated from the context but were directed by the data. Applying such an

⁴ This is one of the most common ways to categorise Chinese HEIs (Zhao & Qi, 2013; Zhejiang University Research Team, 2009) based on their approaches to talent cultivation. In our preliminary observations, there were some differences regarding student CECs across the three types. For example, research-based university students seemed to possess more insights into the use of high-tech tools, whereas higher vocational college students performed better with practical abilities. However, because a cross-case comparison was not the focus, we cannot examine such differences in detail. Thus, future studies should conduct more in-depth cross-case comparisons.

approach allowed us to look for recurring themes considered important to the subjects' actual lives, which might be divergent from the pre-conceptualised competences. For instance, identifying business opportunities in some cases was indicative of an innovative spirit, but in others, it pointed to knowledge or persistence.

The initial themes were generated by examining the codes to identify significantly broader patterns of meaning. We checked the candidate themes against the dataset to determine whether they 'tell a convincing story of data' (Braun & Clarke, 2021). This was an iterative process in which we went back and forth with the data, codes and themes. We also merged the initial themes with a few data into others to generate broader themes. The final codes and themes can be found in "Appendix H".

In Step 3, the themes that emerged from Steps 1 and 2 were contrasted. We paid special attention to the themes identified as competences possessed by the informants but nonetheless linked to the challenges they met in entrepreneurial practices. This process allowed us to identify nuanced competence areas that student entrepreneurs lacked or that were misconceptualised in the Chinese context.

Results

This section will first report the results we gained from the Delphi method, which will answer the first research question. We will then answer the second question by presenting the results of the case studies.

Results of the Delphi Method: Key Stakeholders' Understandings of the CECs of College Students in China

In both rounds of expert consultations, all questionnaires were returned with a response rate of 100%, indicating a high level of participation. Table 1 shows high expert authority coefficient (Cr) values in both rounds, thus suggesting high credibility.

The responses collected via the first questionnaire were classified into CECs ("Appendix E"); the top 10 items were given more abstract competence names, as shown in Table 2. The table also shows the means and Kx values

Table 1 Expert authority coefficient

Round	Ca	Cs	Cr
1	0.787	0.823	0.805
2	0.817	0.893	0.855

obtained through the second survey. The Cronbach's α value of 0.765 demonstrated high reliability, whilst the Kendall coefficient value was 0.51 ($p < 0.05$), suggesting that the experts' opinions were well coordinated.

Results showed that the CECs of college students extracted from the Chinese experts' opinions overlapped but were not completely consistent with the frameworks constructed in the Western context. Specifically, 7 out of 10 competences were frequently covered in the literature, though sometimes with slightly different names.⁵ The following discussion mainly draws on Zdolšek Draksler and Širec (2018), whilst other frameworks or models are also referred to, where relevant:

- (1) *Learning ability* is equivalent to learning competence in the Zdolšek Draksler and Širec (2018) model. This refers to the desire for new information and the ability to learn from different resources. As Li et al. (2019) indicated, strong learning abilities can help student entrepreneurs constantly develop new knowledge and skills, thus helping them to produce competitive advantages.
- (2) *The ability to identify and grasp business opportunities* overlaps with 'opportunity competence' in Man (2001) and Man et al. (2002), 'seeing opportunities' in Kyndt and Baert (2015) and 'market insights' in Kyndt and Baert (2015) and Zdolšek Draksler and Širec (2018). This specific competence is particularly important in the Chinese entrepreneurship environment, which is changing rapidly with its fast-developing economy, society and technology. Some have argued that the entrepreneurship of Chinese college students is mainly opportunity oriented (Li et al., 2021).
- (3) *Innovative spirit* echoes Kyndt and Baert's (2015) construct of creativity, which they adapted from Moberg et al.'s (2014) model. This was also mentioned in Man's (2001) and Man et al.'s (2002) models (i.e. innovativeness). It has been conceptualised as a core competence in Schumpeter (1934) and Martin (1982), with the latter using the concept of 'creativity'.
- (4) *The ability to organise and coordinate teams* is termed organising competences in Zdolšek Draksler and Širec's (2018) model and is 'related to the organisation of different internal and external human, physical, financial and technological resources' (p.

⁵ Given that the original responses in the questionnaires were in Chinese and translated into English, we tried to name the entrepreneurial competences that we identified using the English expressions that can best convey the meanings of the original Chinese terms.

Table 2 CECs of Chinese college students obtained through the Delphi method

Competence and ranking	Total score	Mean	SD	Kx (%)
Learning ability	174	6.44	1.155	80.5
The ability to identify and grasp business opportunities	171	6.33	1.387	79.1
Innovative spirit	167	6.19	1.415	77.3
The ability to raise start-up capital	164	6.07	1.492	75.9
The ability to build entrepreneurial teams	159	5.89	1.805	73.6
The ability to organise and coordinate teams	157	5.81	1.415	72.6
Entrepreneurial passion	157	5.81	1.469	72.6
Professional knowledge	156	5.78	1.368	72.3
Team collaborative spirit	152	5.63	1.305	70.4
Adventurous spirit	137	5.07	1.492	63.4

26) and stresses the coordination of resources in entrepreneurial teams.

- (5) *Entrepreneurial passion* in Man (2001) and Man et al. (2002) refers to the ability to maintain a high level of energy, self-motivation to maintain an optimal level of energy and keeping a positive attitude. This is called the ‘business passion competence cluster’ in Reis et al. (2020).
- (6) *Adventurous spirit* overlaps with the conceptual competences in Man’s (2001) and Man et al.’s (2002) models, because the latter includes the competences related to risk-taking. It is regarded as a fundamental competence that helps entrepreneurs deal with uncertainties in various entrepreneurial arenas (Mitton, 1989; Rezaei-Zadeh et al., 2017).
- (7) *The ability to build entrepreneurial teams* is termed ‘team-building competence’ in Man (2001) and Man et al. (2002) and is deemed a behavioural focus of organising and leading competences. This overlaps with Boojihawon et al.’s (2007) and Vasantha Kumara and Sahasranam’s (2009) ‘networking and team-building competence’.

The other three CECs obtained through the Delphi method, namely, *professional knowledge*, *the ability to raise start-up capital* and *team collaborative spirit*, received relatively less attention in previous models. As Roman and Maxim (2017) noted, national culture and cultural values can provide a lens through which attitudes towards entrepreneurship can be interpreted. The divergence between the CECs conceptualised by the Chinese experts in the current study and those theorised in the literature may be a result of differentiated sociocultural contexts and diverse entrepreneurial policies.

Professional Knowledge

Although knowledge is deemed a vital competence of entrepreneurship, it often refers to managerial and economic knowledge rather than professional knowledge. For example, Zdolšek Draksler and Širec’s (2018) model includes the dimension of entrepreneurial knowledge. In Reis et al.’s (2020) meta-competence framework, knowledge and cognitive meta-competence also refer to market forecasting. In contrast, in Chinese universities, more emphasis is placed on professional discipline and employment education instead of entrepreneurship education (Ma & Bai, 2015). This sets a good knowledge foundation encouraging students to seek entrepreneurial opportunities; however, as the case studies show in the following section, an (over)emphasis on professional knowledge (with entrepreneurial knowledge neglected) may cause a distinct set of problems. Thus, both entrepreneurship knowledge and professional knowledge are required for college student entrepreneurs.

The Ability to Raise Start-up Capital

Although this is a core competence for Chinese college student entrepreneurs, raising start-up capital seldom appears in the literature on CEC models. This discrepancy may be related to China’s diverse entrepreneurship-supporting policies. Many developed countries support student entrepreneurs through special fiscal funds, venture capital and commercial insurance and financial subsidies. In comparison, start-up financial support to college students in China is less available, subject to fierce competition and involve complicated application procedures (Lu et al., 2014). For Chinese college student entrepreneurs, the ability to raise start-up capital is a guarantee of establishing a business.

Team Collaborative Spirit

This competence is a personal quality that values in-group harmony. Paradoxically, although many studies in the Western context have investigated entrepreneurial teams (e.g. Cardon et al., 2017), the EC or CEC frameworks proposed in such studies seldom mentioned team collaborative spirit as an individual EC.⁶ Instead, these frameworks have emphasised personal abilities, such as interpersonal skills, communication skills and leadership (Rezaei-Zadeh et al., 2017). Such a discrepancy may be explained by differences in cultural orientations in the workplace: individualistic cultures are more common in Western countries, whilst China is an example of a collectivist culture (Hofstede et al., 1990). When applied to entrepreneurship, in a collectivist culture, entrepreneurs have a high need for affiliation; by contrast, an individualist culture values more self-sufficiency and personal accomplishment (Pinillos & Reyes, 2011). This may explain why Chinese experts' responses tended to uphold a team-oriented discourse instead of explicitly highlighting personal leadership or individual contributions. However, this does not mean that leadership is unimportant in the Chinese context; rather, it indicates that in Chinese culture, the ability to lead a team is conceptualised differently: a team's common good is prioritised, whilst individualistic heroism is downplayed.⁷

Case Study Results: The Conflicts Between Conceptualised Competences and Real-Life Challenges

The results of the case studies further demonstrate that although Chinese college students' successful entrepreneurship is largely supported by their CECs, some salient issues serve as obstacles to entrepreneurship, thus pointing to the tension between conceptualised CECs and the challenges faced by student entrepreneurs in real-life practice.

⁶ However, see Timmons (1979) for the competence of 'willing to have productive collaboration with others.' Additionally, in Izquierdo and Deschoolmeester (2010), teamwork and team building were included as two items in their survey. That said, they were not selected as the top core competences for entrepreneurial education because of the lower scores on the ranking scale.

⁷ In some Chinese literature, leadership is one of the CECs of college students (Jin, 2016; Li, 2017); however, these studies have followed a top-down approach (designed surveys based on previous competence models), assuming that 'leadership' is the right concept, as commonly used in English literature. On the contrary, the current study, in adopting a bottom-up approach, suggested that the concept of leadership was not commonly used in the experts' discourse when they were required to nominate competences themselves. We believe that the terming of the competence reflects the cultural discourse and, thus, should be retained in its original form.

In this study, we identified the prominent competences and challenges through a thematic analysis ("Appendix H"). Although the competences that emerged mostly paralleled those CECs conceptualised by the experts, the real-life stories revealed further details about how different competences can be collated into broader themes based on the informants' narratives.⁸ Different themes for the challenges they faced were also identified. Upon synthesising the themes, we found that 'innovation', 'knowledge and experience' and 'teams' were the three key areas in which both competences and challenges were identified. Thus, the following three conflicts are regarded as salient in the current study.

The Conflict Between Having an Innovative Spirit and Transforming Innovative Ideas into Scalable Products

Most of the college student entrepreneurs in our sample possessed an innovative spirit that manifested in the area of conceptual and technological innovation. Many were not confined to traditional or simple processing industries but tended to use leading technologies to explore new fields and markets. For example, team *L* of *W* University designed a novel enterprise application software that filled a gap in the market, allowing their company to survive in the highly competitive field of Internet innovation. Moreover, even when some students choose to start a business in traditional fields, they usually apply innovations in these fields using high-tech advancements. For instance, team *G* of *H* University was committed to making breakthroughs in the field of cosmetics by making full use of the resources in a research-based university (i.e. the leading platform for industry–university–research cooperation).

Nevertheless, many of the informants also expressed difficulties transforming their innovative ideas into scalable products. Amongst the 12 cases, only teams *N* and *G* of *H* University had almost achieved large-scale production. Many informants indicated that they had many innovative concepts or technologies but lacked opportunities for market-oriented technology appraisal and product testing. A similar observation was made by Li et al. (2018), who found that even though students cultivated excellent ideas for new products or services, they often faced difficulties associating their ideas with the taught subjects on marketing and finance, due to the weak entrepreneurship education in China. There are frequent anecdotes in China

⁸ One example is merging the codes of 'identifying new opportunities' and 'seeing the market from a different angle' into the broader theme of 'innovative spirit and ideas' because they are both associated with the informants' willingness to try novel ways of doing things.

indicating that many student entrepreneurs are stuck at the level of thoughts or ideas.⁹ Therefore, how to transform innovative ideas into sustainable products/services is a main obstacle perceived by Chinese college student entrepreneurs.

The Conflict Between Winning Entrepreneurial Competitions and Starting/Running a Business in Real Life

Entrepreneurship education in Chinese HEIs is usually driven by entrepreneurial competitions. Many participants indicated that joining these competitions preceded their decision to pursue entrepreneurship. These competitions are usually great avenues for promoting, developing and assessing college students' ECs.

However, starting an actual company is much more complex than participating in competitions, as the former requires a strong ability and rich management experience to deal with emergencies and risks in the entrepreneurial process. For instance, Zhu of *L* Company, *W* University, said, 'Although I have learned management knowledge by myself, I think it is not enough. The practical problems we encountered were different from the entrepreneurial competition in which I participated'. One difference is financial sources. Specifically, entrepreneurship competitions usually provide a certain amount of start-up funds, but in practice, students often encounter difficulties in financing. As the head of team *G* of *H* University said, 'Because we were students, venture capital institutions and angel investors always had a wait-and-see attitude, saying that they will not invest until we graduate'. Therefore, it is misleading to conflate the results of entrepreneurial competition with the level of EC in real-life practice.

The Conflict Between Establishing and Sustaining Teams

In the case studies, a frequently mentioned competence was the ability to build entrepreneurial teams based on common interests and a clear division of entrepreneurial roles. For example, Wang from *L* College started his small business as a freshman with a few friends. As he has stated, 'You will find that some people are very proactive whilst others are prudential'. For every business cooperation, he set up an entrepreneurial team of people with multiple qualities and abilities. Then, he organised various activities to enhance their friendship and sense of camaraderie. Thus, for college student entrepreneurs, the ability to set up a

cohesive and efficient team at the beginning of an entrepreneurial journey is a key competence.

However, the present study also found that large entrepreneurial teams at the initial stage eventually dwindled in membership and lacked sustainability as time went on. According to the interviewees, because of academic pressure, most team members had the mentality of participating in entrepreneurship as a 'part-time job', only devoting themselves partially. As the head of team *Z* from *X* College said, 'Several core members of our team have graduated one after another. They entered the labour force, and it's difficult for them to come back and work shoulder to shoulder with us after graduation'. Most members tended to look for jobs with stable returns. Moreover, in many cases, their passion for entrepreneurship gradually died out in the later stages, especially when their enterprises faced tremendous barriers. Thus, the loss of core team members became a hindrance to the development of start-up enterprises.

It is important to have the ability to build entrepreneurial teams, which is one of the CECs for college students. However, the case analysis further uncovered that maintaining the stability of entrepreneurial teams was an even more significant issue amongst the student entrepreneurs. Scholars have argued that China's one-child policy, which produced individuals who were more self-centred and less sociable and trusting, may have had a direct impact on entrepreneurship (Tu, 2018). Such children are less likely to be entrepreneurs when they grow up (Liu et al., 2020). Thus, the maintenance of entrepreneurial teams can pose challenges for Chinese student entrepreneurs.

Discussion and Implications

Developing CECs in college students is essential for fostering their entrepreneurship skills (Rezaei-Zadeh et al., 2017). In today's complex and changing employment environment, upcoming student entrepreneurs must develop a series of CECs that can help them conquer challenges and thrive in their entrepreneurial endeavours. The findings of the current study suggest that student entrepreneurs met various challenges in real-life practice, which could have been addressed better by enhancing a range of CECs. First, the challenge of product transformation could be better addressed by gaining better insights into the market and enhancing awareness of potential returns on investment. Second, the issue of team sustainable development was closely associated with team members' entrepreneurial passion, commitment and strategic planning for the future. Third, the problem of moving beyond entrepreneurial competition to achieve successful real-life entrepreneurship was linked to the ability to raise

⁹ See example news reports: <http://theory.people.com.cn/n1/2017/0607/c40531-29322754.html> (7 June 2017); <https://news.jxnews.com.cn/system/2014/11/06/013420247.shtml> (6 November 2014).

Table 3 Comparisons between China and Western countries/English literature based on the findings of the study

	China	Western countries/English literature
Common CECs	Learning ability The ability to identify and grasp business opportunities Innovative spirit The ability to organise and coordinate teams Entrepreneurial passion Adventurous spirit The ability to build entrepreneurial teams	
Differing CECs	Professional knowledge The ability to raise start-up capital Team collaborative spirit	Entrepreneurial knowledge, insights into the market, awareness of potential returns on investment More emphasis on leadership and the need for personal accomplishment Other competences, including strategic competence, commitment competence and the ability to plan for the future
Entrepreneurial challenges	Transforming innovative ideas into scalable products Starting and running a business in real life (versus winning entrepreneurial competitions) Sustaining teams	N.A
Policy-related factors	‘Top-down’ approach, policy-oriented (Yu, 2018) The ‘weak entrepreneurs’-oriented policy cannot support college student entrepreneurs (Tang & Miao, 2011)	‘Bottom-up’ approach, business-oriented (Yu, 2018) Meeting entrepreneurs’ individual needs, schedules and situations (Yu, 2018)
Educational factors	More emphasis on professional discipline education and employment education instead of entrepreneurship education (Ma & Bai, 2015) Failure to distinguish between entrepreneurship and entrepreneurial competition (Guo, 2016)	A well-rounded foundation for an entrepreneurship education ecosystem (Yu, 2018) An effective system comprising curriculum, business model, teaching style and practice programmes (Yu, 2018)
Sociocultural factors	High level of long-term orientation (Hofstede Insights, 2018)	Lower level of long-term orientation (in the US case) compared to China (Hofstede Insights, 2018)

start-up funds and a lack of more sophisticated entrepreneurial knowledge.

Some of these proposed competences (e.g. entrepreneurial passion, the ability to raise start-up capital) were recognised by the Chinese experts involved in the current study, suggesting that their importance was recognised at the theoretical level, but their application was met with challenges in actual practice. Other competences (e.g. strategic competence, commitment competence, planning for the future, awareness of potential returns on investment, etc.) were not emphasised in the Chinese experts’ conceptualisation, even though they were already acknowledged as important competences in the literature (Zdolšek Draksler & Širec, 2018). These deficiencies can be attributed to a range of policy-related, educational and socio-cultural factors, as will be elucidated below. Such limitations call for a more well-rounded and renewed understanding of the CECs of college students in China.

In terms of policy factors, China is a ‘socialist market economy’ (Brown, 2018) that uses a ‘top-down’ approach, wherein the government leads and uniformly allocates

funds for entrepreneurship, unlike the ‘bottom-up’ approach in Western countries, wherein universities actively seek funds from the government and industries to create entrepreneurship programmes according to students’ needs, schedules and situations (Liu et al., 2020; Yu, 2018; Cui et al., 2021; Lin et al., 2019). This policy-oriented approach in China has led to some mismatches between policies and reality. The country’s existing supporting policies for college student entrepreneurship are based on the assumption of developing ‘weak entrepreneurs’ (Tang & Miao, 2011). In other words, these policies are generally aimed at supporting students who have difficulties in employment and at the so-called ‘labour-intensive’ enterprises, which is at odds with the original intention of entrepreneurship. Given that government policies are geared towards solving employment issues rather than promoting ECs, the Chinese entrepreneurial ecosystem discourages cultivating the core competences needed for sustainable entrepreneurship, thus causing the obstacles found in our case studies.

As for educational factors, many Chinese universities have misconceptions regarding college students' entrepreneurship practices, in that they often neglect entrepreneurial knowledge and skills, which may lead to a disconnection between concept and real-life entrepreneurship practices (Li et al., 2018; Liu et al., 2020). In addition, entrepreneurial education in China places heavy emphasis on winning entrepreneurial competitions and training students into excellent contestants rather than real entrepreneurs (Guo, 2016). An (over)emphasis on professional and disciplinary knowledge within the Chinese educational system further aggravates the struggle for the legitimacy of entrepreneurship education (Mei & Symaco, 2020). In contrast, Western countries have built a well-rounded foundation for an entrepreneurship education ecosystem—one that features an effective curriculum system, business models, teaching styles and practice programmes (Yu, 2018).

Finally, several sociocultural factors should also be considered. Under the influence of Confucian values and traditions, Chinese people are more inclined to score high on long-term orientation based on Hofstede's cultural dimensions theory (He et al., 2019; Hofstede Insights, 2018; Liu et al., 2020). Therefore, college students tend to choose low-risk, stable jobs rather than pursue high-risk entrepreneurship (Zhou, 2016), thus causing difficulties in sustaining entrepreneurial teams. Hence, the overall sociocultural environment, which is supposed to sustain passion for and commitment to the adventurous endeavours that come with entrepreneurship, is not as encouraging as that in Western countries.

In summary, the results of the current study reveal that the CECs of Chinese college students are conceptualised and exhibited differently than in the English literature, which is largely based on findings in Western countries. Table 3 presents a summary of the findings and discussion presented above. Note that the lists of CECs, challenges and factors are not exhaustive but are based on the data and scope of the current study.

The findings of this research offer theoretical and practical implications for entrepreneurial education. At the theoretical level, the study's findings enrich our understanding of CECs with evidence from a non-Western context. The fit between the conceptualisation of CECs and the local social context and workplace culture should be explored further. At the practical level, universities should

be committed to developing students' core CECs through social practices instead of solely focusing on entrepreneurial competitions. Furthermore, students should be informed not only about recent developments in CECs at the theoretical level, but also about the practical applications of these competences by the student entrepreneurs in real life.

Despite the fact that the current study complements the literature by offering the perspective of a non-Western emerging economy, one limitation is that we derived our data only from the Chinese context. Although some other countries might share similar patterns, the generalisability of the findings must be verified by future studies employing samples from other cultures. Another limitation is that the current study was unable to provide more solid evidence for the relationships amongst different categories of competences, which is an issue worth investigating (e.g. Rezaei-Zadeh, 2014). Thus, future studies can further explore the construction of CEC categories and their relationships using quantitative methods.

Conclusion

Our study used multiple methods to comprehensively explore the CECs of college student entrepreneurs in China. In particular, it used the Delphi method to conceptualise CECs based on the opinions of key stakeholders and experts in China. The differences between the CECs conceptualised by these experts and those in the literature were explained by different sociocultural contexts and developmental stages. The second contribution of this study is that it used the case study method to examine the conceptualised CECs against their practical applications in real-life entrepreneurial processes. In summary, the results revealed the complex and dynamic reality faced by college student entrepreneurs in China. The theoretical understanding of CECs should be further enriched and sharpened to address real-life challenges.

Appendix A

A congregated hybrid model of competence constructs (adapted from Zdolšek Draksler & Širec, 2018)

	Competence construct	Source/s
1	Competencies for strategic planning for the future	Man (2001), Man et al. (2002), Kyndt and Baert (2015)
2	Competencies of decisiveness and commitment	Man (2001), Man et al. (2002), Kyndt and Baert (2015)
3	Conceptual competencies	Man (2001), Man et al. (2002)
4	Organising competencies	Man (2001), Man et al. (2002)
5	Personal strength competencies	Man (2001), Man et al. (2002)
6	Learning competencies	Man (2001), Man et al. (2002), Kyndt and Baert (2015)
7	Competencies of self-knowledge	Kyndt and Baert (2015)
8	Sustainable behaviour competencies	Kyndt and Baert (2015)
9	Competencies for market insight	Kyndt and Baert (2015)
10	Competencies of recognising opportunities	Man (2001), Man et al. (2002), Kyndt and Baert (2015)
11	Competencies of building networks and relationships	Man (2001), Man et al. (2002), Kyndt and Baert (2015)
12	Ability to persuade	Kyndt and Baert (2015)
13	Independence	Kyndt and Baert (2015)
14	Awareness of potential returns on investments	Kyndt and Baert (2015)
15	Perseverance	Kyndt and Baert (2015)
16	Entrepreneurial knowledge	Moberg et al. (2014)
17	Creativity	Moberg et al. (2014)

Appendix B

Categories, inclusion criteria and numbers of informants selected for the Delphi method

Categories	Inclusion criteria	Number of informants selected
Directors of college student entrepreneurship programmes	Responsible persons and executors of administrative departments for college students' entrepreneurship in colleges and universities	7
Successful college student entrepreneurs	Successful college student entrepreneurs and winners of entrepreneurship competitions	7
Researchers specialising in entrepreneurship education	Experts and scholars studying the entrepreneurship education of college students	7
Established entrepreneurs	Entrepreneurs who are running a successful business	6
Total	27	

Appendix C

Survey 1

SURVEY ON THE ELEMENTS OF COLLEGE STUDENTS' CORE ENTREPRENEURIAL COMPETENCE

(The first round)

Dear experts,

In recent years, there has been a surge of college students starting their own businesses. Although the number of college students with entrepreneurial enthusiasm and intention has been rising continuously, the results of their entrepreneurial activities are not ideal. For college students

who lack both social and financial resources, their core entrepreneurial competence (i.e. the distinguishing competitiveness and unique advantages of entrepreneurs) is an important prerequisite for the success of their entrepreneurship activities.

To explore the elements of core entrepreneurial competences among college students, this study will solicit experts' conceptualisation of the notion of core entrepreneurial competences amongst college students. The experts selected include directors of college student entrepreneurship programmes, researchers specialising in

entrepreneurship education, established entrepreneurs and successful college student entrepreneurs.

The expert survey consists of two rounds. This is the first round. Please fill in the open-ended questions according to your own opinions. Please return this questionnaire before September 20, 2020. Thank you for supporting our survey and research. The results of this study will be sent back to the experts in time, and it is expected to be of reference value to your research and work.

Sincerely,
The Research Group

1. Basic information

If you are a director of a college student entrepreneurship programme, please fill in the following questions:

(1) What is your gender?

Female

Male

(2) What is your highest degree?

Associate Bachelor

Bachelor

Master

Doctor

(3) What type of university do you work at?

Research-based university

Teaching-based university

Higher vocational college

(4) What is your job title? _____

If you are a researcher specialising in entrepreneurship education, please fill in the following questions:

(1) What is your gender?

Female

Male

(2) What type of university do you work at?

Research-based university

Teaching-based university

Higher vocational college

(3) What is your professional title?

Professor

Associate Professor

Assistant Professor

Others

If you are an established entrepreneur, please fill in the following questions:

(1) What is your gender?

Female

Male

(2) What is the name of your company? _____

(3) What is the industry in which your company operates? _____

(4) What is your job title? _____

If you are a college student entrepreneur, please fill in the following questions:

(1) What is your gender?

Female

Male

(2) What is the type of your university?

Research-based university

Teaching-based university

Higher vocational college

(2) Which year are you at this university?

Freshman

Sophomore

Junior

Senior

2. In your opinion, what are the elements of core entrepreneurial competences for college students? (Please fill in at least 5 items.)

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

Evidence for your judgement above and the degree of impact of the evidence provided (Please check the most appropriate box)

Evidence for your judgement	Large impact	Medium impact	Small impact
Practical experience			
Theoretical knowledge			
Consulting statistics			
Intuition			

Your familiarity with the issue surveyed (Please check the most appropriate box)

Degree of familiarity	Very familiar	Familiar	Somewhat familiar	Not very familiar	Not familiar at all
Your self-assessment					

Appendix D

Survey 2

SURVEY ON COLLEGE STUDENTS' CORE ENTREPRENEURIAL COMPETENCES

(The second round)

Dear Experts,

Thank you very much for participating in the first round of our survey on the *Elements of College Students' Core Entrepreneurial Competences*. In the first round, a total of 27 questionnaires were collected, including 7 from researchers specialising in entrepreneurship education, 6 from established entrepreneurs, 7 from directors of college student entrepreneurship programmes and 7 from college student entrepreneurs.

Based on the first round of this survey, the elements of core entrepreneurial competence for college students proposed by experts were extracted and ranked. Thus, the top 10 college students' core entrepreneurial competence were included in this second-round questionnaire: **professional knowledge, innovative spirit, the ability to raise start-up**

capital, the ability to identify and grasp business opportunities, entrepreneurial passion, the ability to organise and coordinate teams, team collaborative spirit, learning ability, the ability to build entrepreneurial teams and adventurous spirit. The purpose of this survey is to determine your thoughts on how important these competences are for the success of college student entrepreneurs. Please rate the 10 competences on a scale from 0 to 8, with 0 being the least important and 8 the most important.

Please finish and return the questionnaire before November 31, 2020. Thank you for your cooperation and support!

Sincerely,

The Research Group

[Same questions as Survey 1 for the background information omitted]

To what extent do you think the following competences of college students are important to the success of student entrepreneurs?

No	Competence	Importance Degree (0 = least important; 8 = most important)								
		0	1	2	3	4	5	6	7	8
1	Professional knowledge									
2	Innovative spirit									
3	The ability to raise start-up capital									
4	The ability to identify and grasp business opportunities									
5	Entrepreneurial passion									
6	The ability to organise and coordinate teams									
7	Team collaborative spirit									
8	Learning ability									
9	The ability to build entrepreneurial teams									
10	Adventurous spirit									

[Same questions as Survey 1 for the expert's evidence of judgement and familiarity of the issue surveyed omitted]

Appendix E

CECs of college students collected in the first round of the Delphi method

Items	Frequency	Percentage
Having a strong professional knowledge foundation and research ability	19	14.1%
Having an innovative spirit and a strong sense of innovation	15	11.1%
Ability to raise start-up funds, such as obtaining funds through competitions or angel investors	15	11.1%
Ability to analyse the market accurately and discover business opportunities in time and conduct rational planning for opportunities from a business perspective	13	9.6%
Having entrepreneurial enthusiasm	10	7.4%
Ability to allocate resources reasonably amongst team members and complete tasks efficiently, achieve efficient and smooth communication amongst team members and form good cultural atmosphere for the team	9	6.7%
Having teamwork spirit and being dedicated to the team	7	5.2%
Having strong learning capability	7	5.2%
Ability to build a united, efficient and stable team when starting a business	7	5.2%
Being adventurous; having the courage to think and act; being agile and proactive	7	5.2%
Ability to maintain connections and possessing good interpersonal skills	4	3.0%
Ability to make good use of government policies	4	3.0%
Having a positive attitude for the future	3	2.2%
Ability to do things calmly	3	2.2%
Having entrepreneurial experience	3	2.2%
Ability to endure hardship and loneliness	2	1.5%
Ability to catch up with the social trends	2	1.5%
Ability to adapt to the society	2	1.5%
Having enough time	1	0.7%
Having a strong business concept	1	0.7%
Having market development capability	1	0.7%
Total	135	100%

Appendix F

Basic information on the selected cases

Classification of colleges and universities	Case name	Responsible person	Industry	Specific fields
Research-based universities	<i>W</i> University, <i>L</i> Network Technology Company	Zhu	Internet Technology	Network marketing software, directory collection software, management software
	<i>W</i> University, <i>X</i> Software Technology Company	Liu	Internet Technology	Architectural 3D image processing and software development
	<i>H</i> University, Case N	Xiao	Mechanical Engineering	Research and development (R&D) of robot equipment
	<i>H</i> University, Case G	Lin	Chemical Engineering	R&D and production of the anti-aging cosmetics
Teaching-based universities	<i>A</i> University of Finance and Economics, Case C	Zhao	Pet Industry	Pet dog marketing
	<i>A</i> University of Finance and Economics, <i>E</i> Technology Studio	Luo	Internet Technology	Virtual host service
	<i>M</i> University of Science and Technology, Case T	Li	Education	Consultation
	<i>M</i> University of Science and Technology, <i>Y</i> Digital Technology Company	Sheng	Art & Design	Advertising, animation game production and software development
Higher vocational colleges	<i>L</i> Higher vocational colleges, <i>A</i> Clothing Trading Company	Zhang	Apparel Industry	Etiquette clothing customisation
	<i>L</i> Higher vocational colleges, <i>X</i> online supermarket	Wang	Retail Business	Online supermarket
	<i>X</i> Higher vocational colleges, Case Z	Xue	Agriculture	Automatic sow feeding system based on information system
	<i>X</i> Higher vocational colleges, <i>Y</i> Calligraphy and Painting Art Training Company	Wu	Education	Calligraphy and painting training; Calligraphy and painting works exhibition and sales

Appendix G

SEMI-STRUCTURED INTERVIEW PROTOCOL FOR COLLEGE STUDENT ENTREPRENEURS

1. Basic information of college student entrepreneurs (gender, age, major, colleges and universities; whether they have held relevant cadre positions; whether their relatives or friends have started businesses).

2. When did you start your own business? What was your motivation? What field did you choose in which to start your business? Where did you obtain the necessary information to start your business?

3. How was your start-up team established? How is your team doing right now? Has the composition of your team changed much since you started your business?

4. How do you communicate with your team members and how do you maintain the sustainable development of the entrepreneurial team?

5. What kind of support did you receive in the process of starting your business? What were your financial sources?

6. What was the greatest difficulty you faced in the process of starting your own business? How did you solve it?

7. What are your opinions on college students starting their own businesses during their period of studying at college?

8. Do you think the knowledge and abilities necessary to start your own business are related to what you learned in college? If yes, how?

9. Have you ever participated in a start-up competition? (Why or why not?) How was your experience? Do you think the experience of participating in the competition helped you start your own business?

10. Do you pay attention to the entrepreneurship education programmes at your university? What measures should be taken by the university from your point of view?

11. What are the advantages and disadvantages of college student entrepreneurs compared to other entrepreneurial groups in society?

12. What kind of core competence do you think college students need to have when starting a business?

Appendix H

Thematic analysis results

Themes for competences that contributed to the success of college student entrepreneurs

Example quotes from the data	Code	Theme	Explanation of the theme
'...this new enterprise application software filled a gap in the existing market...'	Innovating the product	Innovative spirit and ideas	Willingness to explore new things and ability to generate new ideas and concepts
'... we tried to make breakthroughs with the resources of the leading industry–university–research cooperation platform of our university...'	Innovating a field with new technology		
'...it was very rare when we were in the second and third year of university. I thought it was a good business opportunity. Now that nobody does it, I will do it.'	Identifying new opportunities		
'...university students nowadays prefer to stay in the dormitories and buy things online, but they could not wait for several days' delivery (which inspired my online shopping delivery business).'	Exploring the value of a novel idea		
'...I analysed the market of web hosting and saw the potential of the independent blogosphere...'	Seeing the market from a different angle		
'...no matter how busy I am, I will stay in the library for two hours and read books on management and marketing...'	Willingness to learn new things		
'... we won the third place in that entrepreneurial competition and after that, we started our own business...'	Entrepreneurial competition experience	Past experiences and knowledge	Past experiences and knowledge base gained through various experiences now serve as a foundation for entrepreneurial success
'...I did all kinds of casual jobs, which helped me accumulate a lot of experience...'	Working experience		
'...I also started from being a street vendor; the first time I sold a mobile phone pendant made of soft pottery...'	Small-scaled entrepreneurial experience		
'...from the second semester, I began to study the market along with my art and design studies...'	Knowledge about the market		
'...I chose the area of software development because I had disciplinary advantages and understood this field better...'	Professional knowledge		
'...to get to where I am today, a large part of it is due to my super strong endurance...'	Endurance	Personal qualities that can deal with difficulties	Various personal traits that help the students retain their entrepreneurial motivation even in the face of difficulties
'...I spent all my time on it without any leisure...'	Hard working		
'...if you hold back in the face of difficulties, it means that you do not have this ability, but if you persist, then it is a kind of growth for you.'	Persistence		
'...there was difficulty, but what we were after was the challenge.'	Willingness to face challenges		
'...I am quite confident in the prospect of this project, and our goal is to make it the most well-known university brand within three years.'	Strong confidence		
'...after a period of running-in, we gathered seven people in our team which had a clear division of labour and ran very well...'	Building a team at the start up stage	Entrepreneurial team building and management	Abilities associated with entrepreneurial team building and management

Table h continued

Example quotes from the data	Code	Theme	Explanation of the theme
'...what I cherish the most is the team I work with... We have built very good rapport...'	Managing the teams efficiently		
'...(I) started by working with CommonMedia in the United States and got my first start-up capital...'	Start-up fund	Resources	Various financial and social resources that facilitate successful entrepreneurship activities
'...(In my) freshman year, I accumulated a sum of money through work-study...'	Personal savings		
'...By chance, I met a peer who had successfully started a business, thus inspiring me a lot...'	Interpersonal relationship resources		
'...I engaged in a lot of social activities that improved my practical skills...'	Practical skills	Skills	Specific skills used in conducting entrepreneurial activities
'...our products not only relied on our professional advantages but also the key laboratories of our university...'	Professional skills		
'...we strived to keep the brand moving smoothly through a variety of strategies...'	Strategic planning skills		

Themes for the challenges met by college student entrepreneurs

Example quotes from the data	Code	Theme	Explanation of the theme
'...although there are many financial support policies for college students to start a business, the threshold is too high. For example, financial assistance requires applicants to be local residents and provide corresponding real estate guarantees and mortgages...'	Lack of resources for product transfer	Difficulty in transferring innovative ideas to actual products	Factors that serve as obstacles to the transfer of innovative ideas to actual products
'...the business needs to participate in the bidding, there is no way... I had to learn about drafting tenders online...'	Lack of knowledge on product transfer		
'...the practical problems we encountered were different from the those I experienced during the entrepreneurial competition I participated in...'	Differences between competition and real-life production		
'...many practical problems encountered in the process of entrepreneurship—whether in marketing or management—cannot find clear answers in books and classrooms...'	Lack of management experiences	Lack of knowledge and experience in running a business	Challenges met in the process of running a business that can be attributed to the lack of knowledge and experiences
'...because of the lack of market research, the company had a loss of more than 30,000 yuan...'	Lack of insights into the market		
'...there was the price competition, and it was really hard to manage cooperative relationships... several companies in the industry slandered our brand on the Internet, resulting in great loss...'	Lack of experience in crisis management		

Example quotes from the data	Code	Theme	Explanation of the theme
'The team members became very busy due to reasons, such as graduation and work, and many people chose to quit... The instability of the technical team was a problem I had been worried about.'	Lack of time amongst team members	Difficulty in sustaining the team	Challenges met in the process of running a business that are related to sustaining the team
'...most of them are more inclined to find stable return jobs rather than engage in entrepreneurship, and the loss of core members has become a hindrance to development the enterprise.'	Traditional ideas of team members		
'...engineering students face good employment prospects, and some members are more willing to go to large enterprises after graduation...'	Different personal priorities of team members		

References

- Arafeh, L. (2016). An entrepreneurial key competencies' model. *Journal of Innovation and Entrepreneurship*, 5(1), 1–26. <https://doi.org/10.1186/s13731-016-0048-6>
- Bacigalupo, M., Kampylis, P., Punie, Y., & Van den Brande, G. (2016). *EntreComp: The entrepreneurship competence framework*. Publication Office of the European Union, 10, 593884.
- Bergevoet, R. H., & Woerkum, C. V. (2006). Improving the entrepreneurial competencies of Dutch dairy farmers through the use of study groups. *Journal of Agricultural Education and Extension*, 12(1), 25–39. <https://doi.org/10.1080/13892240600740852>
- Bird, B. (1995). Towards a theory of entrepreneurial competency. *Advances in Entrepreneurship, Firm Emergence and Growth*, 2, 51–72.
- Boojihawon, D. K., Dimitratos, P., & Young, S. (2007). Characteristics and influences of multinational subsidiary entrepreneurial culture: The case of the advertising sector. *International Business Review*, 16(5), 549–572. <https://doi.org/10.1016/j.ibusrev.2007.06.003>
- Boyatzis, R. (1982). *Competent manager: A model for effective performance*. Wiley.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A reflexive approach*. Retrieved December 13, 2021, from <https://www.psych.auckland.ac.nz/en/about/thematic-analysis.html#af953c2f208a5c63944b74a75e437ba5>
- Brown, R. A. (2018). *Chinese business enterprise in Asia* (Vol. 7). Routledge.
- Cardon, M. S., Post, C., & Forster, W. R. (2017). Team entrepreneurial passion: Its emergence and influence in new venture teams. *Academy of Management Review*, 42(2), 283–305. <https://doi.org/10.5465/amr.2014.0356>
- Chandler, G. N., & Hanks, S. H. (1994). Founder competence, the environment, and venture performance. *Entrepreneurship Theory and Practice*, 18(3), 77–89.
- Cui, J., Sun, J., & Bell, R. (2021). The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes. *The International Journal of Management Education*, 19(1), 100296. <https://doi.org/10.1016/j.ijme.2019.04.001>
- Filatotchev, I., Chahine, S., Wright, M., & Arberk, M. (2005). Founders' characteristics, venture capital syndication and governance in entrepreneurial IPOs. *The International Entrepreneurship and Management Journal*, 1(4), 419–439.
- Gao, G. J., & Su, Y. (2013). An empirical study of entrepreneurial competence of college students: Construct and concept. *Higher Education Development and Evaluation*, 29(3), 27–35.
- Gartner, W. B. (1988). 'Who is an entrepreneur?' is the wrong question. *American Journal of Small Business*, 12(4), 11–32. <https://doi.org/10.1177/104225878801200401>
- Guo, L. C. (2016). How can we replace entrepreneurship education with entrepreneurship competition? *China Education Newspaper*, June 10.
- He, J., Liu, J., & Cheng, G. (2019). The deepening of innovation and entrepreneurship education and the reform of local colleges and universities. In *2018 8th International conference on education and management (ICEM 2018)* (pp. 108–112). Atlantis Press. <https://doi.org/10.2991/icem-18.2019.29>
- Hofstede, G., Neuijen, B., Ohayv, D. D., & Sanders, G. (1990). Measuring organizational cultures: A qualitative and quantitative study across twenty cases. *Administrative Science Quarterly*. <https://doi.org/10.2307/2393392>
- Hofstede Insights. (2018). *Country comparison*. Hofstede Insights. Retrieved December 2, 2021, from www.hofstede-insights.com/country-comparison/china,the-uk/
- Izquierdo, E., & Deschoolmeester, D. (2010). What entrepreneurial competencies should be emphasized in entrepreneurship and innovation education at the undergraduate level? In *Handbook of research in entrepreneurship education: International perspectives* (pp. 1–14). Edward Elgar Publishing Limited.
- Jeste, D. V., Ardelt, M., Blazer, D., Kraemer, H. C., Vaillant, G., & Meeks, T. W. (2010). Expert consensus on characteristics of wisdom: A Delphi method study. *The Gerontologist*, 50(5), 668–680. <https://doi.org/10.1093/geront/gnq022>
- Kellermanns, F. W., Eddleston, K. A., Barnett, T., & Pearson, A. (2008). An exploratory study of family member characteristics and involvement: Effects on entrepreneurial behavior in the family firm. *Family Business Review*, 21(1), 1–14. <https://doi.org/10.1111/j.1741-6248.2007.00107.x>
- Kyndt, E., & Baert, H. (2015). Entrepreneurial competencies: Assessment and predictive value for entrepreneurship. *Journal of Vocational Behavior*, 90, 13–25. <https://doi.org/10.1016/j.jvb.2015.07.002>
- Li, J., Qu, J., & Huang, Q. (2018). Why are some graduate entrepreneurs more innovative than others? The effect of human capital, psychological factor and entrepreneurial rewards on

- entrepreneurial innovativeness. *Entrepreneurship and Regional Development*, 30(5–6), 479–501. <https://doi.org/10.1080/08985626.2017.1406540>
- Li, Y. (2017). Investigation on contemporary college students' entrepreneurship status quo and education guidance countermeasures research. *Educational Research*, 38(02), 65–72.
- Li, Y., Feng, N., Feng, Y. K., He, J., & Huang, C. (2021). An analysis of factors influencing entrepreneurial opportunity identification of college students. *Shangxun*, 26, 195–196.
- Lin, C., Pan, Y., Wu, Y. J., & Wang, L. M. (2019). The effects of entrepreneurship education on entrepreneurial intention among university students in China. In *Dynamic perspectives on globalization and sustainable business in Asia* (pp. 328–346). IGI Global. <https://doi.org/10.4018/978-1-5225-7095-0.ch020>
- Liu, T., Walley, K., Pugh, G., & Adkins, P. (2020). Entrepreneurship education in China: Evidence from a preliminary scoping study of enterprising tendency in Chinese university students. *Journal of Entrepreneurship in Emerging Economies*, 12(2), 305–326. <https://doi.org/10.1108/JEEE-01-2019-0006>
- Liao, Y. X. (2015). Research on entrepreneurship competency model of college students. PhD Dissertation, Guangxi Normal University.
- Lu, L., Hu, R. C., & Dan, B. (2014). Developed countries' entrepreneurship measurements towards college students and its reference to China. *China Higher Education Research*, 08, 55–60.
- Lyu, J., Shepherd, D. M., & Lee, K. (2021). Teaching entrepreneurship in China: Culture matters. *International Journal of Entrepreneurial Behavior and Research*, 27(5), 1285–1310. <https://doi.org/10.1108/IJEER-09-2020-0653>
- Ma, Y. B., & Bai, Z. (2015). Research and exploration on the practice mode of university innovation and entrepreneurship education. *Tsinghua Journal of Education*, 6, 99–103. <https://doi.org/10.14138/j.1001-4519.2015.06.009905>
- Man, T. W. (2001). Entrepreneurial competencies and the performance of small and medium enterprises in the Hong Kong services sector. PhD Dissertation, The Hong Kong Polytechnic University.
- Man, T. W., Lau, T., & Chan, K. F. (2002). The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing*, 17(2), 123–142. [https://doi.org/10.1016/S0883-9026\(00\)00058-6](https://doi.org/10.1016/S0883-9026(00)00058-6)
- Martin, A. (1982). Additional aspects of entrepreneurial history. In *Encyclopedia of entrepreneurship* (pp. 15–19). Edward Elgar.
- Mei, W., & Symaco, L. (2020). University-wide entrepreneurship education in China's higher education institutions: Issues and challenges. *Studies in Higher Education*. <https://doi.org/10.1080/03075079.2020.1735330>
- Mill, J. S. (1848). Principles of political economy with some of their applications. *Social Philosophy*. Retrieved August 15, 2021, from <https://competitionandappropriation.econ.ucla.edu/wp-content/uploads/sites/95/2020/12/AshleyIntro.pdf>
- Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: A literature review and development agenda. *International Journal of Entrepreneurial Behavior and Research*, 16(2), 92–111. <https://doi.org/10.1108/13552551011026995>
- Moberg, K., Vestergaard, L., Fayolle, A., Redford, D., Cooney, T., Singer, S., & Filip, D. (2014). *How to assess and evaluate the influence of entrepreneurship education: A report of the ASTEE project with a user guide to the tools*. The Danish Foundation for Entrepreneurship-Young Enterprise.
- Murphy, M. K., Black, N. A., Lamping, D. L., McKee, C. M., Sanderson, C. F., Askham, J., & Marteau, T. (1998). Consensus development methods, and their use in clinical guideline development. *Health Technology Assessment (Winchester, England)*, 2(3), i–88. <https://doi.org/10.4135/9781848608344>
- Muñiz-Rodríguez, L., Alonso, P., Rodríguez-Muñiz, L. J., & Valcke, M. (2017). Developing and validating a competence framework for secondary mathematics student teachers through a Delphi method. *Journal of Education for Teaching*, 43(4), 383–399.
- Othman, N., Othman, N. H., & Ismail, R. (2012). Impact of globalization on trends in entrepreneurship education in higher education institutions. *International Journal of Trade, Economics and Finance*, 3(4), 267.
- Penchev, P., & Salopaju, A. (2011). Entrepreneurial competencies needed by managers in their work. Master Dissertation, Jönköping University.
- Pinillos, M. J., & Reyes, L. (2011). Relationship between individualist–collectivist culture and entrepreneurial activity: Evidence from Global Entrepreneurship Monitor data. *Small Business Economics*, 37(1), 23–37. <https://doi.org/10.1007/s11187-009-9230-6>
- Rasmussen, E., Mosey, S., & Wright, M. (2011). The evolution of entrepreneurial competencies: A longitudinal study of university spin-off venture emergence. *Journal of Management Studies*, 48(6), 1314–1345. <https://doi.org/10.1111/j.1467-6486.2010.00995.x>
- Reis, D. A., Fleury, A. L., & Carvalho, M. M. (2020). Consolidating core entrepreneurial competences: Toward a meta-competence framework. *International Journal of Entrepreneurial Behavior and Research*, 27(1), 179–204. <https://doi.org/10.1108/IJEER-02-2020-0079>
- Rezaei-Zadeh, M. (2014). An analysis of core entrepreneurial competencies, their interdependencies and their cultivating approaches in virtual education using a collective intelligence methodology. PhD Dissertation, University of Limerick.
- Rezaei-Zadeh, M., Hogan, M., O'Reilly, J., Cunningham, J., & Murphy, E. (2017). Core entrepreneurial competencies and their interdependencies: Insights from a study of Irish and Iranian entrepreneurs, university students and academics. *International Entrepreneurship and Management Journal*, 13(1), 35–73. <https://doi.org/10.1007/s11365-016-0390-y>
- Robles, L., & Zárraga-Rodríguez, M. (2015). Key competencies for entrepreneurship. *Procedia Economics and Finance*, 23, 828–832.
- Roman, T., & Maxim, A. (2017). National culture and higher education as pre-determining factors of student entrepreneurship. *Studies in Higher Education*, 42(6), 993–1014. <https://doi.org/10.1080/03075079.2015.1074671>
- Schumpeter, J. A. (1934). *The theory of economic development*. Harvard University Press.
- Seo, E., Ryu, J., & Hwang, S. (2020). Building key competencies into an environmental education curriculum using a modified Delphi approach in South Korea. *Environmental Education Research*, 26(6), 890–914. <https://doi.org/10.1080/13504622.2020.1733493>
- Tang, Z. M., & Miao, Y. X. (2011). Policy analysis on entrepreneurship of college graduates in China. *First Resource*, 02, 69–84.
- The Consortium for the Entrepreneurship Education. (2010). *Entrepreneurship Competency Model*. The Consortium for the Entrepreneurship Education. Retrieved August 15, 2021, from <http://www.careeronestop.org/competencymodel/competency-models/entrepreneurship.aspx>
- Thomas, A. S., & Mueller, S. L. (2000). A case for comparative entrepreneurship: Assessing the relevance of culture. *Journal of International Business Studies*, 31(2), 287–301. <https://doi.org/10.1057/palgrave.jibs.8490906>
- Timmons, J. A. (1979). Careful self-analysis and team assessment can aid entrepreneurs. *Harvard Business Review*, 57(6), 198.

- Tu, M. (2018). *Education, migration and family relations between China and the UK: The transnational one-child generation*. Emerald Group Publishing.
- Vasanth Kumara, S. A., & Sahasranam, C. (2009). Entrepreneurial characteristics among business management students: An empirical study. *The Icfai Journal of Management Research*, 8, 7–29.
- Wong, W. K., Cheung, H. M., & Venuvinod, P. K. (2005). Individual entrepreneurial characteristics and entrepreneurial success potential. *International Journal of Innovation and Technology Management*, 2(03), 277–292. <https://doi.org/10.1142/S0219877005000502>
- Yan, X., Gu, D., Liang, C., Zhao, S., & Lu, W. (2018). Fostering sustainable entrepreneurs: Evidence from China college students' 'Internet Plus' innovation and entrepreneurship competition (CSIPC). *Sustainability*, 10(9), 3335. <https://doi.org/10.3390/su10093335>
- Yao, S. M. (2009). Exploration on the definition of core entrepreneurial competence of college students. *Education and Vocation*, 36, 155–157. <https://doi.org/10.3969/j.issn.1004-3985.2009.36.068>
- Yu, C. W. (2018). Understanding the ecosystems of Chinese and American entrepreneurship education. *Journal of Entrepreneurship Education*, 10, 15–50.
- Zdolšek Draksler, T., & Širec, K. (2018). Conceptual research model for studying students' entrepreneurial competencies. *Nашe Gospodarstvo/Our Economy*, 64(4), 23–33. <https://doi.org/10.2478/ngoe-2018-0020>
- Zhao, Q. N., & Qi, X. (2013). The classified management of higher education institutions: Connotations and concrete contents. *Educational Research*, 08, 48–56.
- Zhejiang University Research Team. (2009). *The classification of higher education in China*. Higher Education Press.
- Zhou, J. (2016). Research on sustainable development of college student entrepreneurial team. *Journal of Lanzhou Vocational Technical College*, 32(6), 75–76.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.