Entrepreneurship Education and Design Thinking:

A Conceptual Threshold for Their Integration in Indonesian Higher Education

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Abstract—Many ongoing discussions in design thinking show similarities to the current entrepreneurship education debate on integrating both disciplines in the context of higher education. In that case, some articles from the developed countries, have addressed this issue, though fragmentedly. In contrast, this integration-educational type is rarely found in developing countries, particularly Indonesia. Additionally, very few studies have broadened the discussion to include the teaching entrepreneurship-design thinking process cycle and the conceptual threshold to support the integrated teaching process. This paper uses the narrative literature review and in-depth qualitative case-study discussion as the methodology. It aims to establish a conceptual link and threshold between these two areas and provide conceptual strategies for integrating and teaching them in Indonesian higher education. The finding of this study is the five-main entrepreneurship-design thinking process cycle, which strongly incorporates the "empathy-reflect-visualize" cycle and the integrated conceptual threshold as a teaching support tool. This conceptual study provides new pathways for enriching current teaching and research practices of entrepreneurship education and design thinking.

Keywords—design thinking, entrepreneurship in higher education, conceptual threshold, pedagogy, Indonesia

1 Introduction

Existing discussions in design thinking show many studies continue to debate how to integrate it with entrepreneurship education (see, e.g., [1]; [2]). One of the primary rationales is that business schools and higher education institutions (HEIs) worldwide have received much critics. They have sent voluminous ill-equipped graduates into an increasingly turbulent business environment [3]. That claim has emerged because many HEIs may have been relied "too much" on analytical ability imparted in the entrepreneurship education curriculum. From the current economic-global perspective, the quality of graduates' outcomes is insufficient. Therefore, there come many suggestions to incorporate several learning perspectives related to more contemporary

and applicable entrepreneurial skills, such as problem-based [4], experimental-based [5], and design-based learning [6]. The latter perspective appears in the literature as *design thinking*, which nowadays refers to a thinking methodology that can tackle complex business problems, complementing today's young graduates [7].

The widespread design thinking as a creative problem-solving process suggests that HEIs can consider a significant change in entrepreneurship education. Design thinking is an engaging way for students to learn about user empathy, multidisciplinary team projects, problem-solving, creativity, divergent and convergent modes of thinking, iteration process, not-afraid of failure, persistence, and resilience, and a solid motivation to change "a better world" [8]. It enables entrepreneurship educators to integrate many essential design thinking concepts with the related entrepreneurship courses. Thus, it allows students to develop their creative confidence and improve their entrepreneurship perceptions as a rewarding future career. However, studies that have incorporated both disciplines are most likely from developed countries (see, e.g., [9] in Denmark; [10] in the US). Additionally, they have not yet covered a clear picture concerning what elements should be included in integrating entrepreneurship education and design thinking within the higher education context, particularly with the related objectives, activities, tools, and intended results [11].

Furthermore, concerning Indonesia, both entrepreneurship education and design thinking are relatively recent in the Indonesian case. There are still very few Indonesian HEIs and textual case studies in the literature that offer both courses and their integrated teachings [12]. One of the very few exceptions is the School of Business Management, Bandung Institute of Technology (SBM-ITB) [13].

Those circumstances above become paramount for this study to address a research need, i.e., propose a *conceptual integration threshold* of entrepreneurship education and design thinking implemented in HEIs in developing countries. The need to create a conceptual threshold is significant because it could be used as a *proposition* or *starting point* for further research and investigation to examine whether entrepreneurship education and design thinking can be either wholly or partly integrated, especially in Indonesia.

The following is the methodology employed in this study, followed by the narrative literature review of entrepreneurship education and design thinking. The result and discussion will then continue to address how to conceptually integrate both disciplines and adjust to the Indonesian higher education context. Finally, this study will explain the conclusion, limitation, and further research implications at the end.

2 Methodology

The present study employed a narrative literature review [14] and qualitative case-study textual discussion [15], [16].

Some primary reasons are the following. First, there are still unconnected theories on entrepreneurship education and design thinking (see e.g., [9]; [17]). Second, various studies may have conceptualized the existing ideas within diverse research areas [18]. For example, [10] incorporate design thinking in the business curriculum for the

business field and engineering and informatics ones. The option of systematic literature methodology (e.g., [19]) is prominent, but it might be less straightforward. Therefore, this study uses narrative literature to pull many pieces of knowledge together in a broad perspective and describe a topic's extensive process [14].

Studies have shown that the narrative literature method is valuable, as it represents a wide range of published scientific articles in some fields, for instance, medicine and health (e.g., [20]; [21]) and education sciences [22]. However, some other studies have also criticized the method for limitedly employing peer-reviewed methodologies [23]. Despite the above differences, the narrative reviews continue to remain solid in the methodological literature. It offers extensiveness of the literature exploration and flexibility to deal with progressing theory and knowledge [24].

Concerning the qualitative case-study discussion, this study is intended to serve as a starting point and open a new gate for the relatively new research field of entrepreneurship education and design thinking at the Indonesian higher education level. Thus, we intentionally selected the "textual" case from the existing literature. In particular, the School of Business Management, Bandung Institute of Technology (SBM-ITB), Indonesia) [25]; [13]. The main reason is that the institution itself offers design thinking courses in its entrepreneurial pedagogy. The respective textual articles are available in the existing literature, although the number is still limited.

Finally, the main aims of the study are to establish a threshold between these two areas and provide *conceptual* strategies for integrating and teaching entrepreneurship education and design thinking in Indonesian higher education despite the limited time and resources available. Therefore, we believe that the narrative review and qualitative case-study discussion are valuable in this study. Some potential contributions by employing the narrative literature review are an extensive summary of the progress of entrepreneurship education and the primary characteristics and process stages of design thinking extracted and integrated from the note-taking process. We then combined the resulting narrative literature with some qualitative analysis from the textual case study (i.e., SBM ITB, Indonesia) to offer a conceptual threshold of integrating entrepreneurship education and design thinking for the case of Indonesian higher education. The resulting threshold could enrich the theoretical knowledge of both disciplines and expose a new gate for further research on the applicability and adaptability of entrepreneurship education and design thinking, especially in developing countries – in this case, Indonesia.

3 Literature review

3.1 Evaluations of entrepreneurship education

In the past, research in entrepreneurship education concentrated on overcoming the misconception that entrepreneurs are born, not made [26]. The controversy centered around an attribute-based versus a competency-based approach. The former process argues that entrepreneurs are born with unique, innate traits, so entrepreneurship is not learnable [27]. In support of the trait-based process, some studies found differ-

ences in entrepreneurs personality traits compared to managers, as an example, risk propensity and achievement motivation [28], as well as primary five personality features [29]. In contrast, the competency-based approach argues that entrepreneurship is being developed and learned [30]. Furthermore, those inherent qualities of entrepreneurs arguably do not fully explain entrepreneurial activity and success [31]. As such, factors aside from personality could highly contribute to entrepreneurial activity and enhance entrepreneurial success. For instance, individuals do not simply know how to write a business plan and spot opportunities. Instead, they learn and improve these skills through education [32]. Therefore, the research question has shifted from whether we can teach entrepreneurship to how we teach entrepreneurship [31].

Concerning "how to teach entrepreneurship," traditional pedagogical and teaching methods in entrepreneurship and business education in higher education institutions (HEIs) are mostly lectures and targeted nascent entrepreneurs [33]. Those old-fashion methods underscore a behaviorist approach that focuses on transferring and reproducing knowledge, encouraging passivity in student learning [34]. In this case, business schools and HEIs have received many critics for many years to send their voluminous ill-equipped graduates into an increasingly turbulent business environment [3]; [35]. This situation suggests that the exclusive reliance on analytical ability (i.e., behavioristic paradigm) imparted in the entrepreneurship education of HEIs' system is no longer adequate in the current globalization perspective, thereby encouraging the plan to move forward passive to active teaching methods.

Accordingly, contemporary business educators suggest incorporating several more perspectives into the current business and entrepreneurship education curriculum. This movement from passive methods is paramount because it signifies greater recognition that entrepreneurs learn from actual business experience [36], whether positive or negative [37]. As such, more hands-on learning emerged as more educators and researchers began to teach about real-world opportunities and skills as efficient pedagogics [33]. Some examples are problem-based learning [4], student business start-ups, live cases, and business simulations [5] or even online- or digital-based classroom (see e.g., [38]; [39]; [40]). Those methods above encourage active learning through solving real-life problems, which enable knowledge and learning to be more readily transferable to the practical business world [34].

Furthermore, those 'active' teaching methods introduced an experimental feature that traditional ones lack. Experimentation is crucial because it allows a learner to check and validate different assumptions then learn from those experiments' results [41]. By implementing them, the students' role becomes increasingly attached to greater use of hands-on learning, while the educators' role becomes more of a facilitator within the student's learning process [42].

The contemporary teaching methods mentioned above exhibit both a constructivist and experiential learning process to teaching and learning [33]. First, the constructivist view suggests that the learning process should involve "active participation" for getting the latest understanding [34], p. 280. Then, the experiential learning view suggests learning as "the process whereby knowledge accumulates through the transformation of experience" [43], p. 194. According to [44], experiential learning means a holistic, comprehensive, and integrative perspective that combines students' learn-

ing experience, perception, thinking, and behavior. Students, in this learning type, could gain concrete experiences that enable reflective observation of the case. This reflection follows the empathetic-thinking stage and abstract conceptualization, which pushes students to the active experimentation stage. Therefore, this cycle of "empathy-reflect-visualize" for the entrepreneurial teaching method and students' learning process is beneficial. It emphasizes the learner's central role to be life participants in their learning experiences [31]. Such methods facilitate "deep learning whereby students develop a non-public understanding of the fabric instead of simply retention of knowledge" [45], p. 106.

Lastly, another perspective that most likely relates with applicable skills of constructivist and experiential learning approach is "design" [6]. This design perspective appears in the literature as *design thinking*. It refers to a thinking methodology that can tackle complex business problems, complementing today's young graduates [7]. The widespread of design thinking as a process of creative problem solving around the world suggests that business schools and HEIs should consider design thinking as a profound approach to give significant changes in the entrepreneurial teaching methods, objectives, activities, and intended results. The following highlights the fundamental concepts of design thinking: definitions, characteristics, and processes.

3.2 Understanding design thinking: Definitions

The discourse of design thinking is not new. The term was first acknowledged in 1987 by Rowe when he published a book titled "Design Thinking" [46], describing the systematic use of problem-solving procedures in architecture within the realm of design cognition. However, [47] has analyzed the nature of design already eighteen earlier and acknowledged 'design' to encompass all conscious activities to create artifacts and distinguished it from natural science, social science, and humanities. Engineering sciences were also used to develop and apply design thinking as their methodologies and were initially associated with the way designers think [48]. Today, design thinking is a course set in which students work on real-world design challenges given to them as corporate partners. This concept of teaching is now available in several academic institutions and design schools around the world. They often use a particular term, "design-based learning," which refers to a model for enhancing creativity, endurance, engagement, and innovation [49].

Conceptually, the categorization for the roots of design thinking has five subdiscourses: (1) design thinking as the creation of artifacts; (2) design-thinking as a reflexive practice; (3) design thinking as a problem-solving activity; (4) design thinking as a way of reasoning or making sense of things; and (5) design thinking as the creation of meaning. This categorization is also applicable to the past literature that has revealed various ways to define, interpret, and conceptualize design thinking.

In this regard, several definitions, concepts, and interpretations exist in the literature about design thinking. Within the realm of design, design thinking refers to designers' cognitive processes [50]. The term has been developed even more widely and has also become a part of the management realm. It generally associates with a mindset for solving complex-wicked problems in diverse contexts beyond design and en-

couraging innovations [51]. It also brings principles, a methodology, and a collection of tools to realize how both emotional and rational aspirations come into play in innovative problem-solving [2]. However, some commentators argue that the existing definitions of design thinking may be too vague because of the dichotomy between scientific rigor and the relevance for professional practice (e.g., [52]; [53]). So, they suggest three design thinking domains, i.e., as a cognitive style, as an embedded principle in professional practice, and as a method to guide the process of designing. Considering the scope of this study is in the entrepreneurship education realm, the first stance of design thinking, which is as a thinking methodology ('cognitive style') in the problem-solving process, will be used.

3.3 Characteristics of design thinking

Many attributes define design thinking characteristics. Previous literature that explores design thinking often articulates a mix of elements and approaches required to see design thinking realized in individuals as *design thinkers* and how they practice design thinking "ideal" attributes within the organizations [54]. However, design thinking is not a set of fixed features; instead, situated and contextual [51]. Thus, it is possible to find an overlapping space between different studies [55], especially between design thinking and design thinkers' characteristics, as the latter perform the former [56]. It is also not easy to refine the precise understanding of the design thinking characteristics and attributes. Many studies often describe their elements based on circumstantial evidence rather than empirical research [57].

Nonetheless, design thinking has primary characteristics in common, and thereby, it is essential to categorize them to create a more meaningful purpose. [58] group the features into procedural and people perspectives. The procedural perspective refers to the rules, structure, and threshold (such as human-centeredness, collaboration, and experimentation). Whereas the human perspective refers to personal characteristics, attitudes, and contributions (for example, being versatile, having broad-spectrum thinking, and a strong personality). Similarly, [59] have separated several design attributes into cognitive (consideration) and behavioral (doing), and affective (feeling) components of a mindset. Grouping design thinking attributes could establish a threshold for anyone to deal with and manage innovation operationally and strategically, from business to education.

While such a perspective could help understand the nature of design thinking, it is impossible to separate the reflection from doing the design practice (i.e., behavioral attributes) and from the individuals' thought (i.e., designer's cognitive elements or, in this case as 'design thinkers') [60]. Therefore, presenting the main characteristics of design thinking and then followed by the related attributes of design thinkers, both in cognitive and behavioral components within each characteristic's theme, could be one alternative. Table 1 provides a list of design thinking five main elements and their mental and behavior attributes.

Table 1. Design thinking five-main characteristics and the cognitive and behavior attributes extracted from literature

Design thinking characteristics	The related cognitive and behavior attributes
Human-centered and empathetic	Empathy focuses on human values, seeing and understanding customers' value and needs; observational and curious; and environment-centered concern.
Collaboration and communicative team-work	Multi-disciplinary collaboration and embracing diversity; the ability for team-work; cross-disciplinary pollination; interdisciplinary teams; ability to visualize ideas and communicate; and tolerance (deferring judgment).
Experimentation and iterative	The Experimental, pragmatic and explorative mentality; ideation and time-framing experimentation; thinking by doing; experiential intelligence; and action-oriented behavior.
Versatile and broad-spectrum thinking styles	Situated and systemic thinking; critically questioning; integrative (divergent and convergent) thinking; holistic thinking; abductive reasoning; reframing the problem or situation; and think and work systematically.
Firm mentality and personality	Curious and open to learning; being mindful; accept uncertainty, ambiguity, and risk; strong motivation to make a difference; being a model behavior; optimistic; future-oriented; creative; inventive; and generalist.

Overall, the essential characteristic of design thinking is firstly human-centered and empathetic. The application of design thinking as a practice-based method starts by approaching a problem from a human perspective [53]. Then, design thinking is about creating a better environment with radical collaboration as it enables "break-through enlighten and solutions to emerge from the diversity" [61]. The third characteristic is the attitudes of experimentation. As the design thinking process is non-sequential, individuals may undergo feedback loops, so practicing this attribute could be experimental, pragmatic, and explorative and have the out-of-the-box imagination. Moreover, when experiencing design thinking, individuals should practice versatile and broad-spectrum thinking to question critically; use integrative-holistic thinking, abductive reasoning, and reflective reframing; and think systematically to create novel solutions. Lastly, the strong mentality and personality reflect curiosity, openness, mindfulness, and a solid motivation to improve.

3.4 Process cycle of design thinking

Initial design thinking approaches were circular and brought by [47], consisting of several stages: define, ideate, prototype, choose, implement, and learn. Within this so-called "prototypical" design thinking process, a designer understands a problem, creates ideas, and generates the best solution [56]. Moreover, [62] introduced IDEO's design thinking approach in his seminal article in the Harvard Business Review. He outlined examples and sketched the design thinking circular process of inspiration, ideation, and implementation [1].

Several other emerging design thinking approaches also prefer sequential approaches for didactical reasons. The commonality of sequential and circular processes is in the iterate circle. For example, [63] sequential approach (i.e., understand, observe, point of view, ideate, prototype, and test) has outlined vital advancements in the design thinking field. Similarly, both the Hasso Plattner Institute in Germany and

Stanford University in the USA have used this academic institution method. [2] approach in the business education and entrepreneurial areas consists of four sequential phases, and the techniques were developed based on their practical teaching and consulting experiences. The phases are:

- What is? (Explores current reality, assesses problems, and identifies opportunities);
- What if? (Envisions the future by developing hypotheses from the current trends);
- What wows? (Generates manageable solutions from various possibilities);
- And what works? (Evaluates the answers and takes them into the marketplace).

Today, design thinking has emerged as a practical problem-solving methodology in other non-design fields, such as business and education. There are numerous approaches for design thinking within the literature [62] that address design thinking structured way. The design thinking process consists of several stages from the earlier models and can be linear or circular. As such, it may return to the starting pitch and begin a new iteration. It may also include various feedback loops between stages and may even have several locations taking place in parallel. In this matter, identifying the most common elements of design thinking entails a juxtaposition of different approaches. Therefore, this study argues that it could be more beneficial to view the process stages as "a cycle model" instead of sequential steps [62]. Figure 1 illustrates the five major stages of the design thinking process 'cycle' that this study has extracted from the literature- The primary phases: understand the problem comprehensively, generating ideas; experimenting iteratively; testing the solutions; and implementing solutions.

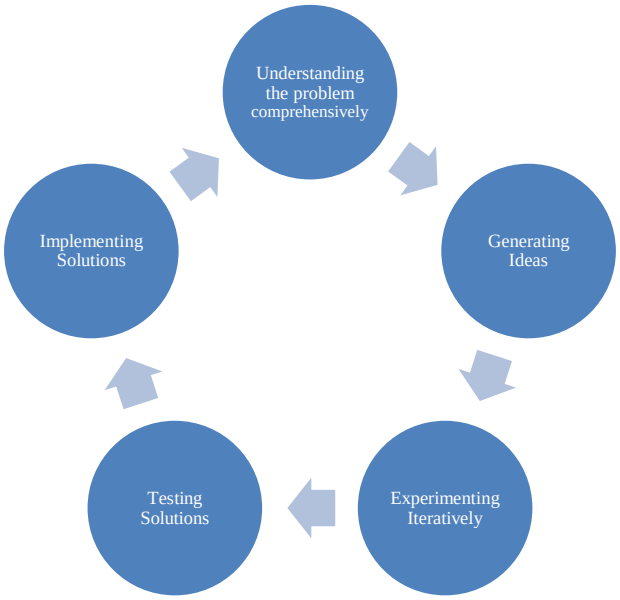

Fig. 1. The five-primary stages of design thinking process extracted from the literature

In conclusion, this study believes that most definitions of design thinking in the literature contain some primary aspects. The goal is to develop a new solution for existing or future problems; orientation is users, the process is iterative, and the participants are multidisciplinary teams. In other words, the approach could help understand the problem context from the users' point of view, creativity to generate ideas and insights, rationality, and to analyze and find innovative solutions from the users' feedback. The expansion of design thinking, especially to entrepreneurship education, offers an exciting new paradigm but requires further explorations of definitions, threshold, toolboxes, and suggested practices for integration to support its implementations and effectiveness possibly.

The following is the discussion on how this study connects and integrates the two disciplines of entrepreneurship education and design thinking and acknowledges some literature that has incorporated them in the academic curricula but at the same time reveals a gap that this study finds to be a research need.

4 Result: Connecting and integrating entrepreneurship education and design thinking

4.1 The "Entrepreneurship-design thinking" process cycle

Design thinking has been well-known as an efficient approach for tackling highly ambiguous situations and unveiling unanticipated problems in many research areas [64]. Notably in the educational field of management [65], in entrepreneurship [9], and social entrepreneurship [66]. It provides a way to introduce students to elaborate, ill-defined entrepreneurial problems with unclear means-end relationships, preparing them for what they will meet as graduates [65]. Therefore, design thinking can be highly relevant for entrepreneurship education [67] as it further provides vast opportunities for non-traditional engagement with industry partners [68].

However, entrepreneurship education and design thinking can be seen as very distinct disciplines and thematically far away. [69] has revealed a 'culture clash' between social sciences and design when he compares management and design students' different cultures. Although there are interfaces between those disciplines, like in organizational design [70], comparability is too narrow due to different research attitudes. Whereas most researchers in the design realm exclude estimation as a modus operandi and embraces individuals' instincts, feelings, and experiments, social sciences (including entrepreneurship) rely on prediction as to their source of knowledge [71]. Even while design thinking is one of five future entrepreneurial minds [72], it is limited to the fields of 'organizing' and 'operating.'

Despite the difference above of both disciplines in researching approaches and allocations, [17] have uncovered several similarities between the two areas: entrepreneurship and design thinking. The similarities that connect both disciplines are:

- **The main actors**: both professions or actors similarly create artifacts. Designers design artifacts, and for the entrepreneurs, it can be new ventures, markets, or organizations (see, e.g., [73]; [74]).
- **The working environment**: both professions deal in similar working environments that are wicked, uncertain, and unpredictable. In this regard, that wicked situation they face is the triggering factor that drives both entrepreneurs and designers to solve problems (see, e.g., [75]; [76]).
- **The key characteristics**: both professions similarly need to have and use "empathetic" characters and skills to grasp users' perspectives and then address their implicit and explicit needs [62]; [6].
- **The creative tools**: both professions use creativity as one of the core tools to imagine new things and create them together (for designers), and to identify entrepreneurial opportunities that may lead to the creation of new ventures (for entrepreneurs) [77]; [78].

From those "corresponding linkages" of entrepreneurship and design thinking explained above, this study believes that there is a significant need to integrate entrepreneurship education with design thinking. It is also paramount because the practice of teaching entrepreneurship in business schools and HEIs is arguably still based on a conventional (*rational*) approach. [79] criticizes that this type of thinking cannot be effective means to solve contemporary global problems. Employing only the sensible approach to teach university students is more relevant where the worlds are stable [35], which does not apply in today's business environment. Several studies have even urged the importance of skill development in acquiring tacit knowledge and self-reflection to balance the "craft" feature of entrepreneurship, i.e., creative thinking and iterative learning (see, e.g., [79]; [80]).

With design thinking approach, students can complement rational and creative thinking to solve messy business problems by incorporating entrepreneurship education with design thinking. It also enables them to acquire "entrepreneurial thinking" skills, such as being entrepreneurial alert to discover opportunities [17]; then emphasizing empathy, visualized experimentation, and reflection [10], which will lead to the iterative-learning of entrepreneurship and design thinking. Additionally, this study has previously generated the five-primary design thinking process cycle (see Figure 1). The stages are problem understanding, idea generation, experimentation, testing, and implementation. By extracting the sequential phases of design thinking, developed by several studies, one integrated process cycle of entrepreneurship and design thinking as shown in Figure 2.

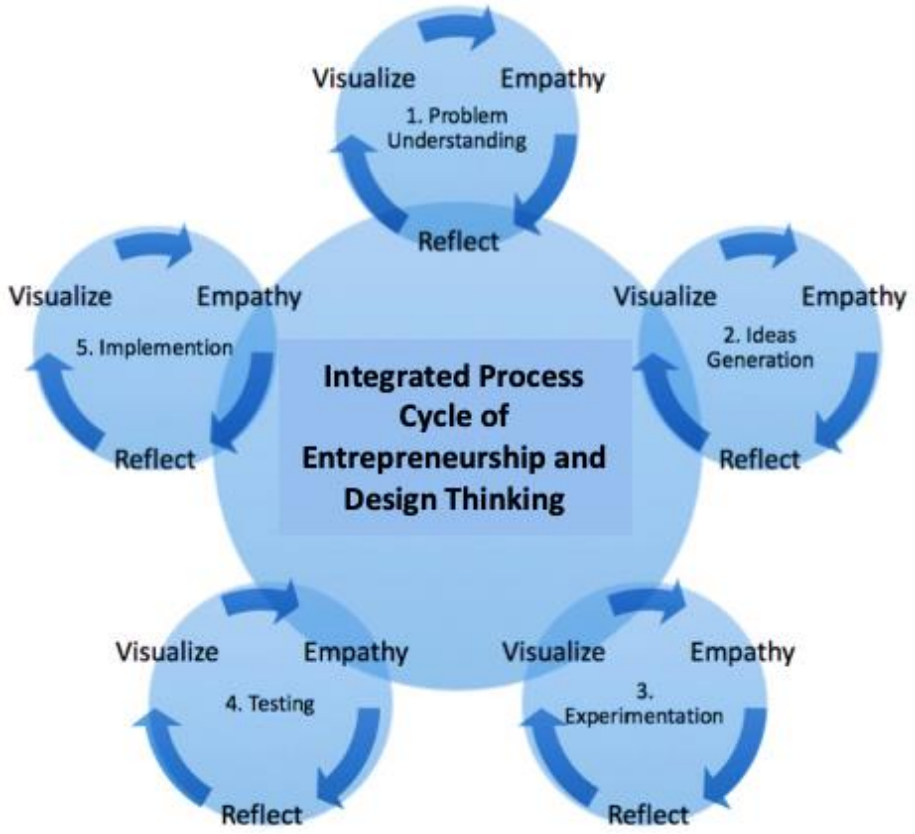

Fig. 2. The proposed design thinking process cycle – the authors

This study's integrated process cycle of entrepreneurship and design thinking is not conceptually exceptional to the other existing models in the literature. However, the proposed model presents a non-linear movement between each stage and the whole process because the problems in design thinking and the method to solve them are not linear. This cycling process can go back and forth from one stage to another, allowing iterative and learning mechanisms during the entrepreneurship-design thinking process [17]. Furthermore, each of the five steps strongly incorporates customers' empathy in discovering entrepreneurial opportunity, self-and team reflection, and visualization, strongly emphasized in the entrepreneurial process [10]. That means the approach of "people-centered" through observation and interaction with users, sense-making and theory integration, prototyping, and storytelling with the team members are emphasized continuously in each stage within this cycle process. Students can learn step by step throughout the process and proceeds to the next project after completion.

From the discussion above, the integration of entrepreneurship in higher education and design thinking can be a highly preferable alternative. It supports pro-active learning [10], and emphasizes experience-based learning as well as promotes reflec-

tive action [79] for preparing young graduates to gain the necessary skills. However, many identified articles above are addressing this issue in developed countries. The examples from developing countries, such as Indonesia, are still limited and probably rarely studied.

4.2 Textual case study: MBA CCE – SBM ITB, Indonesia

The incorporation and integration of design thinking in entrepreneurship education, particularly in Indonesian HEIs, are rare. One of the HEIs is the School of Business and Management, Bandung Institute of Technology (SBM-ITB)[1]. The ITB has been formed in 1920 and is the first and prominent technology-based HEI in Indonesia. The institute began to create the MBA program in 2011, primarily in creative and cultural entrepreneurship (MBA-CCE). This MBA program concentrates on the current theory and actual practice of Indonesian arts, local design and culture, entrepreneurial leadership, and contextual business management for national and global growth and sustainability (Larso and Saphiranti, 2016). Also, they employ an entrepreneurial pedagogy in its curriculum system by enabling its students to undergo the entrepreneurial process of opportunity identification, planning, start-up creation, and growth cycle.

By collaborating with the internal ITB's School of Arts and Design, this program aims to enable students to gain entrepreneurial skills and knowledge and nurture future entrepreneurs to be creative and capable entrepreneurs in the future. Some current MBA courses include in the program, such as marketing management, operations management, leadership, and financial management, as well as three specialized modules: design thinking, contextual nature of creativity, and design-art-culture.

This program has also been supported by business practitioners and real entrepreneurs in various national creative industries. Some of them are in the fashion industry, music, advertising, local arts, and culture. In this case, the MBA CCE employs those practitioners and entrepreneurs as mentors who "accompany" students in the mentoring sessions and as a part of the entrepreneurship education curriculum. The mentors would give a group of students' advices and share their business experience. Students are also be accompanied by mentors during the incubation process to prepare and probably launch their business. Besides some entrepreneurs and practitioners, the MBA-CCE is also supported by banks and other financial institutions that provide soft loans to students. This cooperation will strengthen the ecosystem of entrepreneurship education within the program, particularly to offer accessible funding. Other than that, entrepreneurs ITB'S club and alumni association are parts of the entrepreneurial ecosystem to provide wide networking for students. Additionally, this MBA program cooperates with some local governments and entrepreneurs' associations in the West Java Province, where ITB is located [13].

The design thinking course offered by the MBA-CCE intends to form students' mindset in terms of identifying opportunities, developing products and services, pro-

[1] The official website: https://www.sbm.itb.ac.id. SBM ITB is primarily located in Bandung Province, Indonesia. However, it recently opens a new branch in Jakarta to offer a corporate master-degree program, especially for professionals and business specialists.

cesses, strategies, and executing business models. The course is in the first semester as one of the primary subjects. Every student enrolled in this MBA-CCE must submit their initial business plan; the design thinking course would help them review, re-think, re-identify, or even re-create their business. The teaching method combines theoretical (i.e., *lectures, guest lectures, and case studies*) and practical activities (i.e., *team discussion, on-site business visit, group presentation*). The course contents include "*ideas visualization, think big, design process systematization, developing product and business ideas, and connecting design and market*" [25], p. 226. The topic and materials are the introduction of design thinking, idea generation, brainstorming, exercise innovation, principles of aesthetic, creative process and experience, creativity and design strategy, philosophy of design, company visit, group discussions, business plan presentation, and discussions [13], p.883.

The design thinking course focuses on understanding the process of the occurrence of an idea. Provides an understanding of creative design thinking to be applied at the scale of community operations. Stimulating aesthetic sensitivity is essential to understand how to creatively solve a technical problem in the innovation process because these principles can be formed logically and have a built-in structure. Creativity is a skill that must continue to be developed, related to the human mind's cognitive factors and analytical abilities related to awareness of and understanding of ideas and objects. An idea that identifies with certainty an order, structural and conceptual. Creativity is closely related to context, related to situations where someone catches a problem and carries out the work process. At the end of the course and program, students present their final reports concerning their businesses and entrepreneurial understanding. In this way, students are encouraged to optimize their time for their study and entrepreneurial endeavors [25].

In summary, the integration of entrepreneurship education and design thinking within Indonesian HEIs seems to follow some current design thinking phases. However, both the curriculum and the learning-teaching process shown in the literature seem to be not clearly described, and consequently, may lead to partial implementation of the integration process. This situation, however, provides a research opportunity to offer a conceptual learning-process cycle and integration threshold of entrepreneurship education and design thinking within the context of Indonesian higher education, particularly adapting from the case of MBA-CCE SBM ITB. The following is the discussion of the conceptual threshold proposed by this study.

5 Discussion: Proposing a conceptual threshold of integration entrepreneurship and design thinking in Indonesian higher education

The widespread design thinking has been shown by an increasing number of HEIs that offer the integration of entrepreneurship education and design thinking as innovation. As mentioned earlier, studies that have to incorporate both disciplines are most likely from developed countries (e.g., [9]; [10]; [55]). The examples from developing countries are rather rudimentary.

Even though Indonesia seems to have a positive outlook of its current circumstances, the integration of entrepreneurship education and design thinking within its higher education context (i.e., the MBA CCE SBM ITB) seems to be partially implemented. The stages of design thinking and how the whole 'teaching-learning implementation process (i.e., its entrepreneurship-design thinking teaching stages and threshold) are not clearly described in the available literature. Another reason is that existing studies arguably have not to cover yet a clear picture concerning what elements should be included in the integration design thinking and entrepreneurship education within the higher education context, particularly with the related objectives, activities, tools, and results [11]. Therefore, generating a conceptual threshold of integrating entrepreneurship and design thinking, mainly Indonesian higher education, becomes necessary to address those research gaps.

This study suggests a conceptual process cycle and threshold for their integration. It was done by this study thoroughly discussing the conceptual understandings of entrepreneurship education and design thinking in the previous sections and explaining the general state of entrepreneurship education that incorporates design thinking courses MBA-CCE SBM ITB. From the process cycle (see Figure 2), we extended and adjusted the cycle to the contextual situation and curriculum system of MBA-CCE SBM ITB from the available literature [13]; [25] to reflect and accommodate the research need. The first result is the Figure 3.

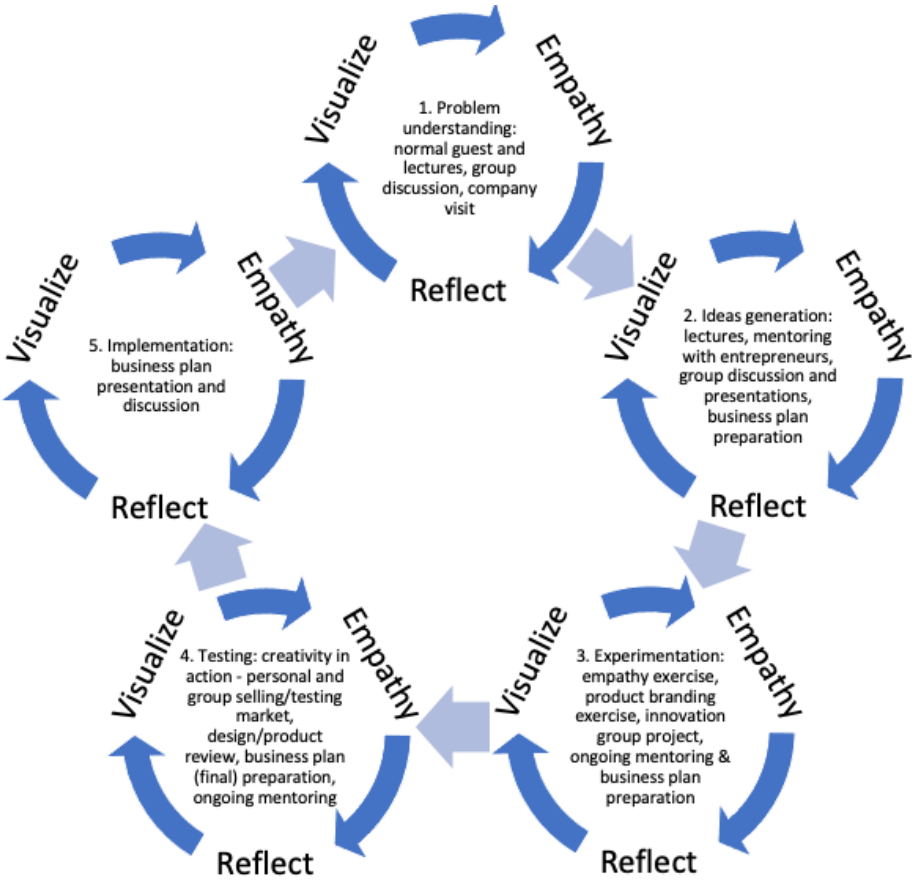

Fig. 3. The proposed process cycle of design thinking and entrepreneurship education in the Indonesian HEIs

This study has consolidated the process stages of design thinking with integrated entrepreneurship-design thinking teaching and learning stages, learning objectives, activities, tools, and results based on the contextual case of MBA-CCE SBM ITB. The conceptual process cycle (Figure 3) and threshold of design thinking and entrepreneurship education have five primary elements:

a) Understanding the problem comprehensively (and being empathetic). The process begins with understanding the situation thoroughly, in which students start researching, defining, interpreting, and (re)framing the issue. The tools can use interviews and observation. In the context of MBA-CCE SBM ITB, students could start with typical and guest lectures, 'in-class' group discussion, and the initial company or industrial visits to reach complete explicit (theoretical knowledge) and implicit understandings of users' needs and wants.
b) Generating ideas. In the second stage, students generate numerous ideas by raising "what if," "what might be," and "how might we" questions, do brainstorming with

teams, and gathering insights. Students can use a persona, users' journey mapping to conceptualize ideas and derive a complete picture. In the context of SBM ITB, the MBA CCE students could start the mentoring sessions with their entrepreneurial mentors and prepare their business plans while still having usual lectures and frequent team discussions.

c) Experimenting iteratively. In the third stage, students do experimentation by creating rapid artifacts and synthesizing users' needs to come up with novel solutions. This stage aims to collect all possible alternative ideas by prototyping and synthesizing early users' feedbacks. The MBA-CCE students could practice this stage by doing empathy exercises, "product branding" analysis and presentation, and continuing the mentoring sessions with their respective mentors to prepare their business plan.

d) Testing the solutions. In the fourth stage, one tests and checks the proposed solutions iteratively by integrating users' feedback until one comes up with the final product or service. The testing stage can be online and offline market or users' testing, creating a knowledge pooling integrated system to find the most promising operational problems. Students of SBM ITB could undergo their selling activity to test the market about their corresponding business ideas or products, then use the information to review and communicate their improvements for the final business plan.

e) Implementing the solutions. The final stage is the solution implementation. In this stage, one could create a business plan to acquire external funding for the tested solution's mass production or sell direct over the internet. The latter option has become the fastest channel to launch a new or improved product or service [2]. This final stage is improved products, services, or system innovations that meet users' needs, solve the problems and be sustainable with the environment. The MBA-CCE students eventually present their business plan and may (or not) execute it in actual practice.

6 Conclusion, limitation, and further research implications

Overall, this study contributes to the richness of both entrepreneurship education and design thinking research areas by outlining the depth of the literature for both disciplines. The following are some of the highlights that have been thoroughly discussed in this study.

The primary features of design thinking, extracted from the existing literature, are human-centered and empathetic, collaboration and communicative threshold, experimentation and iterative, versatile and broad-spectrum thinking style, and strong mentality and personality. Additionally, this study has generated a five-primary entrepreneurship-design thinking process cycle consisting of problem understanding, ideas generation, experimentation, testing, and implementation phases. Each of the five steps strongly incorporates the "empathy-reflect-visualize" entrepreneurial process cycle that could help students to learn gradually throughout the learning process. This study has also proposed the conceptual process cycle and threshold of integrating the

teaching of entrepreneurship and design thinking in the context of Indonesian HEIs, in this case by using the textual example of the MBA-CCE entrepreneurship education program in the SBM-ITB Indonesia.

Despite its significance, this study has a limitation. As it is conceptual research, the interpretations of the findings should be contextual, not general. The findings open valuable future research works, such as to test this study's conceptual process cycle and threshold of whether this type of educational integration is possible in higher education or other academic contexts. Another research possibility is to examine some cross-cultural adaptation strategies in which design thinking could support entrepreneurship education, especially in developing countries.

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