

Characteristics of the entrepreneurial mind-set of students and experienced entrepreneurs explained from a learning perspective

A descriptive and explorative study



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Preface

“The lessons learned shape you as an (future) entrepreneur” – Victor van Saltbommel

This quote does not only fit the topic of this thesis, it is also the main message that I wanted to share with other students while introducing my thesis. During guest lectures, I ended with this quote to stimulate personal reflection with the idea to let participants reflect on their individual Entrepreneurial Mind-Set Monitor scores. Besides a motivational function, the purpose of stimulating personal reflection can be linked to my motivation to write this thesis. Namely, during the first year of the Master Management, Economics, and Consumer Studies at the Wageningen University & Research, I personally experienced that fellow students often lack an entrepreneurial mind-set while, for example, solving a case or working on a group project. This made me think about a possible explanation why this was the case and eventually lead me to the chair group Education and Learning and specifically to Yvette Baggen and Lisa Ploum.

First of all, I would like to express my gratitude to Yvette for her boundless enthusiasm and time she invested to improve the quality of all the outcomes related to this research. I experienced our cooperation as very pleasant and would like to thank you for that. Second, I would like to thank Lisa for her sincere and practical manner of supervising and her solution-driven capabilities. Your feedback and tips were very valuable for this research and I would like to thank you for that. Without the help of both supervisors, I could not develop myself the way I did during the last nine months. That is, I improved various skills such as teaching, interviewing, scientifically writing, and organisational skills to manage different projects while writing my thesis and working together with Yvette and Lisa.

Finally, I would like to thank all the students and teachers who participated or indirectly contributed to the results of this study. Last, but not least, I would like to thank the twelve entrepreneurs for investing time and effort to participate in my research and sharing personal stories that specifically enriched the qualitative results of this study.

Wageningen, June 2021,

Victor van Saltbommel

Abstract

Research problem

A rapidly growing and complex world causes that students have to deal with grand challenges of our time that are all characterised by high levels of complexity and uncertainty. Being the generation of tomorrow, students of today are expected to deal with these problems in their future working environments.

Relevance

The relevance of studying an entrepreneurial mind-set (EM) is that scholars in the field of entrepreneurship state that an EM enhances dealing with complexity and uncertainty. Since previous research has shown that students structure knowledge differently than experienced entrepreneurs because of differences in context and experience, the expectation is that students have a different EM than experienced entrepreneurs. Therefore, it is assumed that students approach complex and challenging situations differently compared to experienced entrepreneurs.

Aim

The aim of this research is to describe the characteristics of the entrepreneurial mind-set of students and experienced entrepreneurs from a learning perspective.

Method

Within this study, an EM is operationalized with Sarasvathy's effectuation theory since this theory uses uncertainty as a starting point and incorporates the chaotic character of an entrepreneurial process

To investigate characteristics of the EM, both quantitative and qualitative research is conducted. It is a mixed methods research that follows a sequential design. 12 experienced entrepreneurs and 181 students participated in this study and completed the mind-set monitor at least once. Retrospective, semi-structured interviews were conducted with 10 participants.

Results

Results of this study indicate that both target groups apply an effectual way of thinking more than a causal way of thinking. Characteristics that describe an EM according to results of this study are: action-oriented, emphasizing opportunities, flexibility, and adaptability under uncertain conditions.

Conclusion & Recommendation

From a learning perspective, results indicate that students apply causal thinking and entrepreneurs effectual thinking. Besides, it can be concluded that the EM of participants seems to differ per situation and that it is questionable whether the mind-set can be characterized with one particular way of thinking. Nevertheless, it is recommended to stimulate the exchange of knowledge, non-cognitive skills and experience between students and experienced entrepreneurs as this will contribute to the development of the EM of both target groups.

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1. Introduction

Present-day society faces numerous challenges on a bigger scale than ever before. Within these global challenges, such as poverty, climate change and resource depletion, two shared characteristics can be identified: they are all characterised by high levels of complexity and high levels of uncertainty (Bacigalupo et al., 2016). Being the generation of tomorrow, students of today are expected to deal with these problems in their future working environments. Looking for ways to contribute, educational institutions are investigating the best way to prepare their students for the upcoming complexity and uncertainty (Gulikers et al., 2018). Scholars Gibb and Lackéus hypothesised that the development of an entrepreneurial mind-set (EM) in an educational context enhances students' ability to deal with problems characterised by complexity and uncertainty (Gibb, 2002; Lackéus, 2015). Additionally, it was found that an EM benefits an uncertain decision-making process (McGrath & MacMillen, 2000).

Education programs that stimulate an EM have gained attention in the academic field (Gulikers et al., 2018) and are often referred to as wide entrepreneurship education (Lackéus, 2015). This wide perspective in entrepreneurship education (EE) is closely connected to a transformation that took place within EE in general. This transformation was caused by a shift in teaching methodology, moving from teaching entrepreneurship through content driven knowledge towards teaching entrepreneurship in an experiential- or learning-by-doing context: submitting students to entrepreneurial processes that facilitate an EM (Krueger, 2015; Kaffka & Krueger, 2018).

However, although scholars such as Ireland et al. (2003), Pollard and Wilson (2014), and Krueger (2015) tried to precisely define an EM, the description of an EM remains somewhat vague and is described as an ill-defined construct that is not always directly observable (Krueger, 2015). The vague definition and unobservability of an EM directly inhibits the application and development of an EM in educational systems.

A popular and intuitive theory in EE that uses the daily reality of entrepreneurs, and especially the high levels of uncertainty, as a starting point is Sarasvathy's effectuation theory (2001A; 2008). Sarasvathy's effectuation theory is one of the first entrepreneurial decision-making theories that incorporates the chaotic character of the entrepreneurial process, in which the entrepreneur has to deal with uncertainties on a daily basis (Krueger, 2007). As such, the uncertain character of an entrepreneurial decision-making process is recognized in Sarasvathy's effectuation theory (2001B) and is therefore used in this study for operationalizing an EM.

The relevance of studying effectuation within EE is emphasized in a broad EE impact study performed by Moberg et al. (2014). Moberg showed that the individual's need to manage and cope with uncertainty and ambiguity is raised during an entrepreneurial process. In other words, effectuation seems to learn students to adapt to changing circumstances more easily, which in turn makes an uncertain decision-making process more effectively (Wiltbank et al.,

2006). Although the relevance of studying effectuation within EE is shown, quantitative studies about the impact of effectuation theory within EE have not been performed thus far. Sarasvathy (2001A & B; 2008) specifically investigated decision-making behaviour of experienced entrepreneurs and focussed at the daily reality of entrepreneurship. Therefore, it is currently unknown whether students, who are used to a more scientific way of thinking, apply effectual or causal thinking.

Since students seem to apply a planned approach that is based on causal logic, starting with goal-oriented action when dealing with uncertainty, this study assumes that students generally apply a more causal way of thinking. A causal mind-set opposes the mind-set of experienced entrepreneurs, which follow an emergent strategy that is based on logic of control and starts with means-oriented action (Sarasvathy, 2001A/B; Dew et al, 2009; De Jong, 2014). Additionally, previous research has shown that students structure knowledge differently than experienced entrepreneurs. This is most likely caused by differences in context and personal experience (Dew et al., 2009; Moberg, 2014; Gunzel-Jensen & Robinson, 2017). These findings suggest that students have a different entrepreneurial mind-set than experienced entrepreneurs, which creates the opportunity to learn from each other in an educational context.

In this study, a primary focus will be placed on EE, since Moberg et al. (2014) concluded that EE increases the belief in entrepreneurial skills and the probability of an individual becoming an entrepreneur. Moreover, sustainable change agents are usually shaped in an educational context (Ploum et al., 2018), which indirectly increases the chance that students start their own company (Moberg et al., 2014). The learning perspective within this study is operationalized with critical developmental experiences (CDEs), which are positioned within constructivism and can be stimulated with experiential learning to better understand an EM in education (Krueger, 2009; Krueger, 2015; Krueger & Neergaard, 2011).

The main research question of this research is as follows: *“What characterizes the entrepreneurial mind-set of students and experienced entrepreneurs and how can both be explained from a learning perspective?”*. As numerous significant problems exist within the life sciences domain (e.g. poverty, climate change and resource depletion), this study focuses only on bachelor and master students participating in a life science degree as well as entrepreneurs active in the food & beverage sector. There are students participating in this study who followed entrepreneurship- courses and / or programs before participating in this study and students without entrepreneurship education experience. Concluding, there are two groups of students in this study; students defined as ‘entrepreneurial’, also referred to as would-be entrepreneurs in literature (e.g. Bird et al., 2012), and students defined as ‘non-entrepreneurial’. To the best of our knowledge, this is the first study that investigates the comparison between the EM of students across higher educational institutions (HEIs) and experienced entrepreneurs in The Netherlands.

Bridging the gap between scholars and practitioners seems to be important as various scholars emphasize the need to make use of experienced entrepreneurs’ knowledge within EE (e.g.

Blenker et al., 2011; Krueger, 2015). Moreover, Krueger (2015) suggests that it is crucial to understand what an expert mind-set comprises. This research investigates both implications by monitoring and reflecting on the development of expert entrepreneurs' mind-set together with students' mind-set. Additionally, this research enhances quantitative data about the application of the effectuation theory in higher education outside the United States. Hereby, the academic knowledge about entrepreneurship, and specifically effectuation in EE, can be increased due to the collection of data at different HEIs in The Netherlands. Collecting quantitative data is, among others, recommended in studies from Perry et al. (2012) and Dew et al., (2009).

The research aims to create a better understanding of the mind-set across contexts in the domain of life sciences. Understanding characteristics of the mind-set of novices (students) and experts (entrepreneurs) is relevant for EE, because results can help bridge the gap between educational programs and the reality of entrepreneurship (Blenker et al., 2011; Krueger, 2015; Gunzel-Jensen & Robinson, 2017). As such, entrepreneurial education programs can be adjusted and designed more effectively based on the findings of this study. Furthermore, possible explanations determined in this study can serve as a foundation for future EE research, which can in turn help students in moving from a novice EM to an expert EM (Krueger, 2007; Krueger 2015).

To start off with, this research characterizes the EM of both target groups based on previous findings and quantitative results of the Entrepreneurial Mind-set Monitor (EMM). Following up, qualitative interviews are conducted to reflect on the results of the monitor and approach of complex and challenging situations with five participants of each target group. This thesis comprises six chapters. After the introduction in this chapter, chapter two will lay the theoretical foundation on which the research is built. Chapter three explains the mixed method of this research and discusses the research questions, procedure, research design, instruments, analysis, and respondents. Chapter four presents both quantitative- and qualitative results. Chapter five discusses the results of this study, elaborates on methodological limitations, and implicates recommendations for future research. The final chapter discusses the conclusion of this research.

2. Theoretical Framework

Within an uncertain context, the concept of value creation seems to play an important role as it contributes to solving complex problems and can help individuals with everyday practices in different contexts (Lackéus, 2020). Therefore, the first chapter of this theoretical framework introduces the broad concept of value creation. Because it is expected that students and entrepreneurs with an EM who follow an effectual decision-making process are able to better deal with complex and challenging situations, the second and third chapter of the theoretical framework respectively describe the concept of an EM and the effectuation theory.

2.1 Value Creation and Uncertainty

Complex and challenging situations are often characterised by uncertainty due to the reason that the future is unpredictable (Sarasvathy, 2001A) and by itself characterised as uncertain (Read et al., 2009). Uncertainty is here defined as “*a lack of information about cause/effect relationships*” (based on Ireland et al., 2003). Entrepreneurial activities often take place in a context characterised by uncertainty due to scarce information. Entrepreneurship is even described as a kind of synonym of uncertainty since pioneering researchers conceptualised the concept in an uncertain context (e.g. Cantillion, 1755; Knight, 1921; Schumpeter, 1911, as cited in Moberg et al., 2014).

Value creation appears to be a crucial aspect of wide entrepreneurship according to the following definition of entrepreneurship: “*Entrepreneurship is when you act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural, or social*” (Moberg et al., 2014, p.14). Since entrepreneurship is defined here as a phenomenon that takes place in multiple contexts, Gulikers et al. (2018) indicated that value creation is something subjective in a broad perspective that is related to a particular target group or user. Besides the subjectivity of value creation, Gulikers et al. (2018) argued that value can also be ecological and that the process of value creation can result in a product, service or process.

Within an entrepreneurial process that aims to create value, there is a main focus on ideas and especially opportunities that are identified, evaluated and exploited. This can be a linear process, but more often it is recognized as a chaotic and unpredictable process where the different phases alternate with each other. Entrepreneurs can start with predefined goals, which is characterised as a causal process, or with their own resources, which is characterised as an effectual process (see Chapter 2.3)(Gulikers et al., 2018). The most suitable approach depends on the context and phase of the process according to Sarasvathy (2001A). Although both approaches can alternate, the way entrepreneurs deal with uncertainty in an entrepreneurial process says something about their EM and their decision-making behaviour. Therefore, the next chapter describes the relevance of having an EM and the main characteristics of an EM.

2.1 Entrepreneurial Mind-set

As this research primary focuses on an EM in an educational context, this section illustrates an EM with a distinction in entrepreneurship education (EE) between traditional- and wide EE. In addition to the crucial value creation aspect of wide entrepreneurship, the focus in EE on wide entrepreneurship appears to be on the entrepreneurial person and mind-set. While in traditional EE, the main focus is on business planning and venture creation (Lans et al., 2018). The wide perspective in EE is closely connected to a popular teaching method called teaching ‘through’ entrepreneurship, which is relevant for this study as it emphasizes the entrepreneurial process facilitating an EM (Blenker et al., 2011; Krueger, 2015) and is the most potential learning approach for developing future entrepreneurs (Matlay et al., 2012). The distinction in EE and the popularity of teaching ‘through’ entrepreneurship confirm a transformation within the field of EE from teaching about content knowledge towards teaching through an entrepreneurial process, that focuses on entrepreneurial thinking and facilitates an EM (Kaffka & Krueger, 2018).

2.2.1 How is an entrepreneurial mind-set defined?

In order to define the EM, Bosman and Fernhaber (2018) separated ‘entrepreneurial’ and ‘mind-set’ and started with the following definition of a mind-set from Merriam-Webster (p.7): *“a mental attitude or inclination*. The Oxford University Press (2020) defines a mind-set as: *“a set of attitudes or fixed ideas that somebody has and that are often difficult to change”*. Scientists from the field of cognitive psychology seem to focus more on the process of information processing when talking about the mind-set. For example, Auster-Gussman and Rothman (2018, p.483) defined a mind-set as: *“an established set of beliefs that shape how people think and reason about a specific topic”*. Gollwitzer and Keller (2016, p.1) defined a mind-set as: *“a set of activated cognitive procedures”*. The previous definition is integrated in the article of Weber et al. (2019, p.46), who explained that the mind-set affects how people perceive information and react on it.

After stating that the essence of entrepreneurship is creating value, Bosman and Fernhaber (2018, p.13) defined the EM as: *“The inclination to discover, evaluate, and exploit opportunities”*. Besides this definition, a more common definition of an EM is the one of McGrath and MacMillan (2000, p.15): *“The ability to rapidly sense, act and mobilize, even under uncertain conditions”*. Ireland et al. (2003, p.968) defined an EM as: *“a growth oriented perspective through which individuals promote flexibility, creativity, continuous innovation and renewal”*.

Even though it is differently formulated (i.e. “exploit”, “act and mobilize”), it seems that without action, no opportunities and innovations will be executed and therefore no value will be created for customers or company owners (Ireland et al., 2003). Moreover, innovation and opportunities are explicitly emphasized in the definitions of Bosman and Fernhaber (2018) and Ireland et al. (2003). Ireland et al. (2003, p.968) explained their definition in other words and made the connection with uncertainty: *“even under the cloak of uncertainty, the entrepreneurially minded can identify and exploit new opportunities because they have*

cognitive abilities that allow them to impart meaning to ambiguous and fragmented situations”. This addition suggests that an EM benefits an uncertain decision-making process due to cognitive abilities that enhance dealing with ambiguity, which is in line with the findings of McGrath and MacMillan (2000) and supported by the suggestion from Moberg et al. (2014) to raise the individual need to manage and cope with uncertainty and ambiguity in an entrepreneurial process.

Thus, earlier work indicates that ‘action-oriented’ and ‘seeking-opportunities’ are essential elements of an EM. Additionally, an EM is regularly related to uncertainty in literature as it benefits an uncertain decision-making process. Based on these findings, an entrepreneurial mind-set is defined as: *“a set of activated cognitive procedures that enable someone to rapidly sense, act and mobilize under uncertain conditions”* within this study.

Having the definition of an EM and the three associated crucial aspects of an EM in mind, the next section elaborates on the relevance of entrepreneurial thinking and specifically on the relevance of having an EM.

2.2.2 What is the relevance of having an entrepreneurial mind-set?

The relevance of having an EM is described in one of the four paradigms of EE presented in a study of Blenker et al. (2011) that focuses on personal development and teaching through entrepreneurship. The reason for suggesting a new paradigm in EE is a trend in the field of entrepreneurship that views entrepreneurship as an everyday practice and not only for creating new businesses. From this perspective, an EM could be described as a mind-set that does not only aim to create new ventures, but aims to also solve other general social problems such that life can be enriched.

This way of looking at an EM is described as a value-creating meta competence that can be applied in different contexts in life. The outcome of an educational process that is built around Blenker’s et al. (2011, p.424) ‘everyday practice paradigm’ can be explained as “an individual that is transformed into an entrepreneur and the context into an opportunity”. Such an outcome fits within the teaching through entrepreneurship method as it facilitates an EM by emphasizing a dynamic entrepreneurial process, which will ultimately shape how individuals think and reason according to Auster-Gussman and Rothman (2018) and Blenker et al. (2011).

An important aspect that is not considered in Blenker’s et al. (2011) suggestion to facilitate an EM in everyday practice is that entrepreneurial activities go hand in hand with uncertainty (Moberg et al., 2014; Sarasvathy, 2001A). From an individual perspective, the information available is not always complete or is ambiguous. Besides, the outcome of a decision in an entrepreneurial process is often uncertain. Moberg et al. (2014) have shown the importance of dealing with uncertainty and ambiguity in order to successfully perform entrepreneurial activities.

The relevance for organisations to have individuals capable of dealing with uncertainty can mainly be dedicated to competitive advantages regarding performance and the creation of wealth (Ireland et al., 2003). Moreover, McGrath and MacMillan (2000) argued that an EM

can even benefit an uncertain decision-making process by offering a confident way to deal with uncertainties and perceiving them as business opportunities. Since they described an EM as a way of thinking, McGrath and MacMillan (2000) suggest to learn from habitual entrepreneurs who have the following overall characteristic in common: 'seeking new opportunities'.

Summarizing, McGrath and MacMillan (2000) describe a mind-set that considers uncertainty as an ally instead of an enemy as second nature to entrepreneurs. Since Sarasvathy's effectuation theory is as a decision-making theory that uses uncertainty as a starting point and is therefore close to the reality of entrepreneurship, it is highly relevant to relate McGrath and MacMillan's (2000) description of an EM with the concept of effectuation. Mainly because it says something about the entrepreneurial way to deal with uncertainty. Before describing the effectuation theory, the next section first focuses on the question how an EM develops.

2.2.3 How does an entrepreneurial mind-set develop?

In 2015, Krueger assumed that an EM reflects cognitive phenomena and particularly deep beliefs. Based on this assumption, an EM can be investigated by diving into cognitive scientific theories. Krueger (2007, p.124) namely believes "that examining deep beliefs affords us the opportunity to better understand entrepreneurship". Deep beliefs are defined as "deeply held strong assumptions that underpin our sensemaking and our decision making" by Krueger (2007, p.124), and can be described as the antecedents of our intentions (Kaffka & Krueger, 2018). Deep beliefs are important because of their influence on automatic decision-making processes. These processes are based on a restricted set of 'very deep anchoring assumptions', which represent the architecture of how we structure knowledge (Krueger, 2017, p.63). While deep beliefs are the antecedents of our intentions, intentions are described as the mediator between attitude and actions and therefore behind action (Kaffka & Krueger, 2018; Krueger, 2017).

Krueger argued (2007) that deep beliefs can change during one's cognitive development process and that they are learned and relearned over time. But, in general they are anchored on some initial belief, which is described as a critical developmental experience (CDE), that makes them hard to change. Nevertheless, he found (p.124 & shown in Figure 1) that deep beliefs "change as entrepreneurs move toward a more professional, expert mind-set". Krueger (2007) reasoned that the lessons learned from these critical developmental experiences are the source of deep beliefs due to cognitive structures that are newly formed. These cognitive structures are human knowledge structures that continuously evolve and can be described as a network of knowledge content (e.g. mind-maps, scripts), which also influences knowledge content itself. Cognitive structures belong to the psychology of information-processing, which studies the mind and its processes (McLeod, 2008). Since changes in these cognitive knowledge structures can lead to a changing mind-set, it is not necessarily knowledge content that differs an expert from a novice. It is the way how an expert

organizes or structures content that differs him or her from a novice (Ericsson and Charness, 1994). Thus, experts become expert due to different cognitive knowledge structures. These different knowledge structures can be developed by applying a constructivistic learning approach within education according to Krueger (2009). Constructivism is a learning theory that focuses on how humans learn (Bada & Olusegun, 2015), and thus helps to understand how students structure knowledge (Krueger, 2015). The latter appears to be crucial for transforming into a more expert entrepreneurial thinker (Krueger, 2009). In order to transform, one should emphasize reflection in an entrepreneurial process because it is essential to capture the CDE according to personal communication with Krueger (2 December 2020). This enhances human learning as it benefits learning how to learn (Krueger, 2007), which Krueger (2017) described as the real objective of education that can be achieved by training students' mind instead of memories. This approach focuses at 'connecting the dots' and recognising a pattern instead of memorizing 'a dot'. By training minds, new cognitive structures are formed that in turn influence one's (automatic) decision-making process. This should be formed through entrepreneurial learning and stimulated with providing CDEs. In short, CDEs highly influence deep beliefs which in turn shape humans knowledge structures. These knowledge structures are important because they anchor cognitive development and typically differ an expert mind-set from a novice.

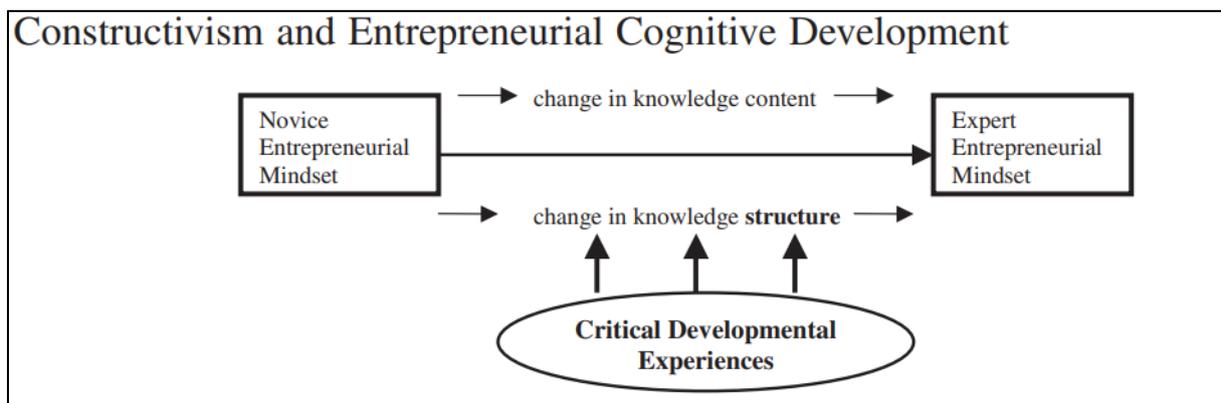


Figure 1: 'Constructivism and Entrepreneurial Cognitive Development' (Krueger, 2007)

To transform a novice EM into an expert EM, Krueger (2007) suggested to capture the CDEs and especially the lessons learned because those are the source of deep beliefs. Since we know that CDEs change deep beliefs and displace anchoring assumptions, which ultimately shape our (cognitive) knowledge structures, it is important to understand what these experiences comprise in order to investigate the contribution to one's EM.

First, Lackéus (2020) indicated that critical learning events offer researchers a way to study entrepreneurial learning. He emphasizes emotionally charged EE and argues that emotional learning events include interaction with external world, teamwork, creating value for others, and feedback and support from external world. Second, Robinson et al. (2016) defined the so-called existential learning approach that aims at triggering recall and encouraging reflection. They described individual experiences of radical breaks or intensified situations as critical experiences that restore one's connectivity with the world. This is essential if students

want to consider themselves as entrepreneurs. Last, Krueger (2015) mentioned that activities alone are not enough for shifting anchoring assumptions, it should be combined with personal reflection, peer support and expert mentoring. These are all elements of the overarching constructivistic approach of learning to change one's knowledge structures. Together, these multiple sources of reflection should lead to individual lessons learned, which is an essential aspect of a CDE (Krueger, 2017).

Following Lackéus' (2020) and Robinson's et al. (2016) description, CDEs are based on emotionally charged situations that are experienced as intensive or as radical breaks by individuals. To capture these CDEs, Krueger (2015) suggests to reflect on them in a constructivistic manner in order to change one's knowledge structures. Although CDEs highly depend on individual experiences, examples of situations that could cause CDEs are perceiving cultural differences, ethical dilemmas, a crisis, a failing project or a successful initiative. The next paragraph is about a relevant learning method to develop the EM and the importance of non-cognitive skills.

As mentioned above, a constructivistic learning approach can change one's deep beliefs due to its effect on individual knowledge structure's. A constructivistic method that can be applied within education and is aimed at changing the learner's mind-set is experiential learning (Robinson et al., 2016), which is also described as transformative learning and often referred to as 'learning-by-doing' (e.g. Krueger, 2015; Lackéus, 2020). Within this study, only the term 'experiential learning' is referred to since Krueger (2015) argued that deep beliefs and anchoring assumptions only change through experiential learning.

Experiential learning activities are mentioned as approaches to increase non-cognitive skills such as perseverance, creativity, showing initiative and an EM. Experiential learning and its focus on non-cognitive skills is highly relevant due to the fact that Krueger (2015, p.7) concluded that "If the entrepreneurial mind-set reflects deep cognitive phenomena then it's the non-cognitive that drives the mind-set". Non-cognitive skills, described as entrepreneurial skills by Gulikers et al. (2018), contain a high level of tacit (implicit) knowledge and demand a lot of practice to be learned. Researchers classified them as part of the EM rather than the entrepreneurial skillset (Moberg et al., 2014).

In short, experiential learning is a method that benefits the development of an EM due to the increase of non-cognitive skills. Experiential learning requires constructivistic reflection in order to transform knowledge gained in actual practice into new perspectives.

2.2.4 What are differences in entrepreneurial mind-set between novices and experts?

Since we found that humans' knowledge structures anchor cognitive development and thereby change one's mind-set, it is highly relevant to investigate differences in mind-set between novices and experts. Dew et al. (2009) found that novices (students) have different (cognitive) knowledge structures compared to experts (experienced entrepreneurs). Namely, novices store, retrieve and process complex information differently.

Apart from differences in their decision-making behaviour, students might experience other critical developmental situations than experienced entrepreneurs. Elements that might have an important influencing role are for example age, work experience, interaction with external world and world view (Lackéus, 2020). Additionally, Ericsson and Charness (1994) indicated the importance of deliberate practice at activities directly related to the expertise for transforming into an expert. As a mind-set is described as “a habit that requires practice to evolve through an interactive process” (Bosman & Fernhaber, 2018, p.8), it is argued that an expert mind-set requires deliberate practice.

Since differences exist between the activities of working and studying, the level of expertise in one particular domain also differs between novices and experts and influences the way how new problems in a domain of expertise are framed (Dew et al., 2009). Moreover, a high level of experience tend to influence the decision whether an entrepreneur engages in an entrepreneurial project or not and thus influences the EM (Moberg et al., 2014). As students have less experience with the reality of entrepreneurship, the decision to engage in an entrepreneurial project will be affected. This makes it difficult for them to decide whether entrepreneurship suits them, which in turn influences their feeling what it is to be an entrepreneur.

Another difference regarding context is that Moberg (2014) found that students lack psychological ownership because experiential assignments in EE programs are readymade and not owned. The described effect is that students will never adapt a more entrepreneurial perspective, while Moberg et al. (2014) describe ownership as an essential aspect of entrepreneurial activities and entrepreneurial learning. They argue that it is hard to encourage the entrepreneurial process in EE without a focus on ownership as a crucial dimension.

Because researchers found that students structure knowledge differently, have less experience with entrepreneurial practice, lack psychological ownership, and probably experience other critical developmental situations, the expectation in this study is that students have a different EM than experienced entrepreneurs.

2.3 Effectuation

The previous sub-chapter among others indicated the importance of an EM as an everyday practice and the benefits of an EM in an uncertain context. As uncertainty is the starting point of the effectuation theory and effectuation is a way of thinking that aims to create value under uncertain conditions, the EM is operationalized with Sarasvathy's effectuation theory within this study.

Saras Sarasvathy (2001A) started her article with an introduction about decisions that need to be taken regarding value creation and especially regarding the creation of new firms. Sarasvathy argued that development processes of new firms often lack information about for example the purchase price, selling price, market interest or customer information, which are all often situational dependent and continuously changing or needs to be collected in a non-existing market. Additionally, decisions that need to be taken often go hand in hand with uncertainty and unique circumstances which make it difficult to predict possible outcomes. Consequently, a decision-making model is built upon the processes of effectuation, as opposed to models that are built upon the processes of causation. Effectuation is later on described as "a cognitive science-based logic of entrepreneurial expertise" by Read et al. (2009, p.1).

2.3.1 What are the differences between causation and effectuation?

The processes of causation and effectuation are defined by Sarasvathy (2001A, p. 245) as follows: "Causation processes take a particular effect as given and focus on selecting between means to create that effect. Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means". A simple example of cooking dinner illustrates the differences between both processes; a chef following a causation process would cook a meal after a client picked a particular menu and collecting ingredients that are needed, while a chef following an effectual process would start with given ingredients and then prepare a desirable meal.

Causation processes are typified by planned strategy approaches such as Kotler's (1991) marketing process which includes segmentation, targeting and positioning. A causal approach is the most effective in a predictable working environment according to Matalamäki (2017). The logic of causation rests on prediction, which is the reason why this process is also described as a predictive approach in literature (e.g. Dew et al., 2009; Read et al., 2009). On the other hand, effectuation processes are typified by emergent, non-predictive and flexible strategies that make use of contingencies and characteristics of decision makers such as who they are, what they know and whom they know. As the logic of effectuation rests on control, an effectual approach is the most effective in an unpredictable environment (Chandler et al., 2011; Sarasvathy, 2001A).

2.3.2 What are the principles of the effectuation theory?

Sarasvathy came up with five principles of the effectuation theory, which are all validated in a study of Chandler et al. (2011). The first principle, also known as 'Bird in the hand', symbolizes

a given set of means of the decision maker. The following questions form a basis for decisions according to this principle: 'Who am I? What do I know? Whom do I know?'. So, the basis of this approach is means-oriented, while the basis for taking action of a causal approach is goal-oriented. Goals determine actions in the latter approach. The second principle states that an effectuator prefers affordable loss instead of expected return and limits this loss instead of maximizing potential returns. The third principle emphasizes strategic alliances rather than competitive analysis, also known as the 'Crazy quilt principle'. It shows opportunities from co-creation with self-selected stakeholders who are willing to commit themselves. The fourth principle is about the preference for exploitation of contingencies that arise unexpectedly over time and is also known as the 'Lemonade principle'. A opposite principle from a causal approach describes the preference to avoid contingencies by predictions and planning to minimize the impact. Chandler et al. (2011) described this principle as the experimentation sub-dimension of effectuation and showed that it is positively related to measures of uncertainty. Since uncertainty could be described as the main characteristic of complex and challenging situations, experimentation is a relevant and validated dimension for measuring uncertainty. The fifth principle emphasizes the controllable aspects of an unpredictable future rather than predicting an uncertain one, also known as the 'Pilot in the plane principle'. A summarizing table with fundamental differences between a causal- and effectual approach can be found at the end of this chapter.

Altogether, Sarasvathy (2001A, p.262) describes an effectuator as follows: "an imaginative actor who seizes contingent opportunities and exploits any and all means at hand to fulfil a plurality of current and future aspirations, many of which are shaped and created through the very process of economic decision making and are not given a priori". Since findings from Read's et al. (2009) meta-analysis (9897 new ventures) showed that all the measurable heuristics describing effectuation are positively and significantly related to new venture performance, one could argue that a successful effectuator is capable to deal with complex and challenging situations that arise during the process of new venture development. However, this research considers an EM from the broad perspective of value creation, which goes beyond new venture creation since value can be created in the form of a process, product or service in financial-, social-, cultural- or ecological domains.

2.3.3 What is the relevance of studying effectual thinking within entrepreneurship education?

Despite the findings of Read et al. (2009), little research has been done about the impact of effectuation within EE. Currently, there are three explorative or descriptive studies that investigated the impact of effectuation within education in general (Günzel-Jensen & Robinson, 2017; Mäkimurto-Koivumaa & Puhakka, 2013; Salusse & Andreassi, 2016), while there are already 732 articles with 'effectuation' in the title, abstract or keywords published on Scopus. This is surprising since various researchers indicated the relevance of studying effectuation within EE.

Effectuation seems to learn students to adapt more easily, which makes an uncertain decision-making process more effectively (Wiltbank et al., 2006). Often, students want to explicitly

know what they have to do for a specific assignment or case and thus might forget that this is not always clear in an entrepreneurial process. So, as students are used to work with a planned strategy and seem to apply a more causal approach (De Jong, 2014; Dew et al., 2009; Sarasvathy, 2001A), adaptability can be highly relevant in a world that is rapidly growing and full of complex challenges.

An effectual decision-making approach increases student’s awareness and ability to create societal impact in a changing environment due to personal-level means. This is mainly because effectuation is actor dependent instead of effect dependent (Mäkimurto-Koivumaa & Puhakka, 2013). Additionally, learning to adapt within an effectuation process provides more, and sometimes even new opportunities, which also increases the ability to create societal impact. The described relevance fits with suggestions from Moberg et al (2014), as they raise the individual need to manage and cope with uncertainty and ambiguity in an entrepreneurial process.

Although the relevance of studying the effectuation theory within EE seems to be indicated, quantitative studies about the impact of effectuation theory within EE fail to occur. Since Sarasvathy (2001A, 2001B; 2008) did not focus on entrepreneurial education because of her aim to only investigate decision-making behaviour of experienced entrepreneurs, it is even more surprising that research about effectuation within EE is lacking because it is currently unknown if students apply effectual thinking. The main reason of studying effectuation within EE in this study is to increase student’s ability to deal with complex and challenging situations that are characterised by uncertainty.

Table 1: ‘Differences between causal and effectual logics’ (Sarasvathy, 2001A, as cited in Dew et al., 2009)

Issue	Causal frame	Effectual frame
View of the future	Predictive. Causal logic frames the future as a continuation of the past. Hence accurate prediction is both necessary and useful.	Creative. Effectual logic frames the future as shaped (at least partially) by willful agents. Prediction is therefore neither easy nor useful.
Basis for taking action	Goal-oriented. In the causal frame, goals, even when constrained by limited means, determine sub-goals. Goals determine actions, including which individuals to bring on board.	Means-oriented. In the effectual frame, goals emerge by imagining courses of action based on given means. Similarly, who comes on board determines what can be and needs to be done. And not vice versa.
Predisposition toward risk and resources	Expected return. Causal logic frames the new venture creation problem as one of pursuing the (risk-adjusted) maximum opportunity and raising required resources to do so. The focus here is on the upside potential.	Affordable loss. Effectual logic frames the problem as one of pursuing adequately satisfactory opportunities without investing more resources than stakeholders can afford to lose. The focus here is on limiting downside potential.
Attitude toward outsiders	Competitive analysis. Causal frames promulgate a competitive attitude toward outsiders. Relationships are driven by competitive analyses and the desire to limit dilution of ownership as far as possible.	Partnerships. Effectual frames advocate stitching together partnerships to create new markets. Relationships, particularly equity partnerships drive the shape and trajectory of the new venture.
Attitudes toward unexpected contingencies	Avoiding. Accurate predictions, careful planning and unwavering focus on targets form hallmarks of causal frames. Contingencies, therefore, are seen as obstacles to be avoided.	Leveraging. Eschewing predictions, imaginative re-thinking of possibilities and continual transformations of targets characterize effectual frames. Contingencies, therefore, are seen as opportunities for novelty creation — and hence to be leveraged.

3. Methods

This chapter discusses the research questions, procedure, research design, analysis and sample related to this mixed methods research. Since this research aims to describe and explain the characteristics of the EM of both target groups, it is descriptive and explorative research. It is explorative in the sense that it is currently unknown if students actually apply effectual thinking. As this research starts with the effectuation theory and then aims to investigate specific characteristics, it follows a deductive way of reasoning. Priority is given to the exploratory goal of the research to gather insights about characteristics of the EM.

Quantitative and qualitative research is conducted to answer the main research question and related sub-questions, which are listed below:

Main research question: “What characterizes the entrepreneurial mind-set of students and experienced entrepreneurs and how can both be explained from a learning perspective?”

- 1) ‘What characterizes the entrepreneurial mind-set of students and experienced entrepreneurs?’
- 2) ‘How do respondents deal with potential critical developmental experiences mentioned during the Entrepreneurial Mind-set Monitor?’
- 3) ‘How do critical developmental experiences explain the entrepreneurial mind-set of students and experienced entrepreneurs?’

3.1 Procedure and research design

Three general steps are carried out in this research. First, desk research is conducted in the form of a literature study to describe an EM, a CDE and the effectuation theory. The keywords that are used per concept while doing literature study can be found in Appendix A. Second, quantitative research is conducted to measure and describe the EM of respondents. In total, 191 respondents completed the EMM at least once. This large sample size benefits the generalizability of quantitative results, which is especially true for students (N= 181) as students with- and without EE experience exist. However, it is noteworthy that the generalizability of the quantitative results for experienced entrepreneurs is much lower given the small sample size (N= 10). Overall, this part of the research has mainly resulted from a project from the European Union called INTRINSIC: innovative, education for sustainable entrepreneurship in life sciences. The project aims to “empower Life Science University teachers to develop their students’ Sustainable Entrepreneurship Competencies so as to prepare their graduates to be being effective entrepreneurs and leaders to address the challenges of Europe’s future sustainable prosperity” (INTRINSIC, n.d.). Third, qualitative in-depth and semi-structured interviews are held with five participants of each target group to reflect on how participants deal with complex and challenging situations that are mentioned in the EMM. The interviews are semi-structured since this provides flexibility to ask follow-up questions and to keep interviews personal, which benefits reflecting on critical situations that might be sensitive in nature according to Gill, Stewart and Treasure (2008). As the purpose of the interviews is to trigger recall and encourage reflection, a retrospective approach is applied that focuses on constructivistic learning (Krueger, 2015; Perry et al., 2012). The selection of

interviewees is based on data quality (the amount that someone completed the EMM has to be at least 3 times and preferably one after another) and interest. It is noteworthy that the latter reduces the external validity, because students defined as ‘entrepreneurial’ within this study already have experience with EE and therefore have some affinity with the discussed topics. This negatively influences the generalizability of the qualitative results for students as a population since the results are probably not representative for all students of the participating HEIs.

A mixed methods research strategy explained by Creswell and Creswell (2017) that matches the research procedure and previously described order is the sequential explanatory strategy. The main strength of a sequential explanatory strategy is its straightforward nature of design (see Figure 2), which contributes to the external validity and transparency of this mixed method research (Creswell & Creswell, 2017). Since this research is particularly explorative in nature because of its aim to gain valuable insights about the development of the EM of both target groups, qualitative data outweigh quantitative data.

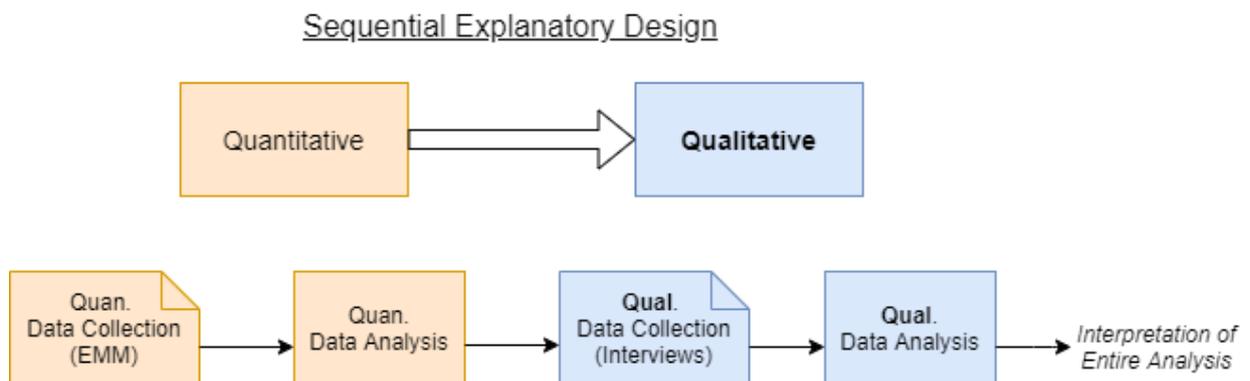


Figure 2: Research Method Design (based on Creswell & Creswell, 2017)

3.2 Analysis and instruments

The dependent variable in this study is the entrepreneurial mind-set. Given the fact that it is currently unclear if students apply an effectual way of thinking, it is expected that the average scores per principle of the effectuation theory are equal for students and experienced entrepreneurs. Within this study, the student target group is divided into two subgroups based on EE experience by looking at the personal codes mentioned by participants in the EMM and Sustainable Entrepreneurship Scan (SES), which are both explained in Appendix A. Results of the assumptions of statistical tests are only reported in the corresponding results section when an assumption is not met because of significant values, thus only when a specific assumption is violated. In all other cases one can assume that the assumptions are met.

3.2.1 Quantitative analysis (S.Q. 1)

Descriptive statistics are generated in IBM SPSS 25 to describe the EM of students and experienced entrepreneurs. At this, a distinction is made between the results of week 1 of the EMM and the results of the entire EMM to describe the development of the EM over time.

Week 1 is chosen as a general baseline within this study because most data is collected in the first week of a monitor. Besides, only data from participants who completed the EMM at least three times is included in the analysis of the entire EMM. In total, students completed the EMM during a period of three weeks and experienced entrepreneurs during a period of six weeks. The difference in weeks was caused by the length of student's semesters.

One-sample T-tests are conducted to describe and compare the average EMM scores of students per principle of the effectuation theory. The assumptions of independent observations and normality were accepted for both groups of students. Samples sizes of respectively 147 entrepreneurial- and 34 non-entrepreneurial students strengthen these findings. In this study, H_0 = means are equal, and H_1 = means are not equal. A p-value at or below 0.05 tells us that the null hypothesis can be rejected.

The one-way ANOVA is conducted to compare the means per effectuation principle per situation type for both groups of students. The complex and challenging situations that respondents mentioned in the EMM are divided into three categories. Namely, 1) 'Work / School', 2) 'Social / Personal' and 3) 'Unknown'. A situation labelled as 'unknown' is not definable based on the mentioned keywords in the EMM. Although the assumptions of independent observations and normality were met, the assumption of homogeneity in variances between situation types was not met due to significant values from both groups of students on different effectuation principles as shown in Table 26 and Table 27. Therefore, it was not possible to statistically check whether the means per principle per situation type are equal for entrepreneurial- and non-entrepreneurial students.

A repeated measures ANOVA is conducted to describe the development of student's EM over time with a sample size of 28. Time is used as independent variable and the individual scores on the effectuation principles as dependent variables. The test was done on the basis of three levels (week 1, 2 and 3) and the effectuation principle scores as within-subject factors. The assumptions of independent observations, normality, and sphericity were all met and the latter is analysed with results of a Mauchly's test per effectuation principle. A Wilks' Lambda test is conducted to statistically test whether the principle means are equal over time with the following assumptions: H_0 = means are equal over time, H_1 = means are not equal over time. The between-subjects factor in this case is the target group 'students' and Bonferroni is used as confidence interval.

When analysing the data of entrepreneurs of the entire period, it turned out that a repeated measures ANOVA was not possible to conduct due to many missing values in the data set. Each within-subject variable contains missing values that are missing because a particular respondent did not complete the EMM in that week. Besides, the null hypothesis of normally distributed data was rejected because of significant p values of a Shapiro-Wilk test. Normality could therefore not be assumed, which is strengthened by the Kurtosis values per principle that are shown in Table 10 in the results section. This table shows that the values are not close to zero and thus not normally distributed.

3.2.2 Qualitative analysis (S.Q. 2 and 3)

Since the retrospective interviews were semi-structured and hence already included main topics to explore one's EM, a Template analysis is chosen as qualitative analysis technique because of its structured analysis process. A factor to consider regarding the internal validity of qualitative results is that most of the codes are based on existing themes while conducting a template analysis. This could form a bias while coding the transcripts due to focusing too much on those themes only (King, 2012). Therefore, multiple iterative and collaborative steps were taken while coding the transcripts. This enhances the understanding and trustworthiness of the qualitative results (Cornish et al., 2013). The interviews were held online due to the COVID-19 measures and are recorded with Microsoft Teams to prevent misinterpretation. The recording has been used for transcribing the interviews afterwards.

In order to produce a final template as specific and concrete as possible, one transcript is coded with the initial template together with Yvette Baggen (1st supervisor) to test the initial codebook while emphasizing inter-rater agreement. During this collaborative process, the interpretation, usage and explanation of the different codes were emphasized from two different researchers' perspectives to ensure transparency and clarity in the final codebook. Hereby, a coding scheme of Sarasvathy (2008), that can be found in the Appendix (Table 34), is used to analyse whether someone applies a more causal- or effectual approach if the EMM did not provide sufficient results. The final codebook, that can be found in Appendix D, contains three layers: 1) Theme, 2) Code, and 3) Explanation. For example, 1) Uncertainty, 2) D1. Dealing with uncertainty, and 3) "Dealing with a situation that lacks information about cause/effect relationships and is perceived by the participant as such".

After coding the interviews with Atlas.ti, narratives were written per discussed situation in order to understand past experiences and detailed stories of the respondents. The narratives can be found in Appendix C and contribute to a better understanding of how respondents deal with complex and challenging situations. In other words, they give "meaning to lived experiences" (Kartch, 2018, p.2).

3.2.3 Combining quantitative- and qualitative data

Within this study, mixing both forms of data occurred when quantitative results of the EMM were used to inform the second wave of qualitative data collection. This means that quantitative- and qualitative data are connected.

In the final analysis phase, descriptive and explorative data was used to characterize the EM of both target groups. Average scores on the EMM (quantitative) were mixed with textual results of the interviews (qualitative). Differences between quantitative and qualitative results were investigated per target group to gain more in-depth insights about the EM. After all, scores on the five effectuation principles are combined with interview results to investigate whether respondents follow a more effectual- or causal way of thinking. It is noteworthy that this is only done with data from experienced entrepreneurs and students categorized as 'entrepreneurial', since there are no interviews held with non-entrepreneurial students

because of a limited amount of time. Hereafter, the results were interpreted and connected to the literature results to explain the EM of both target groups from a learning perspective.

3.3 Sample

The main reason for focusing on students and entrepreneurs is understanding differences between novices (students) and experts (entrepreneurs) so that entrepreneurial education programs can be adjusted and designed more effectively in the future. The aim to learn from (habitual) entrepreneurs is encouraged by different scholars in the field of entrepreneurship (e.g. McGrath & MacMillen, 2000; Blenker et al., 2011; Krueger, 2015). Therefore, entrepreneurs are used in this study to mirror insight about student's EM.

3.3.1 Respondents: students

The sample of this research consists of 147 students from HEIs who follow a Bachelor- or Master degree in the domain of life sciences. These students followed at least one entrepreneurship course or program and could therefore be categorized as would-be entrepreneurs (or potential future entrepreneurs). Within this study, students who match the latter requirement are defined as 'entrepreneurial students' (N= 147; 81.22%). A more detailed explanation of the background of this group can be found in Appendix A. In addition to the group of students that are defined as entrepreneurial students, a group is formed with exactly the same criteria but with students that did not follow entrepreneurship courses or programs in the past. These students are defined as 'non-entrepreneurial students' (N= 34; 18.78%) and used as a benchmark within this study. Overall, 83 out of 181 participating students (45,86%) successfully completed the SES. From the students who successfully completed the SES and specified whether they followed entrepreneurship courses or not while filling in their personal code, the following background information is collected:

Entrepreneurial students

70% of the entrepreneurial students in this study are male and 30% are female, the average age of this group is 24. The majority (63%) has no entrepreneurial parents and does not own a company (88%). As shown in Table 16 in Appendix A, the largest group of entrepreneurial students indicates to be very much interested to become an entrepreneurial individual as employee within an existing company, average interested to start-up an own small company, average interested to start-up and build a high growth company, little interested to acquire or inherent a small company, and little interested to acquire or inherent a company and turn it into a high growth company. Overall, the entrepreneurial intentions of the largest part of this group (28%) are considered to be average.

Non-entrepreneurial students

58% of the non-entrepreneurial students in this study are male and 42% are female, the average age of this group is 24. The majority (69%) has no entrepreneurial parents and does

not own a company (96%). As shown in Table 18 in Appendix A, the largest group of non-entrepreneurial students indicates to be averagely interested to become an entrepreneurial individual as employee within an existing company, much interested to start-up an own small company, very much interested to start-up and build a high growth company, average interested to acquire or inherent a small company, and average interested to acquire or inherent a company and turn it into a high growth company. Overall, the entrepreneurial intentions of the largest part of this group (30%) are considered to be average.

3.3.2 Respondents: entrepreneurs

Besides students, the sample of this research consists of 12 entrepreneurs active in the food and beverages (F&B) sector who founded (individually or together with a partner(s)) at least 2 companies. Furthermore, they preferably have at least 10 years of work experience as an entrepreneur and are therefore defined as ‘experienced entrepreneurs’ in this study (based on studies of Simon & Chase, 1973 and Ericsson, 1993). The entrepreneurs that are part of the sample continuously seek new opportunities and are characterised by their innovative features. Although it should be noted that the food and beverages sector is not a typical sector to work in after following a degree in the domain of life sciences or engineering, it is an interesting target group to study because of the current COVID-19 pandemic that causes many uncertainties that affect these entrepreneurs on different levels. Accordingly, entrepreneurs are selected that actively renew their venture because of unpredictable conditions such as COVID-19 measures. Besides, the main reason for studying entrepreneurs in this specific sector is because of convenient sampling. In Table 2, biographic information of experienced entrepreneurs is displayed.

Table 2: Biographic information of experienced entrepreneurs

Name (fictional= interviewee)	Sex	Age	Years of entrepreneurship experience	Companies founded in the F&B sector
Jessica	Female	37	5	3
X	Male	43	13	4
X	Male	51	20	2
Harry	Male	44	22	1
X	Male	48	25	5
X	Male	55	23	2
Jacob	Male	30	8	2
Damion	Male	41	16	3
X	Female	50	28	6
X	Male	56	28	13
X	Male	61	44	1
Arnold	Male	44	12	3

	In total:	On Average:	On Average:	On Average:
Male	83%	47	19.9	4
Female	17%			

4. Results

This chapter is divided into three sub-chapters. The first quantitative sub-chapter tackles sub-question 1 by presenting the results of the EMM. The second qualitative sub-chapter tackles sub-questions 2 and 3 by presenting the results of the interviews. The third sub-chapter combines both results and tries to explain the EM of students and experienced entrepreneurs from a learning perspective.

4.1 Results of the Entrepreneurial Mind-set Monitor

The results of the EMM are divided into three sections. The first one describes the results of the first week of the EMM, the second describes the development of the EM over time and the third one summarizes the quantitative results per target group. The first section is then divided into three parts with the purpose to give an overall descriptive overview of the different monitors that took place. All the data used for descriptive statistics is based on the first week of a particular monitor. More detailed results of the conducted statistical tests can be found in Appendix C.

4.1.1 Results of week 1 of the EMM

Students:

Results (see Table 25 in Appendix B) of one sample T-tests to compare the mean values per effectuation principle per student group show that there are no significant differences found except for scores from non-entrepreneurial students on the Lemonade principle ($M= 6.41$, $SD= 2.36$), which are higher than the mean of entrepreneurial students ($M=5.17$) with a statistically significant mean difference of 1.21, 95% confidence interval [0.39 to 2.04], $t(33)= 2.99$, $p= 0.005$. Therefore, both student groups are not considered as one group in this study.

Entrepreneurial students

Table 3: Distribution type of complex and challenging situations mentioned by entrepreneurial students shows that almost half (47%) of the situations mentioned by entrepreneurial students belongs to the category 'Social / Personal'. 33% of the situations mentioned belongs to the category 'Work / School' and 20% to the category 'Unknown'.

Table 3: Distribution type of complex and challenging situations mentioned by entrepreneurial students

Type of situation	Amount	Percentage
Unknown	30	20%
Social / Personal	69	47%
Work / School	48	33%
Total	147	100%

Below the descriptive results of an Oneway ANOVA are shown to compare the means per principle per situation type for entrepreneurial students. Since a Levene's test showed that the mean scores from entrepreneurial students on the Crazy quilt principle ($p= 0.019$) and the

Pilot-in-the-plane principle ($p= 0.011$) are lower or equal than 0.05, the assumption of equal variances in each subpopulation (situation type) cannot be met (see Table 26 in Appendix B). Therefore it was not possible to statistically check whether the means per principle per situation type are equal for entrepreneurial students.

Nevertheless, the descriptive results below show that from social / personal situations, entrepreneurial students score highest on the Bird-in-hand principle and lowest on Affordable loss principle. They also score highest on Bird-in-hand and lowest on Affordable loss for situations that belong to the category 'Work / School'. Situations that were undefinable score highest on Pilot-in-the-plane and lowest on Affordable loss. Thus, entrepreneurial students score on every situation type lowest on Affordable loss. 'Work / school' and 'social / personal' related situations receive highest scores from Bird-in-hand, while 'unknown' situations receive highest scores from Pilot-in-the-plane.

Table 4: Descriptive results of Oneway ANOVA on principle scores per situation type of entrepreneurial students

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Bird	Work / School	48	6.44	2.33	.33	5.77	7.11
	Social / Personal	69	5.80	2.52	.30	5.20	6.40
	Unknown	30	5.72	2.31	.42	4.86	6.58
	Total	147	5.99	2.41	.20	5.60	6.39
Affordable	Work / School	48	3.90	2.83	.41	3.08	4.72
	Social / Personal	69	4.84	2.92	.35	4.14	5.54
	Unknown	30	4.83	2.85	.52	3.77	5.89
	Total	147	4.53	2.89	.24	4.06	5.00
Crazy	Work / School	48	5.99	3.24	.47	5.05	6.93
	Social / Personal	69	5.76	2.71	.33	5.12	6.41
	Unknown	30	5.62	2.41	.44	4.72	6.52
	Total	147	5.81	2.82	.23	5.35	6.27
Lemonade	Work / School	48	5.03	2.83	.41	4.21	5.85
	Social / Personal	69	5.35	2.74	.33	4.69	6.01
	Unknown	30	4.99	2.62	.48	4.01	5.96
	Total	147	5.17	2.73	.23	4.73	5.62
Pilot	Work / School	48	6.35	2.54	.37	5.61	7.09
	Social / Personal	69	5.43	3.22	.39	4.65	6.20
	Unknown	30	6.08	2.27	.41	5.24	6.93
	Total	147	5.86	2.85	.24	5.40	6.33

Non-entrepreneurial students

Table 5 shows that the majority (62%) of situations mentioned by non-entrepreneurial students belongs to the category 'Work / School'. 26% of the situations mentioned belongs to the category 'Social / Personal' and 12% to 'Unknown'.

Table 5: Distribution type of complex and challenging situations mentioned by non-entrepreneurial students

Type of situation	Amount	Percentage
Unknown	4	12%
Social / Personal	9	26%
Work / School	21	62%
Total	34	100%

Since a Levene's test showed that the mean scores from non-entrepreneurial students on the Affordable loss principle ($p = 0.050$) is lower or equal than 0.050, the assumption of equal variances in each subpopulation (situation type) cannot be met (see Table 27 Appendix B). Therefore it was not possible to statistically check whether the means per principle per situation type are equal for non-entrepreneurial students.

Nevertheless, the descriptive results below show that from work / school related situations, non-entrepreneurial students score highest on the Crazy quilt principle and lowest on Affordable loss principle. They score highest on Bird-in-hand and lowest on Affordable loss for situations that belong to the category 'Social / Personal'. Situations that were undefinable score highest on Crazy quilt and Lemonade (both an 8.00) and lowest on Affordable loss. Thus, despite that there is no difference between the mean scores on the principle Bird-in-hand principle that received the lowest scores, the mean scores on the principles that received the highest scores is somewhat divided. At this, the Crazy quilt-, Bird-in-hand- and Pilot-in-the-plane principle received the highest score. However, there are only four situations mentioned that belong to the category 'Unknown'.

Table 6: Descriptive results of Oneway ANOVA on principle scores per situation type of non-entrepreneurial students

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Bird	Work / School	21	5.95	2.20	.48	4.95	6.95
	Social / Personal	9	7.11	2.52	.84	5.17	9.05
	Unknown	4	5.50	3.51	1.76	-.08	11.09
	Total	34	6.21	2.43	.42	5.36	7.06
Affordable	Work / School	21	3.76	2.21	.48	2.76	4.77
	Social / Personal	9	4.00	3.12	1.04	1.60	6.40
	Unknown	4	3.75	3.86	1.93	-2.40	9.90
	Total	34	3.82	2.59	.44	2.92	4.73
Crazy	Work / School	21	6.71	2.24	.49	5.70	7.73
	Social / Personal	9	5.22	2.17	.72	3.56	6.89

	Unknown	4	8.00	1.83	.91	5.09	10.91
	Total	34	6.47	2.29	.39	5.68	7.27
Lemonade	Work / School	21	6.00	2.26	.49	4.97	7.03
	Social / Personal	9	6.67	2.60	.87	4.67	8.66
	Unknown	4	8.00	2.16	1.08	4.56	11.43
	Total	34	6.41	2.36	.41	5.59	7.24
Pilot	Work / School	21	6.62	2.06	.45	5.68	7.56
	Social / Personal	9	5.78	3.27	1.09	3.26	8.29
	Unknown	4	7.50	2.08	1.04	4.19	10.81
	Total	34	6.50	2.42	.41	5.66	7.342

Experienced entrepreneurs versus Students

Table 7 shows that all the situations mentioned by experienced entrepreneurs belong to the category 'Work / School'. Since all situations belong to one category, the different scores per situation type per principle are not investigated. Thus, the mean scores per effectuation principle from experienced entrepreneurs in Table 8 on the next page are all related to situations categorised as 'Work / School'.

Table 7: Distribution type of complex and challenging situations mentioned by experienced entrepreneurs

Type of situation	Amount	Percentage
Work / School	10	100%
Total	10	100%

Since the data from experienced entrepreneurs is not normally distributed and a Levene's Test for equality of error variances showed significant values for the Pilot-in-the-plane principle with $F(2, 188) = 3.177, p = 0.044$ based on mean, it was not possible to statistically test whether the means per principle are equal for the three groups because it cannot be assumed that all variances are equal (see Table 28 in Appendix B).

Nevertheless, the descriptive results below show that the total mean scores of all the principles are rounded almost six, except the total mean score of the Affordable loss principle (4.40). Per principle, Table 8 shows that the entrepreneurs score highest (6.40) and entrepreneurial-students lowest (5.99) on the Bird-in-hand principle. Entrepreneurial-students score highest (4.53) and non-entrepreneurial students lowest (3.82) on the Affordable loss principle. On Crazy quilt, non-entrepreneurial students score highest (6.47) and the entrepreneurs lowest (5.70). On the Lemonade principle, the entrepreneurs score highest (7.00) and entrepreneurial-students lowest (5.17). The entrepreneurs score highest (7.80) and entrepreneurial-students lowest (5.86) on the Pilot-in-the-plane principle. Altogether, the results show that experienced entrepreneurs score highest on three of the five principles. Entrepreneurial students score lowest on three of the five principles. However, the mean scores per principle from both group of students do not differ substantial.

Besides the mean scores, the standard deviation per principle is relatively high considering a scale with scores from 0-10. The average total standard deviation is 2.69, which tells us that the scores (on a 0-10 scale) per principle are not close to the mean and that there is relatively high amount of variability in the data set.

Table 8: Descriptive results of Oneway ANOVA on principle scores per target group

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Bird	Student_non-Entrepreneurial	34	6.21	2.43	.42	5.36	7.06	2.0	10.0
	Student_Entrepreneurial	147	5.99	2.41	.20	5.60	6.39	.0	10.0
	Entrepreneur	10	6.40	2.12	.67	4.88	7.92	1.0	8.0
	Total	191	6.05	2.39	.17	5.71	6.39	.0	10.0
Affordable	Student_non-Entrepreneurial	34	3.82	2.59	.44	2.92	4.73	.0	10.0
	Student_Entrepreneurial	147	4.53	2.89	.23	4.06	5.00	.0	10.0
	Entrepreneur	10	4.40	3.37	1.07	1.99	6.81	.0	9.0
	Total	191	4.40	2.86	.21	3.99	4.81	.0	10.0
Crazy	Student_non-Entrepreneurial	34	6.47	2.29	.39	5.67	7.29	2.0	10.0
	Student_Entrepreneurial	147	5.81	2.82	.23	5.35	6.27	.0	10.0
	Entrepreneur	10	5.70	2.45	.78	3.95	7.45	2.0	10.0
	Total	191	5.92	2.72	.20	5.53	6.31	.0	10.0
Lemonade	Student_non-Entrepreneurial	34	6.41	2.36	.41	5.59	7.24	.0	10.0
	Student_Entrepreneurial	147	5.17	2.73	.23	4.73	5.62	.0	10.0
	Entrepreneur	10	7.00	2.05	.65	5.53	8.47	3.0	9.0
	Total	191	5.49	2.69	.19	5.10	5.87	.0	10.0
Pilot	Student_non-Entrepreneurial	34	6.50	2.42	.41	5.66	7.34	.0	10.0
	Student_Entrepreneurial	147	5.86	2.85	.24	5.40	6.33	.0	10.0
	Entrepreneur	10	7.80	1.93	.61	6.42	9.18	3.0	10.0
	Total	191	6.08	2.77	.20	5.68	6.47	.0	10.0

4.1.2 Results of the entire EMM- Entrepreneurial Students

To describe the development of the EM over time per effectuation principle, a repeated measures ANOVA is conducted. Data is included from entrepreneurial students that completed the EMM 3 times.

To test whether the means per principle are equal over time, multivariate tests are done. Table 20 till Table 24 (see Appendix B) show that all p values of Wilks' Lambda for each principle are greater than 0.05. Thus H0 is accepted, which means that there is no significant difference between the means of the principles over time. However, the descriptive table below shows that the means do vary over time. The means increase over time for the Bird-in-hand and Lemonade principle and decrease over time for the Affordable loss, Crazy quilt and Pilot-the-plane principle. Therefore, the within-subjects effect of time per principle is investigated. Results of a repeated measures ANOVA show that the scores on the five effectuation principles are not statistically different over time for entrepreneurial students (see Table 29 till Table 33 in Appendix B). This means that the scores are assumed to be equal over time for entrepreneurial students. Scores on the Affordable loss principle are considered to fluctuate the most over time for this group due to a relatively high F value (3.139) for its within-subjects effect and the highest F value (2.935) for Wilk's Lambda test, but both still not significant (see Table 30 in Appendix B).

Table 9: Results of Repeated Measures ANOVA on principle scores of entrepreneurial students over time

Descriptive Statistics (N= 28)

	Mean	Std. Deviation
Bird-in-hand week 1	6.04	2.53
Bird-in-hand week 2	6	2.29
Bird-in-hand week 3	5.36	2.18
Affordable Loss week 1	3.46	2.65
Affordable Loss week 2	5.04	2.70
Affordable Loss week 3	4.89	3.08
Crazy Quilt week 1	7.04	2.41
Crazy Quilt week 2	6.07	2.55
Crazy Quilt week 3	6.93	2.55
Lemonade week 1	5.61	2.17
Lemonade week 2	5.71	2.77
Lemonade week 3	6.5	2.12
Pilot-in-plane week 1	6.57	2.43
Pilot-in-plane week 2	6	2.65
Pilot-in-plane week 3	6.46	2.89

4.1.2 Results of the entire EMM- Experienced Entrepreneurs

The small sample size (a minimum of 5 respondents in week 3 and 4 and a maximum of 8 in week 1 and 2) makes it hard to find statistically significant results over time. In fact, only nine experienced entrepreneurs completed the EMM at least 3 times (N= 9). Because of the many missing values and normality test results mentioned in Chapter 3.5.1, it is chosen to not run a statistical test but only look at how the data develops over time.

The descriptive statistics in Table 10 show that mean values per principle from week 1 to 6 substantially differ. For example, there is a difference of 2.00 between the mean of Bird-in-hand of week 3 and 4, a difference of 2.36 between the mean of Affordable loss of week 2 and 6, a difference of 3.03 between the mean of Crazy quilt of week 1 and 3, and a difference of 3.00 between the mean of Pilot-in-the-plane of week 1 or 3 and 6. The difference between the highest and lowest mean value of the Lemonade principle is somewhat lower, namely 1.33 between week 1 and 5. These are the differences in mean values per effectuation principle. The total average standard deviation of 2.69 shows that there is a relatively high amount of variability in the data of the six weeks.

Despite the differences in mean values per principle over time, the lower part of Table 10 shows that the mean scores of experienced entrepreneurs on the Crazy quilt- (6.51), Lemonade- (6.97) and Pilot-in-the-plane principle (6.82) after six weeks of monitoring are higher than the mean scores of both groups of students on the same principles in week 1. In total there are 39 scores collected from experienced entrepreneurs during the six week monitor.

Table 10: Descriptive results of Oneway ANOVA on principle scores of experienced entrepreneurs over time

Descriptive Statistics

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Bird	1	8	6.13	2.30	.81	4.21	8.04
	2	8	4.63	2.00	.71	2.96	6.29
	3	5	4.80	3.70	1.66	.20	9.40
	4	5	6.80	2.77	1.24	3.36	10.25
	5	6	5.33	2.94	1.20	2.24	8.42
	6	7	5.71	3.40	1.29	2.57	8.86
	Total	39	5.54	2.73	.44	4.65	6.42
Affordable	1	8	4.38	3.34	1.18	1.59	7.16
	2	8	3.50	2.56	.91	1.36	5.64
	3	5	5.20	3.56	1.59	.78	9.63
	4	5	3.60	1.95	.87	1.18	6.02
	5	6	4.67	2.94	1.20	1.58	7.76
	6	7	5.86	3.44	1.30	2.68	9.04
	Total	39	4.51	2.95	.47	3.56	5.47
Crazy	1	8	5.38	2.62	.92	3.19	7.56
	2	8	6.38	2.92	1.03	3.93	8.82
	3	5	8.40	1.52	.68	6.52	10.28
	4	5	7.60	1.14	.51	6.18	9.02
	5	6	6.33	3.72	1.52	2.43	10.24
	6	7	6.00	2.77	1.05	3.44	8.56
	Total	39	6.51	2.68	.423	5.64	7.38
Lemonade	1	8	7.50	1.69	.60	6.09	8.91

	2	8	7.00	2.00	.71	5.33	8.67
	3	5	7.00	1.41	.63	5.24	8.76
	4	5	7.20	1.30	.58	5.58	8.82
	5	6	6.17	2.48	1.01	3.56	8.77
	6	7	6.86	2.67	1.01	4.39	9.33
	Total	39	6.97	1.94	.31	6.35	7.60
Pilot	1	8	8.00	2.14	.76	6.21	9.79
	2	8	6.63	1.60	.57	5.29	7.96
	3	5	8.00	2.00	.89	5.52	10.48
	4	5	6.60	2.70	1.21	3.25	9.96
	5	6	6.83	3.13	1.28	3.55	10.11
	6	7	5.00	3.06	1.15	2.18	7.83
	Total	39	6.82	2.52	.40	6.00	7.64

Descriptive Statistics

	N Statistic	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Kurtosis Statistic	Std. Error
Bird	39	5.54	2.73	7.47	-.73	.74
Affordable	39	4.51	2.95	8.73	-1.23	.74
Crazy	39	6.51	2.68	7.20	-.91	.74
Lemonade	39	6.97	1.94	3.76	.33	.74
Pilot	39	6.82	2.52	6.36	-.72	.74
Valid N (listwise)	39					

Means plots:

The figures on the next page show that the means per principle are not constant over time and are therefore not considered to be equal over time because of the fluctuations. Scores on the Lemonade principle seem to be the most constant over time based on the total standard deviation and its means plot. Comparing scores of the baseline (week 1) to the total scores per principle, the means increase over time for the Affordable loss and Crazy quilt principle and decrease over time for the Bird-in-hand, Lemonade and Pilot-in-the-plane principle.

Bird-in-hand

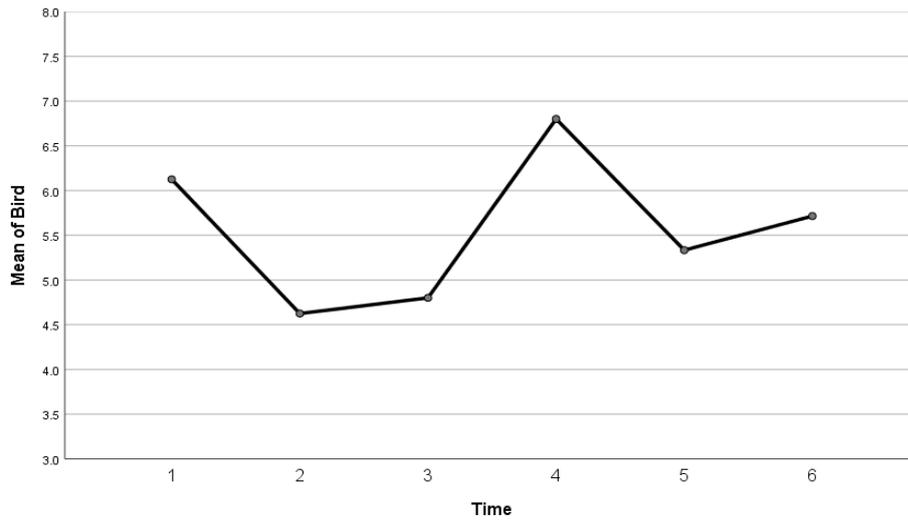


Figure 3: Means plot of scores on the Bird-in-hand principle of experienced entrepreneurs over time

Affordable Loss

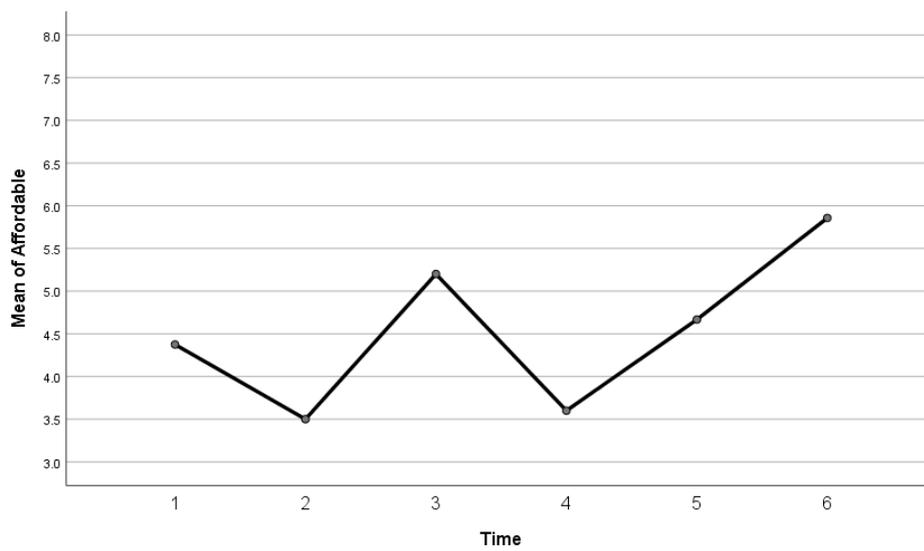


Figure 4: Means plot of scores on the Affordable loss principle of experienced entrepreneurs over time

Crazy quilt

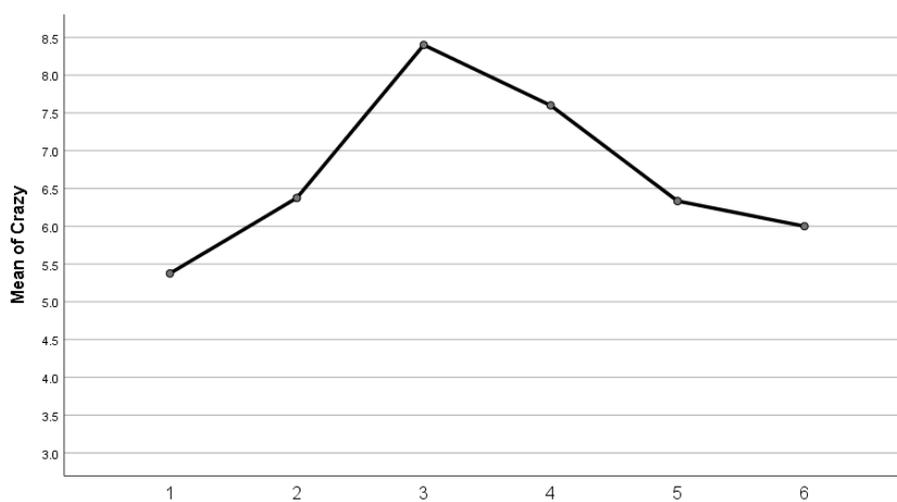


Figure 5: Means plot of scores on the Crazy quilt principle of experienced entrepreneurs over time

Lemonade

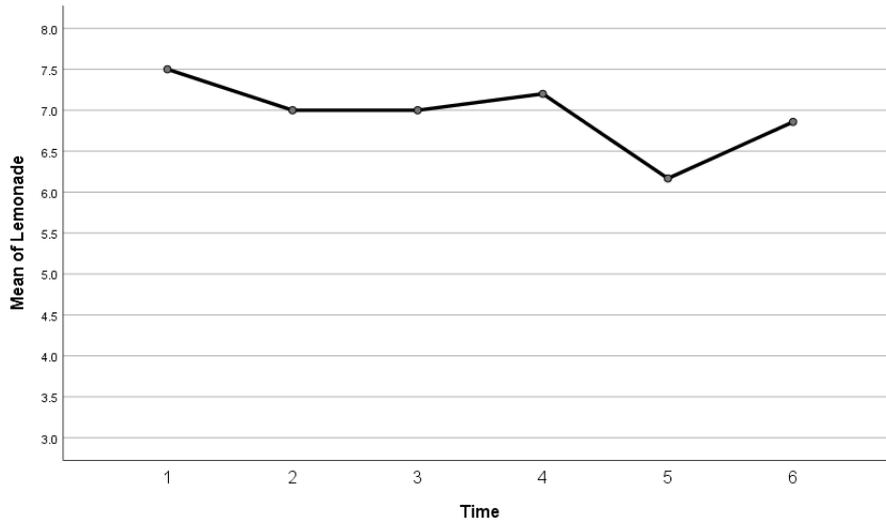


Figure 6: Means plot of scores on the Lemonade principle of experienced entrepreneurs over time

Pilot-in-the-plane

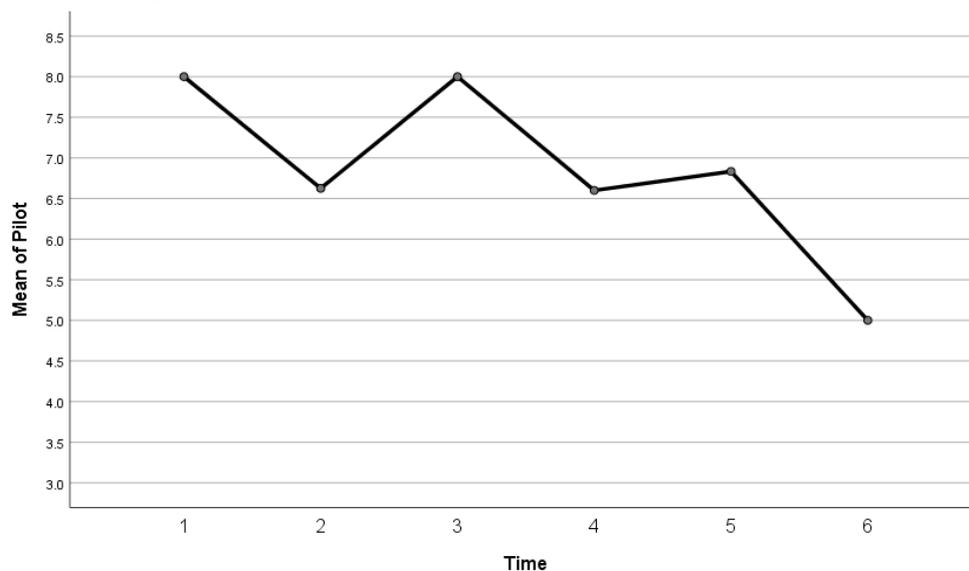


Figure 7: Means plot of scores on the Pilot-in-the-plane principle of experienced entrepreneurs over time

4.1.3 Summary of quantitative results per target group

Entrepreneurial students

Entrepreneurial students score highest on the Affordable loss principle (4.53) from the three groups. Nearly half of the situations (47%) mentioned in the first week of the EMM belongs to the category 'Social / Personal'. Within this category, the group scores highest on the Bird-in-the-hand principle (5.80) and lowest on the Affordable loss principle (4.84). During the whole EMM, the scores per principle of entrepreneurial students do not statistically differ over time.

Non-entrepreneurial students

Non-entrepreneurial students score highest on the Crazy quilt principle (6.47) from the three groups. The majority of situations (62%) mentioned in the first week of the EMM belongs to the category 'Work /School'. Within this category, the group scores highest on the Crazy quilt principle (6.71) and lowest on the Affordable loss principle (3.76).

Experienced entrepreneurs

Experienced entrepreneurs score highest on the Bird-in-hand (6.40), Lemonade (7.00) and Pilot-in-the-plane (7.80) principle from the three groups. Especially their scores on respectively the Lemonade and Pilot-in-the-plane principle are relatively high compared to the scores from Entrepreneurial students (5.17 ; 6.41) and Non-entrepreneurial students (5.86 ; 6.50). All situations mentioned in the first week of the EMM belong to the category 'Work / School. The mean scores per principle fluctuate over time. For example, the mean of the Pilot-in-the-plane principle decreases from 8.00 in week 1 to 5.00 in week 6. After 6 weeks of monitoring, the mean scores on the Crazy quilt, Lemonade and Pilot-in-the-plane principle are still higher than the mean scores of both groups of students on the same principles in week 1.

4.2 Results of the interviews

This chapter is divided in three sections and focuses on how respondents approach potential CDEs mentioned during the monitoring period (SQ2). Sections 4.2.1 and 4.2.2 include insights about the interviews with entrepreneurial-students and experienced entrepreneurs. Each section first shows which effectuation principles are mainly applied based on Interview narratives and the number of quotations per principle. Hereafter, the way of learning and reflecting is discussed together with insights about the effects of the discussed situations on the development of one's EM. These insights are based on narratives of each interview that can be found in Appendix C. Section 4.2.3 summarizes the qualitative results and indicates the approach of both target groups from a more general perspective with a code document table.

4.2.1 Students

Crazy quilt

The Crazy quilt principle is obviously applied by Rosa and Maylin in situations where both students are member of a team but face personal challenges in the form of stress and health problems. In situation 1,2 and 3, the students are part of a larger group and depend on others in order to lead the situation to a positive outcome. This is especially true for situation 2 and 5. Situation 1 and 3 show the influence of one's environment on the mind-set and approach. While in situation 1 others have a positive effect on the functioning of Rosa in a situation where she has to deal with health issues, situation 3 showed a more negative influence on the functioning of Jack and the decisions he made. Situation 2 shows that the situation contributed to the development of Maylin's EM as it explained and confirmed the added value of using strategic partners:

“Yes, until now I did not mention it yet (sarcastic), but you could definitely describe me as a network person. If I know that someone else features competencies that are relevant for me at a particular moment in time, I will just approach you for your help or at least your input. Because I learned many times that innovation will only succeed, or at least easier / more efficient, if you work with a team and not on your own”.

Pilot in the plane

The Pilot-in-the-plane principle is obviously applied by Bernard in situation 4 where he controlled the controllable by combining it with a more planned approach. His view on an entrepreneurial process and related uncertainty especially matches the Pilot-in-the-plane principle but also matches the Lemonade principle:

“I myself have a mind-set of: you cannot control everything as anything can always happen. Thus, it is better to do the things you can do and continue with what you are currently working on. You will probably fix the problems you will face anyhow”.

The described solution of situation 1 implies that the Pilot-in-the-plane principle benefits dealing with long lasting health problems that can occur unexpectedly, since Rosa positively reflects on her approach. Especially since a non-predictive approach helps in a week with health issues according to the following quote of Rosa:

“Letting things go and distracting myself, not really distracting. That is not how I would name it. But as I know that it has such an impact on some aspects of my life that I don’t do anymore, plan it on such a way that I force myself to do the things that I know are good for me and that give me energy”.

The described situation illustrates how an effectuation principle is applied in a situation with a high level of uncertainty. What explicitly contributes to the situation is to be able to adapt and to be flexible, which also matches the solution of situation 5. Situation 1 and 4 show that the interview results related to the Pilot-in-the-plane principle are connected with making a planning by both students. It seems that this causes rest and a more structured overview in the discussed situations.

Way of reflecting and learning

A more general finding is that students seem to reflect by applying a more holistic approach and helicopter view. They appear to better see the bigger picture than experienced entrepreneurs and could more easily recognize different phases of a complex and challenging situation. This might relate to their analytical capabilities that are developed within HEIs as it also appeared that students are capable to identify systems while structuring information. This became clear after investigating various phases of the discussed complex and challenging situation. Additionally, critical reflection is described as the solution of situation 1 and seen as a relevant learning strategy that resulted in new personal findings. Since stress might be an

important indicator of unexpected and undesirable behaviour, situation 1 shows that critical reflection is a method to prevent and be aware of stress.

An interesting insight from situation 3 is that Jack decided to not use additional information as it made the situation more unclear due to too many external opinions about the topic (e.g. on Internet). This is surprising as the complexity of the situation caused that he did not have foreknowledge about it and did not completely understand the whole situation.

Insights about the usage of feedback from students in the described situations are that all students used and actively searched for feedback from others to clarify situation x or to discuss their thoughts about situation x. Maylin uses feedback from others to evaluate an idea as a way to deal with uncertainty. The way students make decisions is different amongst the five respondents. The results show that it highly depends on personal features and preferences. The described effects of the discussed situations with students show that the situations contributed to the development of their EM. Moreover, Maylin confirmed that the discussed situation was a CDE and Rosa and Jack confirmed that the discussed situations were critical learning moments. Bernard mentioned that he does not think that the discussed situation was mind-set changing, but he does think that his EM reduced the level of stress and thereby contributed to the situation. Besides, he believes that learning moments do not specifically have to be physical in the form of how you would approach the same situation (differently) in the future, but can also be a mental thing related to your mind-set.

4.2.2 Experienced entrepreneurs

Crazy quilt

The interview results show that Jessica, Harry, Damion, and Jacob apply the Crazy quilt principle in their daily life. For example, Jessica and Harry mentioned the following:

“If you haven’t done such a thing before, then you need strong people around you”. “It is verry important to gather the right people around you. So, I have a pretty large network with people I know. But you have to build it at some point, especially when you start something new (Jessica)”.

“ The opportunity is of course with other people, where can they lead me? This has to do with the control they have, what can I do with them, where can I use them for? I mean, it is not one way or the other, but an acquaintance is one and acquaintances are two. Thus I am pretty much aware of my network and people and I need to take the company and myself further. That is why I definitely see others as an opportunity, but I will take care that they won’t become a threat for me”(Harry).

Especially Harry applied the Crazy quilt principle while dealing with his complex and challenging situation. He made use of strategic partners (a consultancy company he cooperates with and his accountant) to share the message about the new regulations with his staff, such that he creates a bit risk and transparency towards his staff so that they know various parties are involved and to make it feel more important.

A more general observation is that the team / staff is much discussed during the interviews. Namely, this was discussed in the interviews with Jessica, Harry, and Jacob. The results from situation 6 and 9 show that trusting your team is important and highly valued, which is described as Jacob's lesson learned from experiencing the COVID-19 pandemic as an F&B entrepreneur. Moreover Jacob mentioned that he is nothing without his staff:

"At this moment, the only thing you need is the 'p' from personnel. I see the potential of what they are currently doing. I don't fix anything on my own, I need them to propagate what is happening".

Bird-in-hand

The Bird-in-hand principle is obviously applied by Jacob in situation 6 looking at the described solution and approach. Examples of questions that Jacob asked to his staff and himself were: Who is part of my team? What do we normally do? What do they like? However, Jacob changed the main question he asked to his full time employees after applying self-reflection and receiving unexpected results, which resulted in new insights and eventually lead to motivated staff again. At this, Jacob believes that it is important to involve your team in an entrepreneurial process while thinking about common / shared (company) goals without enforcing your own opinion. Besides, it is important to also distance yourself from your business and keep confidence in your team.

In addition to situation 6, the approach of Damion in situation 10 matches the Bird-in-hand principle as an important part of the solution was that Damion made use of his own capacities (e.g. networking skills, creativity and contact with the school). Besides, he trusted his team since he knew that they were capable to deliver the menu based on their experience. Damion looked what was possible to do based on his own capacities when the initial set-up was cancelled. At this, his team played an important role, which could be interpreted as a means-based approach as Damion leads the team.

A more general observation is that experienced entrepreneurs often have a mind-set of: 'do where you good at and outsource the rest':

"First, I belief that you have to boast something you good at and have to do, and skip those things you are not good at. In this case we were sitting together, they have to fix the music, that is not my thing. They are musicians and have to bring people together"(Jacob).

Lemonade

The Lemonade principle is obviously applied by Damion in situation 10 as he made use of unexpected contingencies, in this case cancelling a Christmas dinner on a primary school. As he reflects:

"I can explain that really easily by saying: well, there was a hitch and eventually I made use of that hitch that did not only result in selling meals to the school children, but also to their parents".

Next to Damion, Harry also made use of unexpected contingencies by using the COVID-19 pandemic for improving his personnel policy in situation 8. He actually transformed a complex and challenging situation into an opportunity as it positively contributed to the organisation of his company.

Way of reflecting and learning

A more general finding is that experienced entrepreneurs mainly focused on their business by emphasising the outcome of a particular situation on one's company first and then reflecting on their own behaviour and approach. While reflecting, they were able to make broad, general questions practical by sharing clear (business related) examples. The transcripts show that critical reflection is not something they are used to. Multiple follow up questions were needed to be asked before they really reflected on their own actions. An exception to this finding is Jacob, who values self-reflection and described it as important because he believes that it is important to be critical about your own behaviour. Therefore, he is always open for receiving feedback.

The way experienced entrepreneurs structure information differs per person. Some make notes while others only apply brainstorming. They seem to gather information mainly from external sources, but do make decision based on knowledge they already have from previous experiences. The results also show that experienced entrepreneurs especially make decision in consultation. However, it became clear that Jessica explained it as making decisions in consultation, but, in practice, it looks more like sharing a decision and asking for confirmation instead of having a discussion about a decision that need to be taken. Other ways of making decisions mentioned are making decision by reacting on your environment, based on your feelings and automatic decision-making. The latter was an example mentioned by Harry to illustrate the development he made as an entrepreneur. A development that changed him from an entrepreneur who took adequate decisions into a more analytical and leading entrepreneur who thinks pragmatic. This example shows that the mind-set of entrepreneurs also seems to change over the years, which is confirmed by Arnold:

“If you look at the enterprise I had, it went well for 18 years except for the financial crisis in 2013 that had an impact on us in combination with some internal issues. For the rest always positive numbers, revenue growth and profit. That is the world you leave before entering this one. So I thought for a while: okay, you are meeting with adversity in a difficult period. But in the end, it made me a bit more cautious in a different world, which is probably also possible. Thus, for me personally it is a learning curve”.

Besides making decisions in consultation, the results show that every entrepreneur makes use of feedback from others in his or her daily life. The most important reason mentioned to do this, is to learn from others. Despite that they seem to value feedback and often share ideas with people in their environment, situation 9 shows that experienced entrepreneurs make less use of feedback in a complex and challenging situation.

The described effects of four of the five discussed situations with experienced entrepreneurs show that the situations did contribute to the development of their EM. Jacob confirmed that the discussed situation was a CDE. Jessica is the only respondent who described the effect of the situation with a negative term, namely 'hindering'; she did not act how she normally would while dealing with a similar situation. Nevertheless, she positively values the outcomes of her decisions. Despite the difficult period the interviewed entrepreneurs have to deal with due to the COVID-19 measures, three of them (Jacob, Damion and Arnold) consider it as a very informative and educational period. Moreover, it resulted in ground-breaking changes according the interview with Harry:

"It might also be a challenge since I always wanted to learn. That is also entrepreneurship. Entrepreneurship is also lifelong learning, continuously improving. If I see what I learned with Graag (new catering start-up) in the last year during the Corona crisis, taking into account the ambitions we have to scale it in the future, it has been very valuable".

4.2.3 Summary of qualitative results

Table 11 indicates how both target groups approach complex and challenging situations based on the interview results. It shows that both experienced entrepreneurs and students seem to apply an effectual approach more than a causal approach. The difference between both groups in amount of quotations that fit an effectual approach is almost equal (students 48.86% versus entrepreneurs 41.54%). The difference in amount of quotations that fit a causal approach is larger than the difference for an effectual approach (students 42.11% versus entrepreneurs 57.89%). This indicates that based on the qualitative interview results, it seems to be more likely that experienced entrepreneurs apply a causal approach than entrepreneurial students.

Causal codes that are more applied by experienced entrepreneurs and cause a relatively large difference between both groups are 'Competitive analysis', 'Existing market knowledge' and 'Predictions of the future'. These causation principles are obviously applied by Harry and Arnold and to a lesser extent by Jessica. The interview results of students show that Jack made use of existing market knowledge and Bernard approached the described situation by also trying to predict the future. Thus, despite that both groups apply overall a more effectual approach, it appears that experienced entrepreneurs more often combine it with elements that fit a causal approach. This became particularly clear in the interview with Jessica and Arnold. Jessica illustrated it with an example about decisions she had to made to dismiss or keep staff during the COVID-19 crisis. The example illustrated how she combined the causation principle 'Predictions of the future' with the Affordable loss principle. Arnold combined the Lemonade principle with 'Existing market knowledge' and 'Predictions of the future' as he invested capital in an uncertain period and situation by acquiring a company (countercyclical investing). In general, he approached his complex and challenging situation by avoiding unexpected events and contributing to the situation with causal logic; a predictive approach.

The largest differences between both groups for effectual codes, with more quotations belonging to entrepreneurs, exist between ‘means-based’ (Bird-in-hand principle) and ‘exploitation of contingencies’ (Lemonade principle). This implies that the basis for taking action of entrepreneurs is means-oriented and that they more often make use of unexpected events than students.

A relatively large difference between the number of quotations coded among both groups exist between the ‘control the controllable’ code (pilot-in-the-plane principle), with more quotations belonging to students. This implies that students more often seem to contribute to a challenging situation by applying a non-predictive approach based on effectual logic than experienced entrepreneurs.

Both students and experienced entrepreneurs made assumptions while dealing with situations x. From the fragments that are about not making assumptions, 80% belongs to students and 20% to entrepreneurs. The largest part (58,33%) of the fragments belonging to decision-making based on previous findings belongs to experienced entrepreneurs.

Altogether, the number of quotations that belong to the theme ‘Critical developmental experiences’ is almost equal between both groups (students 51.41% versus entrepreneurs 48,59%).

Table 11: Code document table qualitative interviews

Codes	Students Gr=439; GS=5		Experienced entrepreneurs Gr=473; GS=5		Totals	
	Absolute	Row- relative	Absolute	Row- relative	Absolute	Row- relative
● E1. Goal-driven Gr=14	8	57,14%	6	42,86%	14	100,00%
● E2. Expected return Gr=12	5	41,67%	7	58,33%	12	100,00%
● E3. Competitive analysis Gr=4	1	25,00%	3	75,00%	4	100,00%
● E4. Existing market knowledge Gr=13	5	38,46%	8	61,54%	13	100,00%
● E5. Predictions of the future Gr=14	5	35,71%	9	64,29%	14	100,00%
● F1. Means-based Gr=18	7	38,89%	11	61,11%	18	100,00%
● F2. Affordable loss Gr=10	4	40,00%	6	60,00%	10	100,00%
● F3. Use of strategic partners Gr=27	15	55,56%	12	44,44%	27	100,00%

• F4. Exploitation of contingencies Gr=16	5	31,25%	11	68,75%	16	100,00%
• F5. Control the controllable Gr=17	12	70,59%	5	29,41%	17	100,00%
• G3. Structuring information Gr=8	3	37,50%	5	62,50%	8	100,00%
• G4. Making assumptions_0 Gr=5	4	80,00%	1	20,00%	5	100,00%
• G4. Making assumptions_1 Gr=12	5	41,67%	7	58,33%	12	100,00%
• G5. Usage of feedback Gr=34	19	55,88%	15	44,12%	34	100,00%
• G6. Search for additional information Gr=23	16	69,56%	7	30,43%	23	100,00%
• G7.1 way of making decisions_Automatic Gr=1	0	0,00%	1	100,00%	1	100,00%
• G7.2 Way of making decisions_In consultation Gr=8	2	25,00%	6	75,00%	8	100,00%
• G7.3 Way of making decisions_reactive Gr=5	2	40,00%	3	60,00%	5	100,00%
• G7.4 Way of making decisions_based on feeling Gr=3	2	66,67%	1	33,33%	3	100,00%
• G8. Making decisions based on previous findings Gr=12	5	41,67%	7	58,33%	12	100,00%
Causal thinking Gr=57; GS=5	24	42,11%	33	57,89%	57	100,00%
Critical developmental experiences Gr=177; GS=18	91	51,41%	86	48,59%	177	100,00%
Effectual thinking Gr=88; GS=5	43	48,86%	45	51,14%	88	100,00%
Totals	283	48,96%	295	51,04%	578	100,00%

Abbreviations :

Gr Groundedness of codes (number of quotations coded by a code) or documents (quotations created in a document)

GS Number of documents in a document group or number of codes in a code group

Table 12: Summarizing table qualitative interview results

	Students	Entrepreneurs
<u>Type of...:</u>	<ol style="list-style-type: none"> 1. Rosa: controller, listener and open 2. Maylin: dominant and ambitious 3. Jack: entrepreneurial, negotiator and risk-taker 4. Bernard: entrepreneurial, active and positive-minded 5. Charlie: entrepreneurial, listener, social and creative 	<ol style="list-style-type: none"> 6. Jacob: energetic, creative and result-driven 7. Arnold: innovative, put things into perspective and a go-getter 8. Harry: analytic, controller, avoiding conflict and confident 9. Jessica: strategic, confident and impulsive / intuitive 10. Damion: hands-on, innovative and customer oriented
<u>Way of dealing with uncertainty:</u>	<ol style="list-style-type: none"> 1. Tries to prepare (e.g. by reading) and be aware of uncertainty, not specifically to reduce it but to understand it. 2. Tries to keep the level of uncertainty low by evaluating and talking about a situation. 3. Accepts uncertainty by focusing on the affordable loss. 4. Learns to deal with uncertainty and focuses on the expected return. 5. Tries to reduce the level of uncertainty by having clearly in mind what he wants to achieve; persevere 	<ol style="list-style-type: none"> 6. By finding goals that fit the organisation which need to be adapted to the people you work with. 7. Wants to experience activities that he does not control or knows and sees it as a challenge. 8. Switches into a controlling mode by investigating and analysing the uncertain situation. 9. By keep believing in your own vision, especially when you start something new. 10. Shares his ideas and vision with others and uses feedback to analyse the situation.
<u>Situation:</u>	<ol style="list-style-type: none"> 1. <i>Long lasting health problems and reflective learning</i> 2. <i>Finding an organisation to cooperate with under extreme time pressure</i> 3. <i>Investing in one specific stock without foreknowledge during an unique period</i> 4. <i>Dealing with a double planning in an uncertain and unclear period</i> 5. <i>Making house rules with 10 differently aged men during the Covid19-pandemic</i> 	<ol style="list-style-type: none"> 6. <i>Motivating six full time employees in an uncertain and difficult period; reflective learning</i> 7. <i>Investing in a new start-up in a new sector in an uncertain period; learning-by-doing</i> 8. <i>New personnel regulations in an uncertain period; transforming challenges into opportunities</i> 9. <i>Decision about opening/closing a restaurant hard to accept</i> 10. <i>Delivering a Christmas menu to 325 school children</i>
<u>Type of situation:</u>	<ol style="list-style-type: none"> 1. Work / School 2. Work / School 3. Social / Personal 4. Work / School 	<ol style="list-style-type: none"> 6. Work / School 7. Work / School 8. Work / School 9. Work / School

	5. Social / Personal						10. Work / School					
<u>Scores EMM per situation:</u>		Bird	AL	CQ	LN	PP		Bird	AL	CQ	LN	PP
	1.	2	6	10	8	7	6.	5	2	10	8	8
	2.	5	3	8	8	7	7.	8	5	8	6	5
	3.	5	1	10	2	0	8.	1	1	9	9	5
	4.	7	5	8	7	4	9.	5	0	5	5	5
	5.	2	5	9	7	7	10.	8	2	6	9	9
<u>Described solution:</u>	<ol style="list-style-type: none"> critical self-reflection; flexibility and adaptability Do not give up, keep communicating, and ask for help / approach your network only invest resources that you can lose be flexible and positive-minded adjust rules to the current state and information available; do not be afraid to change something 						<ol style="list-style-type: none"> finding common / shared goals that need to be translated in individual goals find the right balance between the continuity and liquidity of your company and the company itself. people lack control and need structure in times of crisis, so create clarity think about different scenarios, use feedback from others and share your vision stay positive and keep the overview 					

4.3 Combination of quantitative- qualitative results

This chapter is divided into two sections and combines quantitative results (EMM scores) with qualitative results (interview results). For each target group, it was examined whether the results per principle of the effectuation theory correspond to each other. Each section ends with an indication of an overall final score based on the principles of the effectuation theory on a 0-10 point scale.

4.3.1 Entrepreneurial students

Table 13: Average EMM results of entrepreneurial students in week 1- baseline

Bird-in-hand	Affordable loss	Crazy quilt	Lemonade	Pilot-in-the-plane	Total
5.99	4.53	5.80	5.17	5.86	5.47

The interview results indicate that entrepreneurial student mainly applied the Crazy quilt- and Pilot-in-the-plane principle. This is not surprising given the average scores of the EMM in week 1. Especially Crazy quilt received high scores compared to the other principles regarding the situations discussed in the interviews. This might be explained by the fact that three students are part of a larger group which they work together with in the discussed situations. Based on the interview results, in general, it seems that students see others as a possibility and/or enabling. The Pilot-in-the-plane principle is mainly applied by students on a personal level and is linked to the process of making a (weekly) plan based on activities that are in control at a

specific moment in time. Bird-in-hand received relatively high scores in the EMM, but was not dominantly discussed in the interviews with students.

It is difficult to analyse whether the distribution of the type of situation discussed in the interviews is in line with the distribution found in the quantitative result section as there is no category 'Unknown' since the situations were carefully analysed. Nevertheless, it is worth mentioning that the percentage of Social / Personal situations discussed in interviews (40%) is comparable to the percentage of Social / Personal situations mentioned in the EMM (47%).

Combining the five effectuation principles (see Table 13) and looking at the distribution between effectual- and causal thinking based on the interview results (see Table 11), entrepreneurial students slightly score a more effectual score on a 0-10 point scale (means a score higher than 5 and more quotations coded as 'effectual'). This implicates that entrepreneurial students seem to apply an effectual way of thinking. Relevant insights based on the interview results that possibly explain this finding are:

- Flexibility and adaptability contributed to the solutions of complex and challenging situations mentioned in the interviews
- An EM reduces the amount of stress experienced by students. Stress might be an important indicator of unexpected/undesirable behaviour.
- Students try to reduce the level of uncertainty by investigating the uncertain situation
- Students combine a predictive / planned approach with the Pilot-in-the-plane- and Crazy quilt principle of the effectuation theory.

4.3.2 Experienced entrepreneurs

Table 14: Average EMM results of experienced entrepreneurs in week 1- baseline

Bird-in-hand	Affordable loss	Crazy quilt	Lemonade	Pilot-in-the-plane	Total
6.40	4.40	5.70	7.00	7.80	6,26

The interview results indicate that experienced entrepreneurs mainly applied the Bird-in-hand-, Crazy quilt-, and Lemonade principle. Especially applying the Lemonade principle is not surprising given the average score of the EMM. The interview results confirm that experienced entrepreneurs are capable to exploit contingencies. Regarding the Bird-in-hand principle, the interview results show that entrepreneurs are aware of their own capabilities and know quite well how to use those. Despite that entrepreneurs scored relatively low on the Crazy quilt principle in the EMM, the interview results show that in general this principle is applied by four of the five entrepreneurs in their daily life. They seem to perceive others as a possibility / enabling and more actively involve them in an entrepreneurial process than students. Something that is not completely in line with the scores of the monitor.

The distribution of the type of situation discussed is in line with the distribution found in the quantitative results section since all the situations belong to the category 'Work / School'.

While reflecting on the situations, entrepreneurs mainly focussed on their business instead of their own behaviour and actions.

Combining the five effectuation principles (see Table 14) and looking at the distribution between effectual- and causal thinking based on the interview results (see Table 11), experienced entrepreneurs score a more effectual score on a 0-10 point scale (means a score higher than 5 and more quotations coded as 'effectual'). This implicates that experienced entrepreneurs seem to apply an effectual way of thinking. However, Table 11 indicates that entrepreneurs more often apply a causal approach than students. Besides, Chapter 4.1.2 concluded that the mean scores of entrepreneurs per effectuation principle fluctuate over time, which matches results of the interviews about a changing mind-set. Relevant insights based on the interview results that possibly explain this finding are:

- There is always uncertainty, especially when starting something new. Entrepreneurs want to experience uncertainty in an entrepreneurial process and seem to exploit unexpected events.
- Self-confidence is essential for making decisions and increases by making critical decisions more often.
- Entrepreneurs make decisions based on previous experiences.
- In general, entrepreneurs highly value their team / staff. They try to sometimes distance themselves from the work floor as this benefits personal development within the team, which results in more revenue.

5. Discussion and recommendations

The first part of this chapter elaborates on the starting point of this research, discusses the main characteristics and definition of an EM, and discusses the main findings per target group that are interpreted from a learning perspective. The second part of this chapter discusses the limitations of this research and the third part elaborates on recommendations for future research. This chapter ends with implications for practice.

This study builds on the observation that Sarasvathy's effectuation theory (2001A; 2008) is one of the first entrepreneurial decision-making theories incorporating the chaotic character of an entrepreneurial process in which the entrepreneur must deal with uncertainties (Moberg et al., 2014). Since students must deal with complex and challenging situations that are often characterized by uncertainty in their future working environments, I argue that EE programs should emphasize the development of students' EM, as this benefits their ability to deal with complexity and uncertainty. To monitor the development of the EM of students and experienced entrepreneurs, I used five principles of the effectuation theory as a measure of the EM and investigated potential CDEs influencing the transformation of a novice EM into an expert EM (Krueger, 2007).

Previous research showed that an EM is action-oriented and benefits an uncertain decision-making process due to cognitive abilities that enhance addressing ambiguity (McGrath & MacMillen, 2000; Ireland et al., 2003; Moberg et al., 2014). Another crucial aspect of an EM is seeking-opportunities, which confirms the essence of entrepreneurship and is often associated with innovation in previous studies (e.g. Ireland et al., 2003; Sarasvathy et al., 2010; Bosman & Fernhaber, 2018). The interview results support the first two crucial aspects of an EM but do not necessarily support the association with seeking-opportunities or recognizing entrepreneurial opportunities. This can be explained from a practical perspective, as I decided to focus more on how participants reflected on their approach to complex and challenging situations rather than focusing on value creation while analysing the qualitative results. Because of the previous findings, an expert EM is defined here as *"a set of activated cognitive procedures that enable someone to rapidly sense, act and mobilize under uncertain conditions"* (Ireland et al., 2003; Bosman & Fernhaber, 2018; Gollwitzer & Keller, 2016; McGrath & MacMillen, 2000).

This study has three main findings in relation to student's EM that will be explained in the next paragraphs. First of all, the EMM and interview results indicate that students apply an effectual way of thinking. The results show that entrepreneurial students, on average, score slightly higher than 5 on a 0–10 point scale, indicating a more effectual than a causal score. A possible explanation for this finding rests in the described relevance of studying effectuation within EE in the study of Wiltbank et al. (2006), which shows how effectuation enhances adaptability. The results of interviews with students within this study substantiate this, as they show that effectual thinking contributes to the described complex and challenging situations because of the ability to adapt and apply a flexible approach. Based on this interpretation, one

could argue that flexibility and adaptability need to be part of one's activated cognitive procedure to rapidly sense, act and mobilize under uncertain conditions.

Second, in addition to adaptability and flexibility, embracing uncertainty is found to be a key element of having an EM (McGrath & MacMillen, 2000; Ireland et al., 2003; Moberg et al., 2014). The results from interviews with entrepreneurial students indicate that two out of five accept the existence of uncertainty while three out of five attempt to understand what causes it. Students who seek to understand what causes uncertainty appear to apply causal thinking to reduce the level of uncertainty. Interestingly, these three students are part of a certain (social) group and therefore depend on others to lead the situation to a positive outcome. The results are consistent with Lackéus' (2020) findings about emotionally charged situations that form a basis for a CDE according to the results of this study.

Third, while analysing the qualitative results, it was found that an EM reduces the amount of stress students experience while dealing with complex and challenging situations described as uncertain. Stress might even be an important indicator of unexpected and undesirable behaviour according to this study and appears closely connected to uncertainty in education (Hung et al., 2021). Thus, one could argue that the more uncertain a situation, the higher the stress level experienced by students in an educational setting. This might explain why some of the students attempt to reduce the level of uncertainty by investigating the situation (e.g. doing desk research) and avoiding unexpected events. Both are examples of a more causal way of thinking that fits within the assumption that students apply a more planned approach. This is how they are accustomed to working and is consistent with the common educational approach in many HEIs described as the supply model by Béchar and Grégoire (2005), which focusses on "transmission and reproduction of knowledge and application of procedures" and follows a behaviourist approach (Nabi et al., 2017, p.279). Since Neergaard et al. (2012) found that EE programs in higher education mainly follow a behaviourist approach rather than an experiential approach based on constructivism, this might also explain why minimal research is conducted on the impact of effectuation within EE.

This study has three main findings in relation to experienced entrepreneurs' EM that are explained in this paragraph. The results of interviews with experienced entrepreneurs indicate that three out of five deal with uncertainty by applying a means-based approach. Especially when starting something new, which is often in an uncertain context, self-confidence appears an important aspect of dealing with uncertainty (Moberg et al., 2014). One entrepreneur even wanted to experience uncertainty and considered it a challenge, which relates to the entrepreneurial way of embracing uncertainty and links to the findings of McGrath and MacMillen (2000), who described uncertainty as second nature to entrepreneurs. However, one entrepreneur switches into a type of control modus when experiencing uncertainty. This implies that the approach differs between entrepreneurs and that no single specific mind-set is required with the discussed situations. The described solutions to the complex and challenging situations fit both approaches (causal and effectual), and the approach even appears to change during a particular situation. This implies that the mind-set of

entrepreneurs is not fixed but changes over time, which can be explained by changing cognitive knowledge structures (Krueger, 2007) and is confirmed by the quantitative results of this study.

From a constructivist learning perspective, the results show that students appear to learn by applying a more predictive approach (i.e. “learning the answer” (Krueger, 2007)), can identify systems while learning (i.e. “connecting the dots” (Krueger, 2007)), and learn by applying self-reflection. However, experienced entrepreneurs learn by applying a more means-based approach, as they use knowledge they already have from previous experiences. Moreover, they learn by doing (experiential learning) and validate ideas using feedback from others. Therefore, they appear to learn by actively involving others in an entrepreneurial process. These results build on existence evidence of experienced entrepreneurs’ effectual approach, including co-creation and partnership strategies (i.e. ‘Crazy quilt’), to embrace uncertainty (Read et al. 2009). Thus, from a learning perspective, the results indicate that students apply more causal thinking while experienced entrepreneurs apply more effectual thinking while dealing with complex and challenging situations.

Limitations

Limitations of the EMM are the short period of monitoring one’s mind-set and the consistency in responses. The goal was to frequently monitor mind-sets with a short, recurring questionnaire. In practice, it was a challenge to motivate respondents to complete the EMM every week of the arranged period. This directly influenced the amount of data that could be used for measuring the development of one’s EM. Moreover, it is questionable whether the short monitoring period of only three weeks for students was sufficient to determine whether the EM changes during, for example, an entrepreneurship course. This is especially so because, as we stated, an EM reflects deep beliefs and anchoring assumptions that are difficult to change (Krueger, 2007; Krueger, 2015). Other factors to consider regarding the EMM are that some entrepreneurs struggled with the English questions and sometimes believed that “nothing interesting” was occurring due to the government’s COVID-19 measures. Neither factor necessarily influences the internal validity; however, both could have influenced entrepreneurs’ motivation to complete the monitor.

A factor to consider regarding the conducted interviews is the degree of subjectivity while analysing whether a particular situation was a CDE. Although it was sometimes asked whether someone would describe it as a CDE after explaining what a CDE means, it is difficult to determine if this is the case, especially since retrospective interviews are subject to recall bias (Eisenhower et al., 2004). Can the description of a CDE be based on one interview, or should the same person be interviewed again after 2 years and another investigation conducted regarding whether the discussed situation caused, for example, changed anchoring assumptions? In such a longitudinal design, it is recommended to combine retrospective

interview data with observable behavioural and action variables to mitigate the risk of recall bias (Eisenhower et al., 2004).

Recommendations for future research

Since we argued that it is relevant to study effectuation within EE and concluded that students apply an effectual way of thinking, future research should explicitly study the effect of applying an EM on learning outcomes in EE. The results of this study imply that an EM enhances students' ability to deal with complex and challenging situations characterised by uncertainty; however, it is currently unknown which specific characteristics of an EM contribute to this effect. Therefore, we suggest establishing an experiment with students having the characteristics of an EM mentioned in this study and those without these characteristics to investigate their ability to deal with complex and challenging situations. Ultimately, these results will provide more quantitative insights into the positive effects of applying an EM, which contribute to solving the grand challenges of the 21st century.

Besides suggestions for EE, we found that the mind-set of experienced entrepreneurs is not fixed but changes over time. Future studies could address the question of whether experienced entrepreneurs have a single mind-set that is continuously changing or have one that is highly flexible and enables them to adapt their behaviour to a specific situation. Here, it should be considered that a mind-set can change during a complex and challenging situation or crisis according to the interview results.

Finally, since the literature (e.g. Robotham, 2008) indicates that higher education students are experiencing increasing amounts of stress, future research is required to determine the potential relationship between an EM and stress. This recommendation is strengthened by findings of Baron et al. (2016) indicating that entrepreneurs experience relatively low levels of stress due to their capacity to tolerate or manage stress, which might be explained by the results of this study indicating that an EM reduces the level of stress experienced due to a flexible approach that enables adaptation.

A factor to consider regarding the EMM is that it was found during the interviews that the question in the EMM related to the Affordable loss principle (*"On what did you focus when you first encountered this challenging situation?"*) was interpreted as if one is positive-minded (answer is "potential gains") or negative-minded (answer is "potential risks"). The principle states that an effectuator prefers affordable loss rather than expected return, which does not necessarily mean that an effectuator is negative-minded. Therefore, it is recommended to formulate the answers related to the Affordable loss principle as follows: "maximizing potential returns" (causal) or "limiting losses" (effectual).

Furthermore, the answer options belonging to the Bird-in-hand question (*"What resources did you use in this challenging situation?"*) in the EMM ("Used other's capabilities" or "used my own") are not completely consistent with a goal-oriented approach of causation or a means-oriented approach of effectuation. Does using "other's capabilities" mean that the basis for acting is goal-oriented? Answer options belonging to a new question that may be more relevant to literature results, for example, *"How would you describe your basis for taking*

action?” are “as goal-oriented, meaning that certain goals determined action” or “as means-oriented, meaning that given means determined action”.

Implications for practice

Since the qualitative results of this study imply that experienced entrepreneurs have difficulties with critical self-reflection on their behaviour and actions while students learn by applying self-reflection, it is argued that both groups can learn from each other.

Entrepreneurs can learn from students how to critically reflect on their actions and behaviour and how to approach this from a more holistic perspective. Mainly because we stated that experiential learning requires constructivistic reflection to enhance the development of one's EM. This will contribute to transforming knowledge gained in practice into new perspectives, which entrepreneurs might forget, as they are routinely engaged in daily activities. On the other hand, students can learn from entrepreneurs to believe in themselves and the people around them. Although students appear aware of the added value of working in teams, I know from personal experience that students are not taught how to form a team that suits their goals and context, including personal characteristics such as strengths and weaknesses. This should be emphasized more in EE and can be integrated using experienced entrepreneurs' knowledge and experience.

Briefly, we recommend stimulating the exchange of knowledge, non-cognitive skills and experience between students and experienced entrepreneurs, as this will contribute to the development of the EM of both target groups. To elaborate on this recommendation, future studies could address the relationship between authenticity or real-world interaction and the development of the EM in an educational context. This implication is supported by Neergaard et al. (2012) and strengthened by entrepreneurial students explicitly mentioning that they want to personally develop but lack a clear direction on what to exactly learn and how to apply this in practice.

6. Conclusion

This research aimed to characterize the EM of students and experienced entrepreneurs from a learning perspective. Based on previous research (McGrath & MacMillan, 2000; Ireland et al., 2003; Bosman & Fernhaber, 2018) and interview results of this study, an EM can be characterized as follows: an EM is action-oriented, emphasizes opportunities and enables one to adapt and be flexible under uncertain conditions. Results of quantitative and qualitative analysis of the EM of both target groups indicate that both students and experienced entrepreneurs apply an effectual way of thinking more than a causal way of thinking. Therefore, it can be concluded that the EM of students and experienced entrepreneurs is more consistent with the characteristics of effectuation than those of causation.

For students, the effectual way of thinking can mainly be explained by controlling the controllable (i.e. 'Pilot-in-the-plane') and using strategic partners (i.e. 'Crazy quilt'). Quantitative results show that students' EM is constant during the monitoring period. However, this is only the case for entrepreneurial students, as it was found that the EMM scores of non-entrepreneurial students statistically differed from those of entrepreneurial students. From a learning perspective, the results indicate that entrepreneurial students apply causal thinking since their way of learning can be described as planned or descriptive in order to avoid unexpected events. Their way of reflecting on a potential CDE can be described as a holistic approach that aims to connect the dots by applying system learning combined with critical self-reflection. Although students attempt to control the controllable, the interview results showed that they sometimes combine this with a planned approach regarding activities occurring in the near future (e.g. weekly plans) because of the more structured overview. Based on this, it can be concluded that the EM of students cannot be characterized by a single way of thinking but is a combination of different procedures.

For experienced entrepreneurs, the effectual way of thinking can mainly be explained by exploiting unexpected events (i.e. 'Lemonade') and applying a means-based approach (i.e. 'Bird-in-hand'). Both quantitative and qualitative results show that the EM of entrepreneurs appears to fluctuate over time. Although dominant principles of experienced entrepreneurs' mind-set appear to differ per situation and change over time, a more general finding based on the interview results is that this group appears to have a reasonable knowledge of their capabilities and uses their network to gather the right people around them. Moreover, it was found that self-confidence is an important aspect of experienced entrepreneurs' decision-making behaviour. It increases over time as they learn from past decisions, relating to the finding that entrepreneurs more often make decisions based on previous experiences than students. From a learning perspective, the results indicate that experienced entrepreneurs apply effectual thinking since they apply a more means-based approach using knowledge from previous experiences. They learn by doing (experiential learning) and aim to learn from others. Their way of reflecting on potential a CDE can be described as practical and realistic, enabling them to provide real-life examples from a business perspective.

Combining quantitative and qualitative results, the EM of students and experienced entrepreneurs appear to differ according to the situation. It is questionable whether the mindset can be characterized by a single way of thinking. Nevertheless, characteristics of the EM of both groups are shaped by CDEs contributing to the EM. The interview results imply that the EM is influenced by complex and challenging situations, such as the COVID-19 crisis. CDEs such as the COVID-19 crisis, increase awareness of the presence of an EM. Here, the context appears to play an essential role in how respondents reflect on CDEs and ultimately formulate lessons learned.

7. References

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8. Appendix

Appendix A: Clarification of Methods

Keywords literature study

In the literature study, the following keywords per concept are used:

- a) Value Creation: 'value creation', uncertainty, 'entrepreneurial process'
- b) Entrepreneurial Mind-set: 'cognitive development', constructivism, 'deep beliefs', 'non-cognitive skills', 'entrepreneurial cognition'
- c) Effectuation Theory: entrepreneurship, effectuation, causation, 'new venture creation OR development'

Instruments

Sustainable entrepreneurship scan (SES)

Before starting with the EMM, some students completed a questionnaire called 'Sustainable Entrepreneurship Scan' (SES) with the purpose to provide general background information (e.g. study background and nationality) and data about their entrepreneurial intentions. SES's questions considered in this research are:

- i. Do you have entrepreneurial parents?
- ii. Do you currently own a company

Indicate to what extent you agree with the statements on a 5 point-scale (very little, little, average, much, very much). In which type of activities are you most interested in the next 5 to 10 years?:

- a) Becoming an entrepreneurial individual as employee within an existing company.
- b) Starting up my own small company.
- c) Starting up and building a high growth company
- d) Acquiring or inheriting a small company
- e) Acquiring or inheriting a company and turn it into a high growth company

Entrepreneurial Mind-set Monitor (EMM)

A format of the EMM can be found in Appendix A

During the first months of collecting quantitative data, a web application built by a researcher from the INTRINSIC project that includes the EMM is used as an instrument to monitor the mind-set development of both target groups. The purpose of INTRINSIC regarding the WebApp, which is one of the aimed project outputs, is 'to capture potential development of the (sustainable) entrepreneurial mind-set among participants (e.g. students), based on their effectual decision making process" (INTRINSIC, n.d.). The app makes use of Sarasvathy's (2001) effectuation theory as a guiding theory. It includes five questions related to a complex and challenging situation that participants have to take in mind and describe in two keywords, these question all referrer to the five principles of the effectuation theory. Participants have to score each question on a scale from 0 to 10. A score of '0' means that a participant follows a causal way of thinking on the principle of the effectuation theory that is questioned. A score of '10' means that a participant follows a effectual way of thinking on the principle of the

effectuation theory that is questioned. The idea is to get grip on student’s changing mind-set by frequently monitoring their decisions made in a short questionnaire.

In this study, experienced entrepreneurs are asked to complete the EMM once a week during a period of six weeks. Students are asked to complete the EMM once a week during a period of three weeks as the semesters that students actively participate in education (within a course) were three weeks at the moment of data collection. Before collecting data, all participants of this study were asked to sign an informed consent on a voluntarily base.

In the second part of collecting quantitative data, a switch took place from using the WebApp for the EMM to Google Forms to also send automatic feedback with the scores of the monitor to participating students so that they can use the results for self-reflection. The same questions were asked in the same order, only the answer options were more randomly shown. Seven questions are asked in the EMM, which are included in Appendix A.

Background information students

- From higher education institutions.
In this study, students from Van Hall Larenstein (30%)(university of applied sciences), Wageningen University (44%), the Technical University of Twente (4%), and an interdisciplinary master program from Wageningen University, Amsterdam institute for advanced metropolitan solutions (AMS Institute) and Technical University of Delft (22%).
- Who currently follow a Bachelor- or Master degree in the domain of life sciences.
The thee most common study programs in this research are Business and Consumer Studies (Bachelor), International Development Management (Bachelor), and Management, Economics and Consumer Studies (Master).
- Who followed at least one entrepreneurship course or program and could therefore be categorized as would-be entrepreneurs (or potential future entrepreneurs).
Within this study, students who match this requirement are defined as ‘entrepreneurial students’ (N=147; 81.22%).

Entrepreneurial students

Table 15: Biographic information of entrepreneurial students

N=57	Age	Sex	Entrepreneurial parents?	Own a company?
Average	24			
Male		40; (70%)		
Female		17; (30%)		
Yes			21; (37%)	7; (12%)
No			36; (63%)	50; (88%)

Table 16: Entrepreneurial intentions of entrepreneurial students

<u>Entrepreneurial intentions</u>	A	B	C	D	E	Total	%
Verry little	4	3	7	14	12	40	14%
Little	4	9	8	12	14	47	16%
Average	15	19	17	15	13	79	28%
Much	19	11	12	11	11	64	22%
Very much	15	15	13	5	7	55	19%
	57	57	57	57	57		100%

Indication of interest in the following activities in the next 5 to 10 years:

A= Becoming an entrepreneurial individual as employee within an existing company

B= Starting up my own small company

C= Starting up and building a high growth company

D= Acquiring or inheriting a small company

E= Acquiring of inheriting a company and turn it into a high growth company

Non-entrepreneurial students:

Table 17: Biographic information of non-entrepreneurial students

N= 26	Age	Sex	Entrepreneurial parents?	Own a company?
Average	24			
Male		15; (58%)		
Female		11; (42%)		
Yes			8; (31%)	1; (4%)
No			18; (69%)	25; (96%)

Table 18: Entrepreneurial intentions of non-entrepreneurial students

<u>Entrepreneurial intentions</u>	A	B	C	D	E	Total	%
Verry little	3	2	4	4	8	21	16%
Little	2	6	7	5	3	23	18%
Average	11	4	4	11	9	39	30%
Much	7	8	2	5	2	24	18%
Very much	3	6	9	1	4	23	18%
	26	26	26	26	26		100%

Indication of interest in the following activities in the next 5 to 10 years:

A= Becoming an entrepreneurial individual as employee within an existing company

B= Starting up my own small company

C= Starting up and building a high growth company

D= Acquiring or inheriting a small company

E= Acquiring of inheriting a company and turn it into a high growth company

Appendix B: Format Entrepreneurial Mind-set Monitor

Table 19: Format Entrepreneurial Mind-set Monitor

Question:		Answer options:		
	Refers to:		Follows Causation:	Follows Effectuation:
1) <i>'Are you currently still dealing with the challenging situation?'</i>	/	Yes, No	n.a.	n.a.
a) <i>'What resources did you use in this challenging situation?'</i>	→ 'Bird-in-hand principle'		> Used other's capabilities	> Used my own
b) <i>'On what did you focus when you first encountered this challenging situation?'</i>	→ 'Affordable loss principle'		> Potential gains	> Potential risk
c) <i>'How did you perceive others in this challenging situation?'</i>	→ 'Crazy quilt principle'		> As a threat, hindering	> As a possibility, enabling
d) <i>'To what extent did you make use of unexpected events in this challenging situation?'</i>	→ 'Lemonade principle'		> Avoided them	> Made use of them
e) <i>'Altogether, how did you feel about the situation?'</i>	→ 'Pilot-in-the-plane principle'		> Something out of my hands	> Something I could contribute to
2) <i>'In what kind of activities where you involved in'</i>	/	<ul style="list-style-type: none"> ○ Formal education ○ Extracurricular education 	n.a.	n.a.

<p><i>the last two weeks?</i></p>		<ul style="list-style-type: none"> ○ Formal entrepreneurship education ○ Extracurricular entrepreneurship education ○ Side job ○ Full-time job ○ Start-up ○ Internship ○ Student association ○ Social activity 		
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Note that the answers are differently shown in the real questionnaire to randomize the options.

Appendix C: Statistical output SPSS

Table 20: Results of multivariate tests on scores from entrepreneurial students on the Bird-in-hand principle

Multivariate Tests								
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Pillai's trace	.055	.752 ^a	2.000	26.000	.481	.055	1.505	.164
Wilks' lambda	.945	.752 ^a	2.000	26.000	.481	.055	1.505	.164
Hotelling's trace	.058	.752 ^a	2.000	26.000	.481	.055	1.505	.164
Roy's largest root	.058	.752 ^a	2.000	26.000	.481	.055	1.505	.164

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

- a. Exact statistic
- b. Computed using alpha = .05

Table 21: Results of multivariate tests on scores from entrepreneurial students on the Affordable loss principle

Multivariate Tests								
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Pillai's trace	.184	2.935 ^a	2.000	26.000	.071	.184	5.869	.523
Wilks' lambda	.816	2.935 ^a	2.000	26.000	.071	.184	5.869	.523
Hotelling's trace	.226	2.935 ^a	2.000	26.000	.071	.184	5.869	.523
Roy's largest root	.226	2.935 ^a	2.000	26.000	.071	.184	5.869	.523

Table 22: Results of multivariate tests on scores from entrepreneurial students on the Crazy quilt principle

Multivariate Tests								
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Pillai's trace	.119	1.757 ^a	2.000	26.000	.192	.119	3.514	.334
Wilks' lambda	.881	1.757 ^a	2.000	26.000	.192	.119	3.514	.334
Hotelling's trace	.135	1.757 ^a	2.000	26.000	.192	.119	3.514	.334
Roy's largest root	.135	1.757 ^a	2.000	26.000	.192	.119	3.514	.334

Table 23: Results of multivariate tests on scores from entrepreneurial students on the Lemonade principle

Multivariate Tests								
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Pillai's trace	.031	.419 ^a	2.000	26.000	.662	.031	.837	.111
Wilks' lambda	.969	.419 ^a	2.000	26.000	.662	.031	.837	.111
Hotelling's trace	.032	.419 ^a	2.000	26.000	.662	.031	.837	.111
Roy's largest root	.032	.419 ^a	2.000	26.000	.662	.031	.837	.111

Table 24: Results of multivariate tests on scores from entrepreneurial students on the Pilot-in-the-plane principle

Multivariate Tests								
	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Pillai's trace	.072	1.005 ^a	2.000	26.000	.380	.072	2.011	.206
Wilks' lambda	.928	1.005 ^a	2.000	26.000	.380	.072	2.011	.206
Hotelling's trace	.077	1.005 ^a	2.000	26.000	.380	.072	2.011	.206
Roy's largest root	.077	1.005 ^a	2.000	26.000	.380	.072	2.011	.206

Table 25: Results of an one-sample T-test on mean scores from non-entrepreneurial students on the Lemonade principle compared with the mean value of 5.2 of entrepreneurial students

One-Sample Test						
Test Value = 5.2						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Lemonade	2.990	33	.005	1.2118	.387	2.036

Table 26: Results of an Oneway ANOVA on mean scores per principle and per situation type of entrepreneurial students

Test of Homogeneity of Variances						
		Levene Statistic	df1	df2	Sig.	
Bird	Based on Mean	.292	2	144	.747	
	Based on Median	.333	2	144	.717	
	Based on Median and with adjusted df	.333	2	143,639	.717	
	Based on trimmed mean	.295	2	144	.745	
Affordable	Based on Mean	.111	2	144	.895	
	Based on Median	.117	2	144	.890	
	Based on Median and with adjusted df	.117	2	143,761	.890	
	Based on trimmed mean	.111	2	144	.895	

	Based on trimmed mean	,112	2	144	,894
Crazy	Based on Mean	4,055	2	144	,019
	Based on Median	4,020	2	144	,020
	Based on Median and with adjusted df	4,020	2	143,778	,020
	Based on trimmed mean	4,037	2	144	,020
Lemonade	Based on Mean	,615	2	144	,542
	Based on Median	,544	2	144	,582
	Based on Median and with adjusted df	,544	2	143,261	,582
	Based on trimmed mean	,611	2	144	,544
Pilot	Based on Mean	4,609	2	144	,011
	Based on Median	4,069	2	144	,019
	Based on Median and with adjusted df	4,069	2	135,562	,019
	Based on trimmed mean	4,597	2	144	,012

Table 27: Results of an Oneway ANOVA on mean scores per principle and per situation type of non-entrepreneurial students

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Bird	Based on Mean	1.536	2	31	.231
	Based on Median	1.400	2	31	.262
	Based on Median and with adjusted df	1.400	2	22.172	.268
	Based on trimmed mean	1.515	2	31	.236
Affordable	Based on Mean	3.298	2	31	.050
	Based on Median	1.668	2	31	.205
	Based on Median and with adjusted df	1.668	2	27.421	.207
	Based on trimmed mean	3.276	2	31	.051
Crazy	Based on Mean	.374	2	31	.691
	Based on Median	.259	2	31	.773
	Based on Median and with adjusted df	.259	2	27.082	.774
	Based on trimmed mean	.366	2	31	.697
Lemonade	Based on Mean	.035	2	31	.965
	Based on Median	.147	2	31	.864
	Based on Median and with adjusted df	.147	2	21.976	.864
	Based on trimmed mean	.092	2	31	.912
Pilot	Based on Mean	2.590	2	31	.091

Based on Median	.643	2	31	.533
Based on Median and with adjusted df	.643	2	20.318	.536
Based on trimmed mean	2.254	2	31	.122

Table 28: Results of a Levene's Test on mean scores of the principles of experienced entrepreneurs

Levene's Test of Equality of Error Variances^a

		Levene Statistic	df1	df2	Sig.
Bird	Based on Mean	.951	2	188	.388
	Based on Median	1.596	2	188	.205
	Based on Median and with adjusted df	1.596	2	181.568	.206
	Based on trimmed mean	1.219	2	188	.298
Affordable	Based on Mean	1.378	2	188	.255
	Based on Median	1.691	2	188	.187
	Based on Median and with adjusted df	1.691	2	186.336	.187
	Based on trimmed mean	1.431	2	188	.242
Crazy	Based on Mean	2.407	2	188	.093
	Based on Median	2.515	2	188	.084
	Based on Median and with adjusted df	2.515	2	186.324	.084
	Based on trimmed mean	2.362	2	188	.097
Lemonade	Based on Mean	1.330	2	188	.267
	Based on Median	1.613	2	188	.202
	Based on Median and with adjusted df	1.613	2	186.384	.202
	Based on trimmed mean	1.436	2	188	.240
Pilot	Based on Mean	3.177	2	188	.044
	Based on Median	3.617	2	188	.029
	Based on Median and with adjusted df	3.617	2	187.612	.029
	Based on trimmed mean	3.322	2	188	.038

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Type

Table 29: Results of a repeated measures ANOVA on the Bird-in-hand principle scores of entrepreneurial students over time

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^a
Time	Sphericity Assumed	8.167	2	4.083	.832	.441	.030	1.663	.18
	Greenhouse- Geisser	8.167	1.917	4.261	.832	.437	.030	1.594	.18
	Huynh-Feldt	8.167	2.000	4.083	.832	.441	.030	1.663	.18
	Lower-bound	8.167	1.000	8.167	.832	.370	.030	.832	.14
Error(Tim e)	Sphericity Assumed	265.167	54	4.910					
	Greenhouse- Geisser	265.167	51.751	5.124					
	Huynh-Feldt	265.167	54.000	4.910					
	Lower-bound	265.167	27.000	9.821					

a. Computed using alpha = .05

Table 30: Results of a repeated measures ANOVA on the Affordable loss principle scores of entrepreneurial students over time

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^a
Time	Sphericity Assumed	42.286	2	21.143	3.139	.051	.104	6.278	.579
	Greenhouse- Geisser	42.286	1.882	22.471	3.139	.055	.104	5.907	.561
	Huynh-Feldt	42.286	2.000	21.143	3.139	.051	.104	6.278	.579
	Lower-bound	42.286	1.000	42.286	3.139	.088	.104	3.139	.401
Error(Ti me)	Sphericity Assumed	363.714	54	6.735					
	Greenhouse- Geisser	363.714	50.809	7.158					
	Huynh-Feldt	363.714	54.000	6.735					
	Lower-bound	363.714	27.000	13.471					

Table 31: Results of a repeated measures ANOVA on the Crazy quilt principle scores of entrepreneurial students over time

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^a
Time	Sphericity Assumed	15.643	2	7.821	1.243	.297	.044	2.487	.259
	Greenhouse- Geisser	15.643	1.764	8.868	1.243	.294	.044	2.193	.244
	Huynh-Feldt	15.643	1.878	8.330	1.243	.295	.044	2.335	.251
	Lower-bound	15.643	1.000	15.643	1.243	.275	.044	1.243	.189
Error(Ti me)	Sphericity Assumed	339.690	54	6.291					
	Greenhouse- Geisser	339.690	47.625	7.133					
	Huynh-Feldt	339.690	50.701	6.700					
	Lower-bound	339.690	27.000	12.581					

Table 32: Results of a repeated measures ANOVA on the Lemonade principle scores of entrepreneurial students over time

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^a
Time	Sphericity Assumed	13.310	2	6.655	1.299	.281	.046	2.598	.2
	Greenhouse- Geisser	13.310	1.670	7.970	1.299	.279	.046	2.169	.2
	Huynh-Feldt	13.310	1.767	7.532	1.299	.280	.046	2.295	.2
	Lower-bound	13.310	1.000	13.310	1.299	.264	.046	1.299	.1
Error(Tim e)	Sphericity Assumed	276.690	54	5.124					
	Greenhouse- Geisser	276.690	45.089	6.137					
	Huynh-Feldt	276.690	47.710	5.799					
	Lower-bound	276.690	27.000	10.248					

Table 33: Results of a repeated measures ANOVA on the Pilot-in-the-plane principle scores of entrepreneurial students over time

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observe Power ^a
Time	Sphericity Assumed	5.167	2	2.583	.348	.708	.013	.696	.10
	Greenhouse- Geisser	5.167	1.903	2.715	.348	.697	.013	.662	.10
	Huynh-Feldt	5.167	2.000	2.583	.348	.708	.013	.696	.10
	Lower-bound	5.167	1.000	5.167	.348	.560	.013	.348	.00
Error(Tim e)	Sphericity Assumed	400.833	54	7.423					
	Greenhouse- Geisser	400.833	51.390	7.800					
	Huynh-Feldt	400.833	54.000	7.423					
	Lower-bound	400.833	27.000	14.846					

Appendix D: Analysis qualitative results

Interview guide

- **Purpose:** Explaining the EM of both target groups from a learning perspective (in this case, by focussing on CDE and applying an existential learning approach, which aims to trigger recall and reflection)

- **Related sub-questions:**

2) 'How do respondents reflect on their critical developmental experiences mentioned during the monitoring period?'

3) 'How do critical developmental experiences explain the entrepreneurial mind-set of students and experienced entrepreneurs?'

- **Target group:** students and experienced entrepreneurs

- **Estimated duration:** 90 minutes

- **Interview style:** personal; retrospective; semi-structured; in-depth; reflective;

Introduction (5 min.)

Can I record this interview?

I will ask you some questions. At all times you can decide that you would not like to answer a question or that you would like to end the interview. We will respect your choices, but we would like you to communicate to us why this is the case. Some questions might be a bit harder to answer or less linked to your described situations. If this is the case, do let us know and try to answer the question to the best of your ability. There is no right or wrong in this interview.

We will never publish this interview and your personal name or company name will not be used. The results of this interview will be shared with my supervisors but will at all times stay internal information of WUR. We will inform you if any alterations are considered. Thank you in advance for taking the time to talk to us.

- Briefly explain the relevance of this study again.
- Explain the structure of the interview.

Neutral questions (5 min.)

- Who are you?
- What is your function within your enterprise?
- Can you describe what kind of entrepreneur/student you are?
- Were you familiar with the effectuation theory before participating in this study? And what did you know about the theory?

Themes and questions:

I. Value creation under uncertainty:

1. How do you investigate opportunities as an entrepreneur in the F&B sector or as student in your daily life?
2. And how do you deal with uncertainty in such an entrepreneurial process?

Description of complex and challenging situation (10 min.)

You mentioned the following situations as challenging and complex in the EMM...

- What do you consider as the most challenging situation that you mentioned in the EMM? Why?
 - refer to this situation as '**situation x**' from now on.
- What exactly was challenging and complex in situation x? Can you give an example? (example of a specific moment or situation that was challenging)
- (If not clear yet, ask again why it was challenging?)
- Are you currently still dealing with situation x?
- How did you experience the previously described situation? (e.g. intense, emotional, or informative)

In this research, we defined uncertainty as a "lack of information about cause/effect relationships" (Ireland et al., 2003).

- On a scale from 0-10, how would you score the level of uncertainty of situation x? (0= there is no information available; 10= all the information you need is available)

Themes and questions:

I. Effectuation theory:

1. In general, how did you approach situation x? Can you give an example?
2. What was the first thing you have done while dealing with situation x?
 - a. And what did you do next?
 - Try to find different phases and ask for confirmation
3. In each step that you just explained, what worked and what did not in your opinion?
 - Stimulate evaluation and analysis of the undertaken actions
4. Did something unexpected happen in the previous described steps? And if so, how did you deal with it?

Saras Sarasvathy, the founder of the effectuation theory, explained the theory with 5 principles. We are now going to zoom into these 5 principles by reflecting on the scores you gave when reflecting on situation x.

5. Resources: 'my own capacities' versus 'used other's capabilities'.
6. Focus: 'on potential gains' versus 'on potential risk'.
7. Perception of others: 'as a possibility, enabling' versus 'as a threat, hindering'.
8. Usage of unexpected events: 'avoided them' versus 'made use of them'.
9. General feeling: 'something out of my hands' versus 'something I could contribute to'.

II. Critical developmental experiences:

1. Did you make a certain assumption while dealing with situation x?

- a. On what was this assumption based?
- b. Did this assumption influence your approach of dealing with situation x? And how?
2. How did you make decisions that needed to be taken during the process of dealing with situation x ? Automatic, yes/no, why?
3. Did you ask for feedback or support from something or someone while dealing with situation x? Why?
4. How did you use information related to situation x?
(For instance, how did you decide to use or not to use certain information or feedback from others?)
5. Did you look for additional information to clarify situation x? If so, how?
6. And how did you react to that (predictive) information? For example, did you make notes or concept-maps?
7. What was 'game changing' or caused a ground-breaking change in the process of dealing with situation x?
 - a. Can you give an example?
8. Do situations as situation x occur more often?
 - a. How often?
9. Did you experience a similar situation in the past?
 - a. Did this situation influence the way you dealt with situation x?
 - b. How?

I. Lessons learned from complex and challenging situations:

1. Did you formulate lessons learned regarding situation x? If so, how did you came up with those?
2. If you had to formulate lessons learned regarding situation x, what would these be?
3. Did you reflect on possible changes that took place during the process of dealing with situation x?

Self-reflection is defined as 'the activity of thinking about your own feelings and behaviour, and the reasons that may lie behind them' by the Cambridge Dictionary.

4. Which term would you use to describe the effect of situation x on the development of your EM?
5. While reflecting on situation x, how do you look back at your approach? Positive / negative? Maybe something out of your hands? Controllable in the future?
6. How would you approach the same situation in the future?
7. How would you describe the 'solution' of the complex and challenging situation we discussed?

End (2 min.)

- Have we missed something you think is important and not discussed?

Template analysis

A “Template analysis is a style of thematic analysis that balances a relatively high degree of structure in the process of analysing textual data with the flexibility to adapt it to the needs of a particular study” (King, 2012). The following steps are based on an explanation of the University of Huddersfield (n.d.), which follows the work of professor Nigel King, and are carried out in this study to conduct the template analysis: 1) define themes, 2) transcribe interviews, 3) formulate codes, 4) produce initial template, 5) develop template, 6) interpret and wrap up findings.

Table 34: “Coding scheme” (found in De Jong, 2014, based on Sarasvathy, 2008)

Causation legend		Effectuation legend	
G	Goal-driven	M	Means-based
R	Expected return	L	Affordable loss
B	Competitive analysis	A	Use of alliances
K	Existing market knowledge	E	Exploitation of contingencies
P	Predictions of the future	C	Control by prediction
X	Causal	N	Effectual

Final Codebook

Table 35: Final codebook

Theme	Colour	Code	Explanation
Introduction	●	A1. Introduction_Career	For example, study background and previous/other jobs. But also family and hobbies etc.
Introduction	●	A2. Introduction_Current enterprise	Descriptive information about one's current enterprise.
Introduction	●	A3. Type of entrepreneur	Description about the type of entrepreneur that does not fit the categories below.
Introduction	●	A3.1 Type of entrepreneur_analytic	
Introduction	●	A3.2 Type of entrepreneur_long-term versus short-term	
Introduction	●	A3.3 Type of entrepreneur_controller	
Introduction	●	A3.4 Type of entrepreneur_hands-on	
Introduction	●	A3.4 Type of entrepreneur_innovative	
Introduction	●	A3.5 Type of entrepreneur_motivator	
Introduction	●	A3.6 Type of entrepreneur_go-getter	
Introduction	●	A4. Type of student	Descriptions about the type of student that does not fit the categories below.
Introduction	●	A4.1 Type of student_entrepreneurial	

Introduction	●	A4.2 Type of student_dominant	
Introduction	●	A4.3 Type of student_controller	
Introduction	●	A4.4 Type of student_negotiator	
Introduction	●	A4.5 Type of student_listener	
Introduction	●	A5. Introduction Student	General introduction of a student. E.g. study background, student association, hobbies, and sports.
Value creation	●	B1. Value creation	Description about how value for others is created. The value can be financial, cultural, social or ecological.
Value creation	●	B2. Identification of opportunities	Discovering opportunities that can basically be anything to create value (e.g. the idea to organize a festival).
Value creation	●	B3. Evaluation of opportunities	Evaluating opportunities to create value (e.g. questioning what kind of festival suits your interests).
Value creation	●	B4. Exploitation of opportunities	Exploiting opportunities to create value.
Description complex and challenging situation	●	C1. Description of situation x	Describing situation x by specifically mentioning what and how something happened.
Description complex and challenging situation	●	C2. Analysis of situation x	One step further than only describing what happened. Thus not only describing what happened but also analysing why situation x happened, without focusing on your own feelings and behaviour.
Uncertainty	●	D1. Dealing with uncertainty	Dealing with a situation that lacks information about cause/effect relationships and is perceived by the participant as such
Uncertainty	●	D1.1 Dealing with uncertainty_Persevere	
Uncertainty	●	D2. Description of an uncertain situation	Assess the degree of uncertainty between 0-5 on a scale from 0-10 OR description of a situation that lacks information about cause/effect relationships
Uncertainty	●	D3. Description of a certain situation	Assess the degree of uncertainty between 6-10 on a scale from 0-10 OR description of a situation that does not lack information about cause/effect relationships
Causal thinking	●	E1. Goal-driven	Basis for taking action is goal-driven
Causal thinking	●	E2. Expected return	Focus on potential gains
Causal thinking	●	E3. Competitive analysis	Perceive others as a threat, hindering
Causal thinking	●	E4. Existing market knowledge	Avoided unexpected events
Causal thinking	●	E5. Predictions of the future	Contributing to/dealing with the situation by causal logic, a predictive approach
Effectual thinking	●	F1. Means-based	Basis for taking action is means-oriented, using own capabilities
Effectual thinking	●	F2. Affordable loss	Focus on potential risk
Effectual thinking	●	F3. Use of strategic partners	Perceive others as a possibility / enabling and actively involve them in an entrepreneurial process
Effectual thinking	●	F4. Exploitation of contingencies	Make use of unexpected events
Effectual thinking	●	F5. Control the controllable	Contribute to the situation by effectual logic, a non-predictive approach. Focus on those things/steps that are in control of the participant.
Critical developmental experiences	●	G1. Way of experiencing	Description about how someone experienced the situation that is not in line with the categories below
CDE	●	G1.1 Way of experiencing_Intense	

CDE	•	G1.2 Way of experiencing_stressed	
CDE	•	G1.3 Way of experiencing_annoying	
CDE	•	G1.4 Way of experiencing_emotional	
CDE	•	G1.5 Way of experiencing_informative	
CDE	•	G2. Usage of information / processing of information	E.g., numbers, Corona rules, etc. (not people/stakeholders) AND processing of information/how person handles information (to get to a decision)
CDE	•	G3. Structuring information	E.g., notes, visualisations such as mind-maps etc.
CDE	•	G4. Making assumptions_0	0= respondent did not make assumptions while dealing with situation x
CDE	•	G4. Making assumptions_1	1= respondent did make assumptions while dealing with situation x
CDE	•	G5. Usage of feedback	Usage of feedback from other's regarding situation x
CDE	•	G6. Search for additional information	Searching for additional information to clarify situation x. E.g. on Internet of support from a specific institution.
CDE	•	G7.1 Way of making decisions_Automatic	
CDE	•	G7.2 Way of making decisions_In consultation	
CDE	•	G7.3 Way of making decisions_reactive	
CDE	•	G7.4 Way of making decisions_based on feeling	
CDE	•	G8. Making decisions based on previous findings	E.g. making decisions for the organisation of a festival based on a pilot the year before.
Reflection	•	H1. Lessons Learned	Description of lessons learned regarding situation x.
Reflection	•	H2. Reflection of the approach	Self-reflection is defined as <i>'the activity of thinking about your own feelings and behaviour, and the reasons that may lie behind them'</i> by the Cambridge Dictionary.
Reflection	•	H2.1 Reflection positive	Respondent reflects on a positive manner on his/her approach and is satisfied.
Reflection	•	H2.2 Reflection negative	Respondent reflects on a negative manner on his/her approach and is unsatisfied.
Reflection	•	H3. Approach of the same situation in the future	
Reflection	•	H4. Description of the solution of the complex and challenging situation	
Reflection	•	H5. Change in beliefs about situation x	
Reflection	•	H6. Effect of situation x on the development of the EM	E.g. a strengthening or obstructive effect on the development of one's EM.
Reflection	•	H7. Contribution to one's EM	Experiencing situation x did contribute to the development of one's EM.

Profile sampling interviewees

Entrepreneurial Students:

All of Wageningen University and Research

1) Rosa

Rosa is 20 years old, follows the Bachelor program Biotechnology and currently does the minor Innovation and Entrepreneurship. Rosa described herself as a atypical student, she likes to be creative and takes her study seriously. Overall, she can be described as a controller, a listener and as open. Rosa is familiar with the effectuation theory.

2) Maylin

Maylin follows the Bachelor program Nutrition and Health and is involved in the Entrepreneurship-track. Rosa describes herself as dominant and ambitious. She is also detail-oriented and likes to try new things. Maylin is familiar with the effectuation theory.

3) Jack

Jack follows the Bachelor program Business and Consumer Studies and is interested in entrepreneurship. Jack described himself as a practical and social student. Overall, he can be described as a negotiator, risk-taker and entrepreneurial.

4) Bernard

Bernard is 21 years old, follows the Bachelor program International Land and Water Management and does the minor Innovation and Entrepreneurship because he was missing content about entrepreneurship and economics in his bachelor's. He can be described as entrepreneurial, active and positive-minded. Bernard is familiar with the effectuation theory and believes that in general the student life is pretty organised and fits a causal way of thinking.

5) Charlie

Charlie follows the Bachelor Nutrition and Health and does the minor Innovation and Entrepreneurship. He can be described as a listener, social, creative and entrepreneurial. Charlie is familiar with the effectuation theory

Experienced Entrepreneurs:

6) Jacob

Jacob is 30 years, has 8 years of entrepreneurship experience and found 2 companies in the F&B sector. He is co-founder and general director of his current enterprise. Jacob describes himself as an energetic, creative and result-driven entrepreneur and mentions that he started as an entrepreneur because he likes to do many different things.

7) Arnold

Arnold is 44 years, has 12 years of entrepreneurship experience and found 3 companies in the F&B sector. He started a new catering company just before the second lockdown of the COVID-19 pandemic in The Netherlands. Arnold describes himself as a go-getter and an innovative entrepreneur who put things into perspective.

8) Harry

Harry is 44 years, has 22 years of entrepreneurship experience and found 1 company in the F&B sector. He is running his current enterprise together with his wife. Harry describes himself as analytic, confident and a controller who avoids conflict, but mentions that he changed as an entrepreneur over time.

9) Jessica

Jessica is 37 years, has 5 five years of entrepreneurship experience and found 3 companies in the F&B sector. Jessica describes herself as an entrepreneur who started without any experience and sees things as challenges and opportunities. Overall, she can be described as strategic, confident and impulsive / intuitive.

10) Damion

Damion is 41 years, has 16 years of entrepreneurship experience and found 3 companies in the F&B sector. Damion describes himself as an innovative, hands-on and customer-oriented entrepreneur. He argues that flexibility is the main strength of his current enterprise but he also considers it as a con because a lack of focus.

Interview narratives

Students

Situation 1- Long lasting health problems and reflective learning

Short description: Rosa struggles with long lasting health problems that resulted in abrupt frustration during participation in group work that was part of a university course about Entrepreneurship. This was challenging because the health phenomena occurred unexpectedly, but she had to deal with it according to Rosa. She describes it as a complex situation due to the fact that after 1.5 year of research the cause of the health problems is still unclear and because it demands a different lifestyle. The timeframe of the situation itself is about one week and Rosa described the level of uncertainty with a 5 on a scale from 0-10 since she has experience with her health issues and is reasonably aware of the consequences but on the other hand it is unknown what the cause is and there is no scientific evidence.

Reflection: When her health problems occur, Rosa tries to actively take time for herself and be aware of what she does in a week she has to deal with it. Forcing herself to do things does not work and she does not think that there is a significant difference between making a weekly planning and not. However, visualising what she has to do in such a week helps and causes rest of mind. An interesting quote is the following: *"I am often not aware of my actions, but I am aware of the emotions that I feel with them"*. In this situation, the team Rosa was part of had the task to record a team meeting and reflect on it. This led to interesting insights as she was confronted with her own behaviour. Altogether, she is positive about her decision to closely watch how she manifested herself during the meeting and sharing her feelings afterwards with the group. She adds the following to her vision on critical reflection:

"Share your findings with your team members when this is relevant, or something is not going as it supposed to be, so that they are aware of particular actions and you can prevent to become a hinder to a certain extent".

She described critical reflection of your own actions as the solution of the situation and confirms that flexibility and adaptability benefit dealing with her health problems.

Lessons learned: There are three lessons learned mentioned regarding this situation. First, taking time for yourself provides options for self-reflection. Second, making others aware of your 'own situation' is not considered as whining about your problems, it can actually provide benefits. Third, looking in the mirror to criticize your actions provides possibilities for self-awareness and benefits group work, which in the end leads to a better result. In addition to these lessons learned, Rosa

concluded that stress might be an important indicator of unexpected and undesirable behaviour. Therefore, she wants to become aware of unconscious stress, because that is how she experiences it. RP thinks that she slightly developed her EM during this specific situation because she is made aware that she actually has different aspects of a comprehensive mind-set that is included in different aspects of life, which she described as an improvement and as the effect of situation x on the development of her EM. But she would not say herself that she has an EM. Nevertheless, the situation is assessed as a critical learning moment.

Situation 2- Finding an organisation to cooperate with under extreme time pressure

Short description: Maylin had to find an organisation together with her group for an assignment of a University course about Entrepreneurship. This had to be fixed in one week and appeared to be challenging. Maylin described it as complex due to the time available and the fact that she couldn't directly influence the response of the companies approached. Moreover, she had the idea that she felt more responsibly for finding an organisation for the group than some other team mates. Especially the time pressure resulted in stress. The situation is described with a 7 regarding the level of uncertainty on a scale from 0-10 due to the assignment that was not totally clear, team mates who Maylin did not know at that time and an uncertain outcome. The information she had was mainly about organisation she knows from her own social network.

Reflection: Maylin has the feeling that she contributed to the situation because of the responsibility she felt to approach companies. However, she also mentioned that she was fed up with herself since it felt as her problem instead of a problem of the group. Nevertheless, her intention to not give up ultimately lead to more certainty. However she also thinks that some aspects of the situation were uncontrollable. Additionally, she is critical about the way of communicating within her group in this specific week. But she positively reflects on the decision to inform supervisors about their state and the group problems. This contributed to the situation and is part of the described solution, which is described as not giving up, keep communicating, send signals when problems exist and approach people that can help succeeding by Maylin.

Lessons learned: In addition to the lesson learned about communication, Maylin learned herself and the way she acts within teams better during the uncertain situation where she had the feeling that she could not influence it. This is something new and she thus did not experience before. Besides, she developed her EM as she knows the value of a network and experienced how important it is to approach companies and to get into action. Last, the situation made Maylin aware of capacities she has that fit an EM and she wants to improve further. This was also the reason why she described the effect of the situation on the development of her EM as explanatory and strengthening. This is specifically about identification of opportunities and making use of strategic partners.

Situation 3- Investing in one specific stock without foreknowledge during an unique period

Short description: The situation is described with the keywords 'uncertainty / satisfaction' by Jack. Uncertain since he had no knowledge about this situation (investing in one specific stock that was going sky-high but also dropped rather quickly) and thus described the level of uncertainty with a 7/8 on a scale from 0-10. The information available was about the development of the stock price, which did not make sense as Jack did not understand what was going on. Nevertheless, he decided to initially invest 1000 euro and raised the investment with 2500 euro the day after. In the end, he made a profit of 400 euro which causes some form of satisfaction. It was a complex situation because

Jack had fear of missing out due to the influence of his environment, felt pressure to do better than his roommates, and wanted to pass an exam of a course he had in the same week. The timeframe of the situation was four days, although it felt as six weeks according to Jack. He mainly experienced the situation as stressful because there was a high chance that he would lose his money, but also intense, annoying and informative due to the lessons learned.

Reflection: Despite that Jack mentioned that he did not have a specific approach but just experienced it, his approach was very much focused on the expected return. When analysing the situation, he described it with two phases: 1) euphoria and 2) fear. In phase two, Jack made the decision to sell all the stocks he had when the price was decreasing. Despite that this caused regret, Jack was surprised he would regret selling it after making a conscious decision. This was mainly due to his roommates who were still part of the rollercoaster ride. Something that did not work for Jack was to be constantly confronted with the decisions he made. Something that would have worked was to make a risk analysis. The solution of the situation is to only invest resources that you can lose when you do not have adequate foreknowledge. So, Jack would focus on the affordable loss principle when he has to deal with a similar situation in the future.

Lessons learned: 1) on a personal level, Jack learned about the influence of his environment, 2) learned that he follows his own instinct and makes less use of information from other's in a crisis situation and 3) that you have to be aware of the decisions you made and that the outcome can be positive and negative. In the future, Jack would emphasize the risk analysis phase more to avoid / forecast unexpected contingencies. The effect of the situation on the development of the EM is described as positive and strengthening because he learned how to deal with a situation like this one and knows when to step on the gas and brake. Jack believes that the effect would even have been larger when he e.g. lost half of his money; learning-by-doing. All together the situation is described as critical learning moment.

Situation 4- Dealing with a double planning in an uncertain and unclear period

Short description: In this situation, Bernard had to decide about a side-job that would cause a double planning since he was also following a full-time course. He does not think that it is the most complex he ever experienced, but especially the ambiguity made it a challenging situation. Bernard described it as an uncertain situation, 7 on a scale from 0-10, since there was e.g. no schedule and training days were announced one or two days in advance. This caused stress since he did not know when what would happen, which made it difficult inform his group from the university about his availability. The timeframe was about one week and he started working two weeks after evaluating and deciding on the job offer.

Reflection: Looking back at the phases Bernard went through, he thinks that it was beneficial to 'let things go' and stay positive. On the other hand, trying to influence the situation did not work; "So, asking for more information or to work on a specific date was not possible. Thus, actually that never worked". Bernard clearly reflects on his approach as follows:

"As already mentioned, I couldn't influence the schedule, so this was something I could not contribute to. That was causing stress or the problems so to say. Of course, in the end you focus on what you can do, but the problems were caused by the fact that I could influence it".

When reflecting, Bernard found that he has unconscious preference for work work-related activities as these are not changeable. But, to make a double planning work, Bernard mentions that there has to be some form of flexibility. Additionally, Bernard believes that it is important to listen to your body and talk about any form of stress. But he also mentions that dealing with a double planning works different per person and that the solution of the situation has to do with his mind-set, which he described as positive. If you are positive about something it is more likely that the outcome will also be positive according to Bernard.

Lessons learned: The lessons learned are: 1) to control the controllable, 2) flexibility is essential when dealing with a double planning, and 3) an EM reduces the amount of stress in an uncertain and unclear period. He adds the following to the latter:

“If I had to mention one thing, it would be to focus on the positive while having the pilot-in-the-plane principle in mind. If you know that, it is almost impossible to worry about things that you cannot influence / control”.

The effect of the situation on the development of the EM is described as strengthening because the situation confirmed that Bernard is capable to deal with a double planning due to his own planning skills. Even though it is an confirmation of what he already knew, again, it turned out that his planning skills and mind-set contributed to the situation. However, Bernard does not think that the discussed situation is mind-set changing.

Situation 5- Making house rules with 10 differently aged men during the Covid19-crisis

Short description: The main challenge in this situation was to find consensus about house rules in a student house with differently aged men who all have a different view on the situation, which also makes it complex. Charlie described the situation as challenging since one has to trust each other and has to feel comfortable in his own house. At a certain point, the level of trust from Charlie in one of his housemates was damaged, which resulted in a different personal approach and was something that never happened before. The level of uncertainty is described with a 5 on a scale from 0-10 as it was unknown how long the Covid19 situation would be and if everyone was respecting the rules. On the other hand, it was known what the rules of the government were and how you deal with these as a house. Charlie experienced the situation as intense, emotional, annoying, tiring and informative.

Reflection: Charlie’s approach can be described as involved, listening and putted into perspective. While reflecting, he noticed that took a more passive role during the whole situation due to mental tiredness, e.g. during discussions about the house rules:

“...actually I was too tired to listen to everyone’s opinion because in many cases I didn’t agree. So I decided to just listen, because then I at least know what other’s think and there are probably other guys who can better fix it”.

However, Charlie beliefs that he contributed to the group process of the situation and mentions the idea of collective thinking. He positively reflects on his approach, which connects well with the Crazy quilt principle, especially the idea to see others as a possibility / enabling. He reflects as follows:

“You are not searching for common solutions if you see others as a threat in such a situation. Then, you are searching for something that only benefits yourself that will not make you a victim, which is a very bad starting point in my opinion”.

Charlie believes that the solution of this situation is to adjust rules to the current state and information available and what feels best. Do not be afraid to change something, this is actually something powerful: *“Come back to earlier findings after finding other insights. Thus, be flexible”*.

Lessons learned: Charlie’s lessons learned are: 1) to keep an overview of the situation and exactly know why you are doing something to make a conscious decision, 2) invest time in searching for as much as information possible by asking people how they feel and what they want and 3) on a more personal level, do not give up and do not distance from the problem. But try to dig deeper, especially when something annoys me or irritates me. The effect from the situation on the development of Charlie’s EM is described as positive, strengthening, and clarifying, which he also considers as explanatory. It was an informative situation that positively changed the mind-set as he states: *“You just gain more experience in such a moment that you can creatively use in the future in a different situation”*.

Experienced entrepreneurs

Situation 6- *Motivating six full time employees in an uncertain and difficult period; reflective learning*

Short description: Jacob described the situation with the two keywords ‘re-energize staff’. In this situation, Jacob had to motivate his full time employees while his two companies were closed due to Covid19 measures. This was challenging because he did not want too much revenue, as this would affect the amount of financial support from the government. On the other hand, Jacob was convinced that he had to keep his staff busy with some work, eventually social work somewhere externally. It was complex because Jacob felt that he had no energy to motivate his staff to do things that they are not used to do. He described it as the most difficult problem of the last 1.5 year and experienced it as intense. Specifically because it was about keeping the motivation high in an uncertain period where he felt that his ship was shrinking.

Reflection: Jacob approached the situation by observing what was going on, analysing what his staff normally did, informing what they want to do, thinking how he would approach the situation himself and looking for solutions together with his team. Looking back, he found that the question what they wanted to do did not work; *“Because they already had an answer to this question, what we want is not possible. As we just want to start working again, but that is not possible. But, what do we want to do? We don’t know, because we can’t do anything at this moment”*. This was something surprising and unexpected, as Jacob himself had answers to this question. So after a short reflection period he asked the question what they missed, which resulted in useful answers after a brainstorm session with the whole team. This indirectly lead to motivated personnel that showed creativity and energy to get things done again, which surprised Jacob and was an eye-opener for him:

“ It really is an eye-opener for me regarding the process. I was really busy with directing one specific way. We have to move in that direction to achieve our goals, where I was pulling it very much to reach that direction. What I noticed is that if you ‘walk along them’ and involve them in the process, which is somewhat slower, that this works better”.

Jacob believes that finding common / shared goals is the starting point of solving situation x. The next step is to search for individuals goal that contribute to shared team goals without enforcing your own way or opinion. This is in line with how Jacob deals with uncertainty: *“You have to find goals that fit the organisation and adapt them to the people you work with”*. This connects well with the Bird-in-

hand principle that was dominantly present in the interview and contributed to the solution of the situation.

Lessons learned: The most important lesson learned was to involve his staff in the entrepreneurial process to achieve the goals together. Besides, he learned that it is good to sometimes 'step away' from your company so that others have the space to develop their own learning process.

"You have to trust your staff in what they do, and if you recognize that they do something that does not fit within the broader picture, it was not clearly explained by me who we are"

Jacob described the effect of this situation on the development of his EM as positive and clarifying because it provided insights about his presence and the job satisfaction of his staff. Additionally, the situation made clear that his EM needs action and is influenced by this specific situation due to the impact on his emotional state.

Situation 7- Investing in a new start-up in a new sector in an uncertain period; learning-by-doing

Short description: Arnold believes that investing capital is essential for every entrepreneur, but it becomes challenging when there is no financial perspective in an uncertain and difficult period (Covid19-crisis). The main challenge in this situation was to stick to an investment agenda and to make plans to keep the business running. The situation is described as complex due to lacking information about the time horizon of the crisis, which makes financial calculations such as the return on investment very uncertain. The timeframe was from March 2020 to the present (February 2021) and Arnold described the level of uncertainty with a 8 on a scale from 0-10 since the only information available was about the present state and almost nothing about the future. He experiences the situation as informative, emotional and intense:

"You know, it hurts that you can't execute your plans and ideas. That keeps gnawing at me. I am a human being who wants to achieve something, I want to create something beautiful while I am restricted to do that. That hurts, gnaws at me and makes me uncertain. So that it is not nice".

Reflection: Arnold decided to keep investing, but less opportunistic. He started with making financial forecasts with the information available (mainly Covid19 measures and revenue) and has gone through the following steps: 1) predict the future, 2) analyse and check what is going on (January 2021), 3) search for external information, 4) search for solutions to increase the liquidity. On a personal level, Arnold did not expect that he would find this situation that challenging as he experienced it. From a mental perspective, he expected that he would deal with this situation more easily. Arnold says, among others, the following about his approach:

"Well, I started too opportunistic to be honest. Looking back, the risk I took might be too big. You know, the con of selling your company and having some money is that you also spend your money more easily in comparison with a situation that you have approach a bank. Actually, it was not really (financially) healthy to do the whole investment with equity. My conclusion is that you don't want that because you miss the opportunity to let intelligent parties criticize your case / story".

Arnold believes that the most important thing for an entrepreneur is to constantly have the feeling that the balance between the continuity and liquidity of your company and the company itself is right. When forecasting your revenue, you really have to consult a number of companies that experienced a familiar situation.

Lessons learned: Arnold learned that in a situation as this one you should emphasize the risk analysis even more and that you have to accept as a starting company that there is a high chance that you

main business idea will not be profitable without having another stable incoming revenue stream. On a personal level Arnold learned to meet with adversity and became more cautious due to the whole situation. He describes the effect of the situation on the development of his EM as strengthening because it challenges you as an entrepreneur on its deepest level which he believes makes you even stronger.

Situation 8- *New personnel regulations in an uncertain period; transforming challenges into opportunities*

Short description: In this situation, Harry planned a meeting with all his full time employees (12) to share new regulations about overtime hours and holidays that were thought to be negatively perceived. It was complex because some of the employees have been working for a long time and Harry knew what the effect of the measures would be on their private life. The timeframe was from October 2020 to February 2021 and Harry described the level of uncertainty with a 5 on a scale from 0-10. There was information available about the formal side of the story and e.g. the overtime hours, but on the other side of the story it felt as talking and managing with assumptions about an uncertain future. Harry experienced the situation as intense, annoying and emotional. The following quotes summarizes how he experienced it:

"...We invested quite a lot in their mental health. Maybe that is why it hurts more than I hoped. I do so much for you, is a postcard too much for me?"

"But, apparently there is also a bit of frustration, and you have to be careful with frustration. Thus, apparently the grief is all mine. That is fine, but then you also need to work".

Reflection: Looking back, Harry had the feeling that he could contribute to the situation due to his way of leadership and staccato way of communication. He approached the situation to the point and made the assumption that his staff would not leave. Something he learned over time which is the result of increased self-confidence. However, Harry is also critical about the way he approached his staff, perhaps he could have empathized more with the staff, which is something he claims his staff was not doing and feels a bit as action-reaction. Nevertheless, he does not think that this would change the whole situation. From a business perspective, the new regulations caused rest and clarity (also in the long-run). From a personal perspective, he would rather not have done it himself, but preferred to let someone else share the message. He mentioned the following about this:

"I focus more on the guided way to achieve my goal, as I already know where I want to go. I only communicate it slightly differently, such that I end the game uncivilized".

Insights Harry got from dealing with the situation are the following: 1) people (in this case his staff) lack control and need structure, and 2) in times of crisis, one shows different behaviour. I expected more empathy from my personnel, but it seems that this movement is different in times of crisis. The related solution is described as: create clarity, which is something that many entrepreneurs in the sector suffer according to Harry:

"Hospitality, non-verbal communication, entertaining people, pleasing people, and avoiding conflict is in our genes. I think that is something that many of us have who are also active on active on the floor. When you look at this case and have to advice someone, it means that you have to be direct, concise and clear. This creates the most perspective, also for your employee".

Lessons learned: 1) share the message and be clear, but also accept potential damage that can be avoided by doing 'your homework', 2) the distance between the staff and Harry increased and 3)

Harry 'learned' that he and his wife have to care about themselves only, because that is what others do as well. His family and wealth are priority number one at the moment. The effect of the situation on the development of his EM is described as clarifying because Harry made use of the uncertain situation to improve the work structure of his staff. It contributed to development of his EM as he transformed challenges into opportunities by creating clarity, which benefits the process of dealing with business related challenges according to Harry.

Situation 9- Decision about opening/closing a restaurant hard to accept

Short description: During the second lockdown of the COVID-19 crisis in January Jessica had to deal with the dilemma to open or close one of the restaurants she is managing. This was mainly challenging because Jessica found it difficult to accept that the restaurant would be closed for a month, which felt as a loss. This also made it complex as it does not fit with the EM of Jessica. The level of uncertainty is described with a 7 on a scale from 0-10 as there was not much information available. The external information about what is allowed and what not on the short-term created uncertainty. That is the main reason why Jessica experienced the situation as intense and heavy. The timeframe of the situation was the entire month of January.

Reflection: When reflecting on the approach of the situation, it was found that Jessica did not act as she normally does in an uncertain situation. She found it difficult to make a decision due to lacking information and because it did not match her character. For example, she normally sees others as a possibility and enabling while she made the decision to not discuss the case with others in this specific situation.

"This was something I did not run into myself due to a combination of circumstances. Sometimes you are a more heroic than you usually are".

Nevertheless, Jessica believes that the decision to close the restaurant caused rest on a personal level, which provided the possibility to reflect on the whole situation. Something that might be clarifying and did work well in this situation based on other comments. The solution of this situation is to think about different scenarios, share your decision made and use feedback from others. Go for it if you find positive response from others. At this, Jessica mentioned that self-confidence is important for making decisions, something that increases if you have to do it more often. In the future, Jessica would doubt less when she has to deal with a similar situation as she already experienced if before. This makes it easier to accept and to put it aside.

Lessons learned: Jessica learned that things not always go the way you want it to, which is an aspect of accepting your choice. It is not always possible to control the world according to Jessica. Besides, she learned how important her team is. Creating value is only possible with a strong team that you have to pay attention to, which is a big challenge during the COVID-19 crisis. The effect of the situation on the development of Jessica her EM is described as hindering as she did not act how she normally would while dealing with a similar situation. However, she positively values the outcomes of her decision.

Situation 10- Delivering a Christmas menu to 325 school children

Short description: In this situation, Damion had to deal with disappointment after the government decided to close all primary schools on Wednesday while Damion had a catering order for 325 children on Thursday. It was complex because Damion and his team experienced it as another

adversity in an uncertain period. They already spent time on this order and got energy from it. Therefore, the challenge was to still generate turnover by delivering the menu, because the customer wanted to buy but it was not possible to sell due to COVID-19 measures. PR described it as a certain information as it seemed that all relevant information was available. He mainly experienced the situation as informative, but also a bit frustrating when an external institution made the decision to cancel it.

Reflection: Despite that it was not possible to deliver the menu at school, Damion made use of the unexpected contingency as he decided to deliver the menu as takeaway in his shop, which resulted in extra revenue and more publicity. Two important reasons why he positively reflects on his approach, that can best be described as means-based and making use of contingencies. Means-based because self-confidence and deliberate practice created room to search for solutions based on experience in this situation as Damion had confidence in his team. So he could focus on other things and it felt like years of experience came together (e.g. his network and the knowledge about how to deliver a menu like this):

“...also the space in my mind to creatively think. I had the feeling that I could open some drawers in my brain and I might work if we would combine those because of years of experience, not only from me but also from my team. This is what we built and it felt that we were able to do it!”

Damion describes the main solution of this situation as: stay positive. But he also clearly mentioned what his preferences were to the school, which in the end seems to be part of the solution. When he has to deal with a similar situation in the future he would make more time for keeping an overview of the situation.

Lessons learned: Damion learned that when there is a hitch he needs to take a short break so that he can think about solutions. Especially because his daily agenda is determined by operational activities. On the other hand, Damion also learned that he works well under some pressure, which is actually something he likes and suits him as a leader. The effect of the situation on the development of the EM is described as positive and strengthening. It contributed to the EM as Damion developed a more ‘yes we can’ mentality, specifically when unexpected contingencies occur.