CERN IdeaSquare Journal of Experimental Innovation, 2022; 6(2): 41-50
DOI: https://doi.org/10.23726/cij.2022.1399

ORIGINAL ARTICLE

Design-driven entrepreneurship: a cooking exercise to integrate effectuation and design thinking

Luca Iandoli[1], Kevin James[1*]

[1]St. John's University, Jamaica, New York, United States
*Corresponding author: jamesk@stjohns.edu

ABSTRACT

This paper aims to contribute to the debate on the role of making in entrepreneurial problem-solving and proposes a workflow to represent how effectual thinking occurs via the combination of tools and constraints with aesthetic decision criteria based on entrepreneurs' perceptions, emotions, preferences, and technical abilities. We propose a pedagogic framework to model design-driven discovery in an effectuation setting and present an experiential learning exercise to (1) provide students with an effective analogy to practice effectuation via a design-driven making experience; (2) helping them to reflect on the importance of aesthetic criteria, emotional validation, and empathy in entrepreneurial endeavours. The proposed exercise is built on using cooking as a metaphor for design-driven innovation. The design of the exercise is grounded on effectuation theory, design-driven entrepreneurship, and pedagogic approaches relying on an intensive use of co-creation and prototyping. The exercise was demoed to academic instructors during a virtual international conference on design-driven innovation. The experts' feedback and reactions were collected through the video recording of the session and follow-up conversations. This paper will present the exercise in detail, lessons learned, and reflections extracted from the demo session. We finally discuss how the exercise can be used to conduct empirical research to assess the effectiveness of design-driven teaching tools in entrepreneurship education.

Keywords: Creativity; aesthetics; effectuation; design; ideation; new product development.

Received: October 2022. Accepted: November 2022

INTRODUCTION

Entrepreneurship education has witnessed significant pedagogic innovations in the last decade through the emergence of popular teaching approaches based on Customer discovery (Blank & Dorf, 2020), Lean start-up (Ries, 2011), Business model generation (Osterwalder & Pigneur, 2010), and, more recently, Design Thinking (Brown & Katz, 2019). These new approaches differ substantially from the traditional business-plan-based methods from the conceptual and practical points of view.

On the conceptual side, the new pedagogic tools are compatible with the effectuation theory (Sarasvathy, 2001), according to which entrepreneurs attempt to create a reality they can control instead of predicting outcomes through causal models. The integration between effectuation theory and design thinking can help transform entrepreneurship into a science of the artificial (Dimov, 2016; Berglund et al., 2020; Simon, 1996) to augment the effectiveness of entrepreneurial action (Berglund & Verduijn, 2018) and support the accumulation of entrepreneurial expertise via deliberate practice (Dew et al, 2017).

Methodologies such as Lean Start-up, Customer Discovery, and Business Model Generation have, in fact, much in common with Design Thinking, namely the centrality of prototyping and knowledge visualization, the necessity to engage with users and stakeholders, and the adoption of agile and scalable project management approach to manage uncertainty and support hypotheses validation via repeated testing of prototypes characterized by increasing fidelity. Notwithstanding these similarities, the injection of design-driven pedagogic tools in entrepreneurship classes is characterized by the predominance of ideation over "making" exercises (Sarooghui et al., 2019). This unbalance is probably the result of several factors, including a shallow or incorrect understanding of the conceptual underpinning of design-driven entrepreneurship, the limited availability of spaces, instructors, and resources for makers, and the lack of makers' exercises that are deliberately designed to integrate theories of entrepreneurial practice with Design Thinking.

In this paper, we focus on the latter issue by contributing with an exercise format that combines effectuation theory with a making experience based on using cooking as a metaphor to develop empathy and hone design skills. There is, in fact, a relative scarcity of experiential learning exercises based on effectuation theory compared to much research on this topic. The applications of effectuation and design to teaching

entrepreneurship in a virtual setting are even less common. In the next section, we provide the theoretical background behind the exercise and propose a model to represent the design workflow in an effectuation setting. Sections 3 and 4 will describe the exercise and its validation with a group of design and entrepreneurship instructors. We finally discuss how the exercise can be used to conduct experimental research to assess the impact of making exercises on students' skills for creative problem-solving.

MODELLING THE DESIGN WORKFLOW UNDER EFFECTUATION SETTINGS

The duality of entrepreneurial action: experimentation and transformation

The tendency to believe that human creation involves translating an abstract idea into an artifact is known as ilomorphism. In contrast with the ilomorphic approach, the creation of something novel is not the result of a "production" based on abstract blueprints, but a process of organic growth based on the transformation and manipulation of materials (Ingold, 2013).

The role of physical experience as the structuring element of our cognition finds correspondence in theories of embodied cognition (Damasio, 1999; Lakoff, 2012), in which feeling, acting, and knowing cannot be separated (Damasio, 2021).

Entrepreneurship education is a receptive field for adopting pedagogical practices focusing on making if we reframe entrepreneurship as a science of the artificial (Simon, 1996), helping entrepreneurs to design effective outputs and courses of action (Dimov, 2016).

To illustrate how conceptualizing entrepreneurs as makers and entrepreneurship as artifact-centered design can be translated into pedagogical practices, we refer to the model in Figure 1. Following Berglund et al. (2020), we represent entrepreneurial action as a duality between experimentation and transformation. Human activity occurs across the interface between an external system (reality) and individual consciousness. According to Simon (1996), this interface is given by a design artifact through which we can engage with both systems. Typical entrepreneurial artifacts include prototypes, business models, marketing campaign materials, the design of suitable workspaces, etc.

The artifact can be designed to test its effectiveness (Figure 1, left side) or via the transformation of materials to embody ideas into a meaningful object (Figure 1, right side).

Artifacts are both the input and the output of entrepreneurial action in both cases. For instance, on the experimentation side, a prototype can be subject to experimental testing based on specific hypotheses. The artifact will have to be designed so that the selected hypotheses can be tested. For instance, if a certain color palette in the interface is expected to improve accessibility, the prototype must implement that feature. The result of these tests will provide input to modify the initial design, e.g., by confirming or denying that a specific combination does improve accessibility.

Similarly, on the transformation side, a low-fidelity prototype can help scaffold ideas and trigger attempts to improve or refine the design. The outcome will be, again, a modified artifact.

An artifact-centred design view of entrepreneurship frames action as a sense-making and learning process through which entrepreneurs aim at i) generating a distinctive value proposition and ii) maximizing its fit with existing resources and underserved market opportunities. The combination of experimentation and transformation practices can support entrepreneurs in identifying novel solutions and opportunities by combining rigorous validation of distinct prototypes with the generation of new ideas and their embodiment into mutable artifacts to support co-creation and interpretative flexibility.

More specifically, higher-fidelity, distinct artifacts can be used as experimental stimuli to ascertain whether a novel solution can effectively address an identified market imperfection (Dorf Blank and Dorf, 2020). Specific hypotheses associated with the prototype's features and functions can be formulated and subject to objective testing following the scientific method.

On the transformation side, artifacts are underspecified and mutable to support ideas' cognitive and emotional scaffolding (Bjorklund et al., 2017; Passera, 2017) and their embodiment through manipulating technical, environmental, and mental constraints. In the transformation phase, artifacts allow us to think about possibilities and conceive the future as an endogenous creation by wilful individuals (Dew et al., 2017) instead of an objective reality that must be discovered.

Using underdeveloped and mutable artifacts creates room for interpretative flexibility, free-flowing user interaction, and a deeper understanding of technological limitations and user affordances. Transformational activities make creativity stem from the manipulation of materials and the more profound knowledge of technical possibilities and constraints (morphogenetic process) as opposed to abstract ideation. Students are continuously asked to question the take-for-granted and explore across boundaries. Finally, transformation allows them to hone aesthetic and emotional intelligence to better empathize with customers and anticipate hostile or welcoming emotional responses.

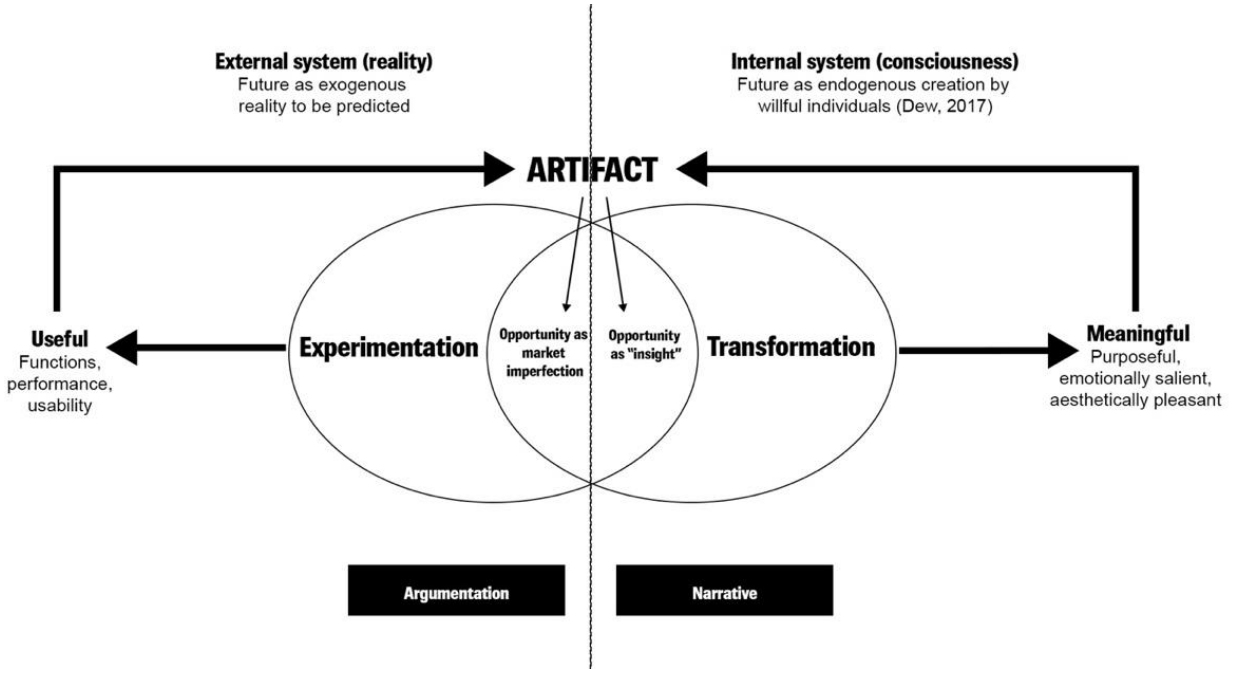

Fig. 1. Entrepreneurial design as a duality between transformation and experimentation

While more contemporary approaches to entrepreneurship education, such as Blank and Dorf's Customer discovery (2020), have had great merit in translating and applying the scientific method to testing the validity of market hypotheses, there is a severe shortage of pedagogic practices to train skills to support the transformational side of entrepreneurial action. The customer discovery process is based on a rigorous process of formulating testable hypotheses, developing metrics, and generating learning from failure. However, customer discovery does not directly and explicitly support generating hypotheses and insights. Entrepreneurs and students are asked to rely on their "talent" or "creativity." They are typically exposed to ideation exercises of dubious effectiveness. One reason behind this shortage is the already mentioned predominance of ilomorphism in education based on the notion that ideas and theories have a more privileged pedagogic status than artifacts and practice. Other factors include misconceptions about the nature and the practice of creativity, traditionally confused with the vague notion of ideation, or the lack of appropriate infrastructure to support makers (Sarooghi et al., 2019). Another reason is that transformation requires a different working logic, typically not taught nor deliberately practiced in business and technical schools.

Practicing transformation: narrative thinking and effectuation

According to Bruner (1985), human thinking is the product of a duality between two different but complementary modes of thought: argumentative and narrative. Argumentation and narrative differ primarily in their fundamental goals: the former aims to verify if a statement is true or false; the storyteller's objective is to convince readers that a particular chain of events sounds plausible and emotional. Another critical difference between valid argumentation and good storytelling is that the former cannot be underspecified. Conversely, the latter is deliberately left incomplete to solicit listeners' intervention in anticipating what might happen and playing with their expectations.

As shown in Figure 1, argumentation is the logic for experimentation, while storytelling is the thinking mode of transformation. While storytelling is applied to text or speech, transformation can equally rely on the intense use of knowledge displays through visual aids, models, and other artifacts. More broadly, we identify the ability to reason aesthetically as the underlying thinking mode of transformation, based on the use and manipulation of materials and assessment criteria driven by emotional assessment and the pursuit of fitness and meaning.

Entrepreneurship research has focused on the role of storytelling in intention formation (Gartner, 2010), storytelling to support venture legitimacy (Becker-Blease et al., 2015; Fisher et al., 2017), as a teaching approach based on emphasizing stories of success VS failure (Steyaert, 2007), or as a mechanism to increase the effectiveness of marketing messages and branding. Limited attention has been dedicated to using artistic media to build a narrative to identify or revise entrepreneurial artifacts.

The use of storytelling is just one of the tools for applying a design-driven pedagogy to support the creation of transformational risk. A broader toolbox

could include design heuristics and principles such as Maeda's laws of simplicity (Maeda, 2006), Gestalt laws (Wertheimer and Riezler 1944; Koffka 2013), emotional design (Norman, 2004), MAYA design principles (Hekkert, 2006), and art-driven approaches (Iandoli and Zollo, 2022).

A design-driven pedagogy is highly compatible with well-known theories of entrepreneurial action, namely Sarah Sarasvathy's ideas of effectuation (2001). Sarasvathy juxtaposes effectuation and causation as alternative thinking modes in entrepreneurial behavior. She defines causation as a cognitive "process that takes a particular effect as given and focus on selecting between means to create that effect" and "effectuation as a process that takes a set of means as given and focuses on selecting between possible effects that can be created with that set of means." (Sarasvathy, 2001, p. 245).

Effectuation seems mostly at work in the transformation phase, while causation appears to be the underlying logic of experimentation (Table 1). Again, the duality reconciles different theoretical descriptions of entrepreneurial action. Additionally, an approach based on making can facilitate the translation of effectuation precepts into actionable teaching strategies.

Modelling the transformation workflow

Based on interviews with entrepreneurs operating in creative industries (DCMS, 2015) such as advertising, architecture, crafts, and visual arts, (Iandoli & Zollo, 2022) identify three salient moments of the workflow through which creative individuals practice transformation to identify novel solutions for a unique customer experience:

(i) Self-imposed constraints: demarcating a cognitive and emotional space in which discovery can unfold (Create the Box)
(ii) Self-guided discovery: play with rules and resources to identify good problems (Thinking within the box)
(iii) Resolution: recognizing tensions and resolving trade-offs (Thinking outside of the box).

The first step shows that the search for novelty does not start in a vacuum or via freewheeling ideation, but it is based on a mix of expertise and emotional intelligence. For instance, in an interview that was part of the study with a famous chef founder of a 3-star Michelin restaurant, this space contains his vast technical knowledge of ingredients and cooking techniques combined with an emotional understanding and attachment to his own culinary culture and terroir.

Exploring this self-defined and well-articulated problem space in the self-guided discovery step helps identify available resources and constraints. In the chef example, those may include certain ingredients' physical and chemical properties, customers' expectations or technical limitations, pros, and cons of specific cooking techniques. In this step, an intense activity of manipulating materials and resources helps identify potentially good problems by generating hypotheses and serendipitous discoveries.

In the third step, some problems are solved by identifying relevant trade-offs and their closure through innovative combinations or additions. For instance, the salty-sweet continuum could be the base for determining a desired level of sapidity and may suggest the inclusion of a new ingredient, e.g., a variety of onions providing the additional sweetness moderated by some tanginess.

The proposed framework is consistent with an entrepreneurial effectuation logic since the workflow is oriented towards operating with available means and resources to create a controllable future. The workflow also aligns with the design thinking cycle based on the empathize-ideate-prototype process. The workflow is finally consistent with recent developments in cognitive science based on the theory of embodied cognition (Damasio, 2021). Embodied cognition argues that information processing is mediated by bodily interaction with the environment and that decision-making is driven by emotions as much as by "rational" assessment.

Table 1. A comparison of experimentation and transformation based on Effectuation theory (adapted from Sarasvathy, 2001)

	Experimentation (Causation)	**Transformation (Effectuation)**
Givens	Effect is given	Some means are given
Decision making criteria	Optimize based on expected returns	Aesthetic, based on actor's competent perceptions, emotions, preferences, and technical abilities
Modus operandi	Planning	Co-creating
Unknowns	Anticipate predictable scenarios	Focus on controllable aspects of an unpredictable future
Outcome	Increase market share based on the recognition of market imperfections	Increase market share based on the generation of (intersubjective) insights

A cooking metaphor to practice transformation

As illustrated in the next section, we use the dual mindset model and the creative workflow framework to structure a design thinking exercise grounded on effectuation theory and identify checkpoints and materials for reflection and sense-making.

We decided to develop a cooking exercise inspired by Sara Sarasvathy's example to illustrate the difference between causation and effectuation (Sarasvathy, 2001). She compares two situations in which a meal must be prepared. The first refers to a restaurant chef preparing meals for the restaurant menu. The menu is designed based on known customer expectations and sourcing possibilities. The chef uses a causation logic to achieve given effects driven by these expectations and constraints and plans to acquire the necessary means to optimize the cost/benefit ratio. Contrast the professional chef with someone who has an unexpected guest and needs to improvise a solution. This impromptu chef will adopt an effectuation logic by reversing the relationship between means and effects. She will work with given means (the ingredients available in the house) and use aesthetic criteria based on perceptions, emotions, preferences, and technical abilities to achieve controllable and satisficing effects.

The second reason behind the choice of cooking is that preparing a meal is an intuitive metaphor for understanding user-centered design. When we cook for someone, we spontaneously empathize by developing assumptions about what our guests enjoy and need. We then experiment with ingredients and cooking techniques to realize a functional prototype. We combine technical and aesthetic criteria to judge whether the result is satisficing. Finally, we test our creation by collecting data, including verbal and non-verbal feedback from our guests.

Third, meal preparation is a task that requires participants to work with physical matter and be aware of the information gathered through their senses and assessed from emotional and aesthetic points of view.

Fourth, cooking is an everyday experience most people can relate to, and for which students may possess some experience and have access to cooking equipment in their private spaces. Finally, cooking provides a relevant real-world situation. Cooking and consuming food with other guests is very important in all cultures. It can be associated with family memories and social or religious rituals. It is prominent in many social situations where we must be mindful of others. Other creativity exercises, such as building a spaghetti marshmallow tower (Wujec, 2010), are not emotionally salient regarding users' feelings or for anticipating the consequences of bad design.

THE STRUCTURE AND IMPLEMENTATION OF THE EXERCISE

The proposed exercise combines effectuation theory and design thinking in an online teaching environment. The COVID-19 pandemic was an additional contingent factor. The impossibility of using labs and other makers' facilities triggered the idea of making spaces that could be available to students in their homes. Most people have access to at least some essential cooking tools and equipment in their houses or apartments, and the experience of cooking together would relieve them from the social isolation imposed by the pandemic lockdown. In this section, we provide instructions for independent replication of the exercise.

Setting and preparation

About one week before the exercise, each cook receives instructions to prepare for the event. We used a simple and underspecified problem statement: "In 45 mins, you must cook X", where X is a cooked/prepared dish the students should be familiar with. In this version, the cooks are not presented with formal restrictions or expectations, and the concept of the meal is left up to their interpretation. A variation of the exercise is to provide students with additional constraints to assess how their workflow is impacted; The cooks are expected to procure necessary ingredients independently and set up a webcam (phone, webcam, or laptop) in the kitchen or cooking area. Participants should also have access to a web-conferencing system such as Cisco Webex, Microsoft Teams, Zoom, etc.

Step-by-step implementation

The exercise starts with each student cook joining the zoom call from within their kitchens. A facilitator should be pre-selected to oversee the experiment as a timekeeper and by guiding reflections and discussion during and after the cooking phase.

We suggest the following timeline for the exercise:

(i) Introduction and Welcome (10 Minutes): The facilitator reminds the participants about the instructions and objectives of the exercise

(ii) Cooking Phase (45 Minutes): The participants cook the meal. While preparing the meal, the facilitator asks the participants questions to help them reflect on their cognitive and practical process of creating their meal.

Questions that could be asked during the cooking phase:

- What was the source of your recipe? (Creating the box)
- Can you figuratively open your brain and tell me what you are doing now? (Think within the box)
- Are there any rules you follow when combining your ingredients? Or are you simply improvising on the go? (Think within the box)

- "How do you balance ingredients and flavors in this plate? (Think out of the box)
- Did you violate any of the rules you usually use or introduce some new rules or variations (Think outside of the box)
- (If the outcome is different than expected) How do you explain this? Was this an accident or the result of some experiment you were attempting? (Think outside of the box)

(iii) Pitching the Final Product (1-2 Minutes per participant): The participants will pitch/present their final cooked/prepared meal. A cooking contest can be included to make the exercise more engaging, or if an "audience" is present, they can vote on the best pitch.

(iv) Reflection/Debrief Phase (45 Minutes): The facilitator can ask follow-up questions to analyze the metaphor and extend it to other entrepreneurial activities. Possible topics that can be discussed during the reflection phase.

- How this cooking experience maps to your entrepreneurial project? Any analogy?
- Reflect on and describe the creative workflow you used to prepare the meal.
- Did you have in mind a hypothetical guest? How important were the guest's expectations in the making of your plate?
- How can this exercise be applied to other creative challenges?
- Assuming students have been exposed to effectual theory: Did the experiment help you understand the difference between effectual and causal entrepreneurial action?

RESULTS

The simulation of the "What's cookin'" teaching exercise occurred through a demo session in which faculty and university administrators from three innovation centers (St. John's University Design Factory (New York), Design Factory Aveiro (Portugal), and Inno. Space Design Factory (Germany)) participated as testers. The participants were expert instructors and scholars with backgrounds in design, innovation, and entrepreneurship. The demo session was held during an online conference called International Design Factory Week. This one-week conference brings together worldwide innovation centers to discuss design and product development best practices. The data was collected from 1) a live Q&A debriefing session over Zoom 2) and an analysis of the session recordings.

The cooks were not presented with formal restrictions or expectations, and the concept of the "burger" was up to their interpretation. Some of the cooks purchased ingredients for the day of the experiment; others improvised with what they had at home. They were asked to set up a webcam (phone, webcam, or laptop) in the kitchen or cooking area and participate in the event connected via Zoom from various international locations. Some other participants attended the event as members of the audience.

During the cooking phase, the facilitator would ask cooks about their cooking process using questions like those reported in section 4. The questions allowed the cooks to think on their feet, allowing the audience to understand the thinking and the process the cooks were going through.

At the end of the 45 mins, each cook would pitch their creations to the group. Then, the facilitator moderated a group discussion on cooking as an analogy of effectual design and entrepreneurship.

After the session, the two investigators meet to review the Zoom recordings. The Zoom recordings were then automatically transcribed using Descript software. Approximately a ten thousand words document was generated in this way (about 20 pages). One of the authors examined the raw transcript for cleaning the text of transcription mistakes. Once the initial data review was concluded, the investigators met for 2 hours to define an inductive coding structure to annotate the session transcript based on the theoretical framework described in section 2 (Table 2).

Table 2: Coding scheme

Theme	Descriptions
Self-imposed constraints: demarcating a cognitive and emotional space in which the discovery process is free to unfold (Create the Box)	Discussions or comments that relate to crafting a menu or design for a product. How someone felt inspired by a personal experience that influences their product design or recipe.
Self-guided discovery: transform constraints into opportunities and resources (Think within the box)	Discussion or comments that relate to constraints, quality and quantity of the utilized resources, trade-offs, options and alternatives, trial and error, manipulation of the ingredients, observations and emotional reactions about the cooking process and intermediate results, concerns over missing ingredients or resources Discussion or comments that relate to constraints, concerns over missing ingredients or resources.
Resolution: identifying tensions and resolving trade-offs (Think outside of the box)	Discussions or comments about final results or products, resolving problems and identifying tradeoffs

The recordings and the subsequent transcript were then thematically independently annotated and analyzed through NVIVO to identify findings and observations based on the proposed coding scheme. One of this paper's authors participated in the annotation phase, while the second coder had not been involved with this research previously and was trained solely for the coding. The two coders met afterward to compare annotations and assess the level of agreement. Disagreements were then discussed and resolved. This approach is based on David Thomas' (2006) inductive approach to (1) condense and summarize raw data, (2) establish links between research objectives and findings derived from the data, and (3) validate a framework to understand the underlying structure within the data (Thomas, 2006).

The transcript content was also analyzed to see what words or common concepts appeared most frequently within these themes. The frequency analysis is displayed in the word map of Figure 2.

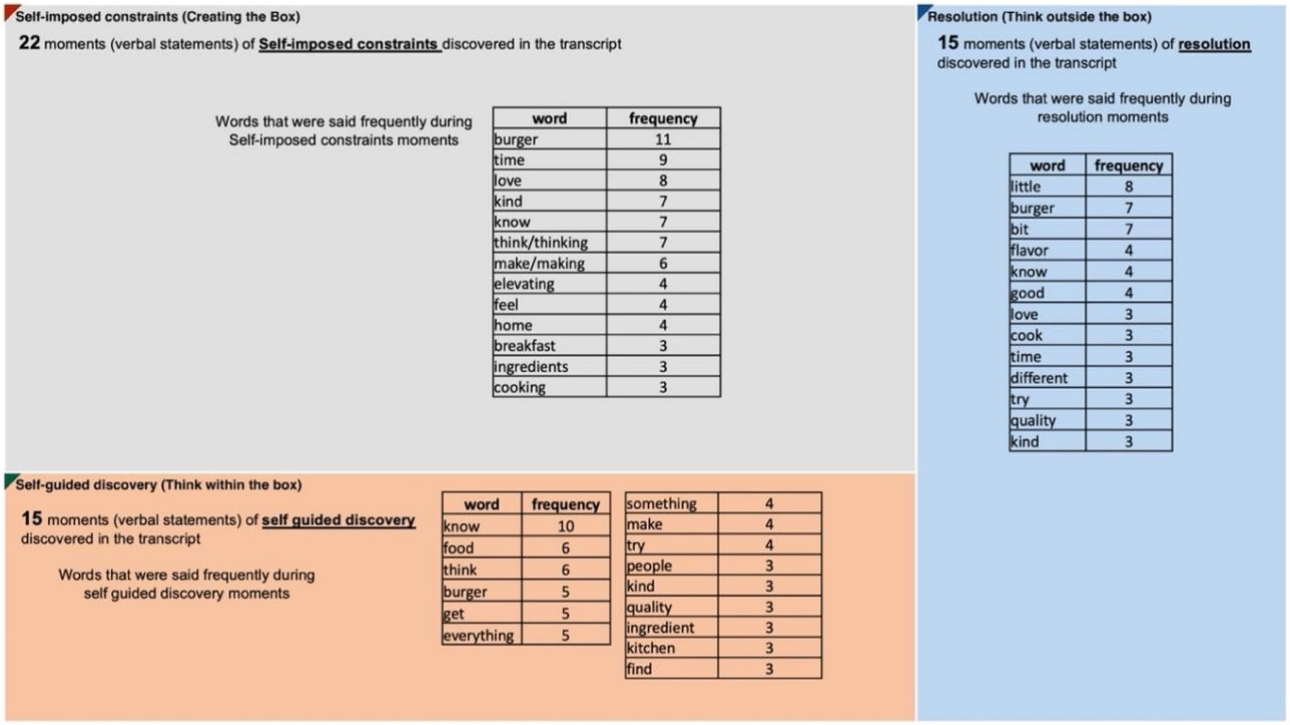

Fig. 2. Treemap with frequent keywords. The size of each box is proportional to the number of moments coded for each theme. Words that were said frequently were then extrapolated from the data using databasic.io.

After conducting the thematic analysis, we discovered 22 instances of self-imposed constraints (Creating the box), 15 instances of self-guided discovery (thinking within the box), and 15 instances of resolution (thinking outside the box). The analysis results are displayed in Figure 2, in which the size of the boxes is proportional to the number of instances for each theme. The most frequent and relevant keywords are reported in each box.

DISCUSSION

The word map in Figure 2 shows the prominence of keywords associated with inputs and resources (ingredients, flavor, kitchen, things) and with the making process (cooking, improvising, recipe, experience). The use of an effectual, making-oriented language provides evidence that participants resorted to an effectuation thinking mode driven by the manipulation of ingredients while creating the plate instead of rational planning and abstract thinking.

Observing the size of the boxes in Figure 2, it is possible to notice that the time and focus allocated to activating existing knowledge (creating the box) and manipulating available resources (thinking within the box) constitute almost three-quarters of the process. This result provides evidence that the participants' creative workflow is firmly grounded on their toolbox of notions, rules, and resources and that they leveraged such toolbox to execute the task and produce results.

In some cases, these results were novel or unexpected. For instance, one of the participants who lacked some ingredients and wanted to make a vegetarian version of the plate resorted to replacing bread with tortillas and meat with a mix of ground beans and vegetables to address the challenge. These solutions were not planned or ideated initially but made up or identified

by combining the challenge instructions with constraints, available resources, and pre-existing cultural preferences and knowledge.

Students can be invited to reflect on the importance of the richness and variety of such toolboxes in determining successful results. Students can also be reminded that playing with this toolbox and engaging with the making experience can offer alternative, viable, and potentially more effective pathways to problem-solving than abstract ideation and planning.

The exercise can also be leveraged to stimulate reflection on the importance of emotions in creative problem-solving. Cooking can awaken emotions and personal memories that can play different roles in each process step. During the “creating the box” phase, whereby initial processes, rules, and guidelines are often self-imposed, emotions can trigger positive memory and support inspiration. Emotional validation is used to assess options and outcomes or promote empathetic thinking in the other phases. These findings are consistent with the proposed 3-step workflow and theories on emotional design (Norman, 2004) and studies in cognitive sciences on the role of emotions in decision-making (Damasio, 1994, 1999).

For instance, during the experiment, when participants were asked, "What was the source of your recipe?" one participant went, "well, when I was younger, I would remember cooking burgers with my dad and how he did it; it was always a good memory.." and another participant mentioned that they want to "approach the burger with a certain taste" and wanted to center the experience of the burger around the friends and family who they normal would cook for. It was clear to us that, as a metaphor, cooking can reflect how powerful emotions can be in how individuals make practical decisions to develop a solution.

During the experiment, our cooks defined their rules when cooking their burgers based on their prior experiences and assumptions. The cooks disclosed some of their own "rules" when creating their burgers. One participant, for example, explained that they always toast their burger buns, as they believed the bun's crunch would counter any sogginess from the other ingredients on the burger. These rules can be determined by participants’ mental models, emotional attachment, and culinary knowledge based on traditions or habits. However, the rules are not necessarily empirically valid or optimal. Students can also be reminded that leveraging internal, pre-existing knowledge can lead to the acritical activation of biases and stereotypes but that the making activity can help them put pre-existing beliefs to the test. Thus, one important output from this exercise could be to help participants critically reflect on their practices to question/improve them.

We also found evidence that the cooks discovered challenges and had to solve trade-offs.

Our cooks found out that sometimes they had to be creative with ingredients. Some cooks were missing "proper bread or eggs," so they had to maintain flexibility and quickly devise alternative plans to develop their final products. For example, when one cook couldn't find the eggs for their Brunch Burgers, they recombined some of the available ingredients to create a unique burger sauce and made Bacon Cheeseburgers instead. They abandoned their original plan to meet the time constraints.

In another example, one participant didn't have burger buns, so instead, they decided to use Pita Bread as their buns, using a repurposing strategy. In that way, they felt that the alternative approach made the product unique and different.

In several cases, the participants found that deviations from their plans often produced better results. Furthermore, when the participants faced a deficit, they were exposed to the emotions and process of overcoming that deficit. Such emotional pressure was a powerful motivator to devise alternative solutions quickly.

Our cooks were mindful of whom they were cooking/designing for. The metaphor of the customer as a guest can also be fruitful for entrepreneurs. Most participants had in mind that they were cooking for a hypothetical guest and making assumptions about the guest's expectations of the meal. One of the participants had real guests and was cooking for them. We often adapt our recipes to their taste buds when we cook for others. In the same way, when we approach designing products for others, we are taking a human-centered design approach when we build a solution around them and their needs.

Students can be solicited to reflect on to which extent they incorporated these expectations in the making exercise or why they did not do so. They can also be invited to reflect on the exciting (or disastrous) emotional prospect of cooking something for a guest who likes (or dislikes) the plate. They can be invited to identify which factors can lead to successful or unsuccessful anticipation of customers’ needs.

In one case, one participant had several guests for whom she was cooking. An issue of scalability emerged. Cooking for a large group of people versus one person reflects the same challenge an entrepreneur must face when scaling up production without losing quality. Cooking for a large group provided an unanticipated challenge. In this case, the cook resorted to a different workflow in which some items were pre-processed and combined in parallel so the guests could eat their plates together as a group.

CONCLUSIONS

The proposed exercise is a viable and engaging pedagogic expedient to teach effectuation and design-driven entrepreneurship in a physical or online environment. More broadly, the demo results provide fascinating insights into how novel experiential learning

approaches to entrepreneurship can be devised by combining design thinking with effectuation theory and based on the centrality of the making experience in which "learning with things" prevails over "learning from things" (Ingold, 2013).

With this work, we also want to highlight the importance of creativity and aesthetics in identifying entrepreneurial opportunities and transforming ideas into viable products. We wish to draw scholars' attention toward understanding how aesthetic preferences and skills (the entrepreneurial right brain) interact with the rational entrepreneurial mindset driven by planning, organizing, and monetizing needs. Such research may support the design of a more balanced educational mix in which creative and aesthetic thinking receive adequate pedagogic attention and a more rigorous theoretical foundation for a pedagogy of making (Ingold, 2013) in entrepreneurial education.

This research could produce empirical validation for the dual mindset model presented in fig. 1, which would provide educators with solid practical support for developing more and better pedagogic tools to support transformation skills. While we have offered some evidence in this paper, the data have been obtained in a single session with participants that were engaged and seemingly aware of being part of a teaching exercise assessment.

For instance, it could be interesting to create a control group that simulates the cooking following an ideation-driven approach and then compare the two conditions in terms of learning indicators, quality of the solution, and structure of the problem-solving process.

We speculate that participants in the cooking group will outperform subjects in the non-cooking condition on many indicators associated with awareness, student engagement, problem-solving skills, and quality of the solution.

Research experiments could also be designed to create conditions in which participants are asked to operate with a more or less balanced mix between experimentation and transformation. We speculate that the adoption of a balanced mix is associated to better results in terms of identifying more innovative solutions.

The structure of the exercise makes possible the introduction of many variants in its execution. These include the possibility of providing more or less constraining challenges briefs, the introduction of a surprise event, individual VS team-based execution, or more or less stringent limitations in the ingredients lists and other rules of the game.

Implementing these variations can provide ways to achieve alternative pedagogic objectives and focuses. It can also provide a base for the rigorous design of research experiments and hypotheses testing. For instance, it could be interesting to create a control group that simulates the cooking following an ideation-driven approach and then compare the output and learning indicators results.

We speculate that participants in the cooking group will outperform subjects in the non-cooking condition on many indicators associated with awareness, student engagement, problem-solving skills, and quality of the solution.

By varying the level of prescriptiveness of the instructions, the exercise format could be used to investigate the impact of constraints on students' creativity. For instance, a control group could be created in which students are given less detailed instructions and their performance compared with participants in another group working on a more open and ambiguous problem definition. Another option could be to analyze the impact of a more structured problem-solving methodology. We speculate that better performances could be achieved with an intermediate level of structuration: some structures could make participants more creative instead of too little or too much.

Finally, the cooking exercise could be modified and leveraged to introduce entrepreneurship students to applying design heuristics, principles, and techniques. For instance, students could combine cooking with storytelling or explore the typical familiarity-novelty design trade-off in realizing a recipe.

ACKNOWLEDGEMENTS

We would like to offer a special acknowledgement to Gohar Aznauryan, doctoral student at St. John's University and the entire International Design Factory Global Network for their support on this special project.

REFERENCES

Berglund, H., Bousfiha, M., & Mansoori, Y., 2020, Opportunities as Artifacts and Entrepreneurship as Design, The Academy of Management Review; 45(4): 825-846. https://doi.org/10.5465/amr.2018.0285

Berglund, K., & Verduijn, K., 2018, Revitalizing entrepreneurship education. Adopting a critical approach in the classroom. Routledge, London, UK.

Blank, S., & Dorf, B., 2020, The startup owner's manual: The step-by-step guide for building a great company. John Wiley & Sons, Hoboken, NJ, USA.

Brown, T., & Katz, B., 2019, Change by design: How design thinking transforms organizations and inspires innovation (Vol. 20091). Harper Business, New York, NY, USA.

Damasio, A., 2021, Feeling & Knowing: Making Minds Conscious. Pantheon, New Yok, NY, USA.

DMCS (2015). Creative Industries Economic Estimates, Department for Culture, Media & Sport Statistical release – UK government, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/394668/Creative_Industries_Economic_Estimates_-_January_2015.pdf

Dew, N., Ramesh, A., Read, S., & Sarasvathy, S. D., 2017, Toward deliberate practice in the development of

entrepreneurial expertise: The anatomy of the effectual ask. In: The Cambridge Handbook of Expertise and Expert Performance (pp. 389-412). Cambridge University Press, UK.

Dimov, D., 2016, Toward a Design Science of Entrepreneurship, Models of Start-up Thinking and Action: Theoretical, Empirical and Pedagogical Approaches (Advances in Entrepreneurship, Firm Emergence and Growth, Vol. 18), Emerald Group Publishing Limited, Bingley, pp. 1-31. https://doi.org/10.1108/S1074-754020160000018001

Evans, D., 2020, How Zoom became so popular during social distancing. Retrieved from CNBC: https://www.cnbc.com/2020/04/03/how-zoom-rose-to-the-top-during-the-coronavirus-pandemic.html

Hekkert, P., 2006, Design aesthetics: principles of pleasure in design. Psychology science; 48(2): 157.

Iandoli, L., & Zollo, G., 2022, Elegant Design. Bloomsbury, London, UK.

Ingold, T., 2013, Making Anthropology, Archaeology, Art and Architecture. Routledge, London, UK.

Koffka, K., 2013, Principles of Gestalt psychology. Routledge, London, UK.

Norman, D. A., 2004, Emotional design: Why we love (or hate) everyday things. Civitas Books.

Osterwalder, A., & Pigneur, Y., 2010, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers (The Strategyzer series). John Wiley and Sons, Hobokien, NJ, USA.

Ries, E., 2011, The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Currency, Redfern, Sydney, Australia.

Sarasvathy, S. D., 2001, Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency, The Academy of Management Review; 26(2): 243-263.

Sarooghui, H., Sunny, S., Hornsby, J., & Fernhaber, S., 2019, Design thinking and entrepreneurship education: Where are we, and what are the possibilities? Journal of Small Business Management; 57: 78-93.

Simon, H. A., 1996, The architecture of complexity. Sciences of the artificial (third ed). MIT Press., Cambridge, USA.

Thomas, D. R., 2006, A general inductive approach for analyzing qualitative evaluation data. American Journal of Evaluation, 27(2), 237–246.

Wertheimer, M., and Riezler, K., 1944, ‘Gestalt theory’, Social Research, 78–99.

Wujec, T., 2010, The marshmallow challenge. https://www.marshmallowchallenge.com