# Sparking Creativity in Entrepreneurship Courses: Investigating the Effect of Hybrid Brainstorming Sessions on Business Opportunity Identification Outcomes

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**Abstract:** Opportunity Identification (OI) is one of the key entrepreneurial capabilities targeted in most entrepreneurship education programs. The most frequently used technique for facilitating business OI in entrepreneurship courses is brainstorming. Previous findings indicated the positive effect of hybrid (individual and group) settings on overall brainstorming outcomes, i.e., quality and quantity of the generated ideas, compared to only individual or group settings. However, to date, no study has explored the effect of hybrid brainstorming sessions on individual idea-generation skills outside the group, a possibility labelled "group-to-individual transfer". This study aims to fill this gap by conducting an experimental study with 33 bachelor's and master's students who attended an entrepreneurship course at a Dutch university. A repeated measurement study design is used to explore the effect of group idea generation on individual performance outside the group. Based on this design, students passed three phases, i.e., (1) individual, (2) group, and (3) individual idea generation, using an online platform, and the measurement was taken after the individual idea generation phases. The findings indicated that individual idea generation after the group work resulted in fewer comprehensible business ideas but with a higher rate of concrete ideas that were more innovative compared to ideas generated before the group work.

**Keywords**: Opportunity Identification, Business Idea Generation, Hybrid Brainstorming

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## Introduction

Opportunity Identification (OI) is one of the key entrepreneurial capabilities of any successful entrepreneur or entrepreneurial citizen (e.g., Ardichvili et al., 2003; Baggen et al., 2015). From the cognitive psychology perspective, scholars described the OI process as a multi-step creative process (Dimov, 2007) that includes at least two underlying phases, i.e., idea generation and idea evaluation (Vogel, 2017), essential for identifying potential business opportunities (Lans et al., 2018). According to McMullen and Kier (2017), individuals' business idea generation and evaluation can be facilitated by respectively stimulating their divergent and convergent thinking skills. In this regard, the most frequently used technique for stimulating divergent thinking skills is brainstorming (Farrokhnia et al., 2022; Linsey et al., 2011; Litchfield et al., 2011; Ritter & Mostert, 2017).

The brainstorming technique was initially developed by Osborn (1957) based on the premise that generating more ideas increases the likelihood of coming up with a higher-quality idea (Clapham, 2003; Simonton, 1990). Brainstorming has been used in different individual and/or group settings. However, scholars believe that the most effective brainstorming sessions involve an alternation of individual and group idea-generation sessions (Brown & Paulus, 2002; Paulus et al., 2018), known as "hybrid brainstorming" (Korde & Paulus, 2017). In this regard, some scholars explored the effect of different hybrid settings such as individual-to-group (e.g., Ritter & Mostert, 2018), group-to-individual (e.g., Baruah & Paulus, 2008), and group-individual-group and individual-group-individual (e.g., Korde & Paulus, 2017) on *overall* brainstorming outcomes, i.e., the quality and quantity of the generated ideas. Their findings have clearly indicated the superiority of hybrid settings over only individual or group works in brainstorming sessions.

According to scholars, the interpersonal interactions among group members create collaborative "zones of proximal development" (see Vygotsky, 1987) that can also facilitate the development of individual task-related skills (Farrokhnia et al., 2019; Gholami et al., 2020; Hassanzadeh et al., 2016; Hatami et al., 2016; Noroozi, 2022; Noroozi et al., 2012, 2016), such as decision-making (e.g., Curseu et al., 2015), problem-solving (e.g., Laughlin et al., 2008; Noroozi et al., 2013), and judgment (e.g., Schultze et al., 2012) outside the group - a possibility that has been called as "*group-to-individual transfer*" (Laughlin & Barth, 1981). Although many studies explored the effect of hybrid brainstorming sessions on the overall outcomes, to date, no study has explored whether experience in a group idea generation in hybrid brainstorming sessions would aid ex-members to perform better in individual idea generation afterwards, especially in the entrepreneurship context. In this

regard, the primary purpose of this study is to investigate the effects of group business idea generation in hybrid brainstorming sessions on individual business idea generation skills outside the group in terms of the quantity and quality of generated ideas.

## Method

### Participants

The sample of this study consists of 33 higher education students (16 female and 17 male) at Wageningen University & Research (WUR), randomly assigned into 11 groups with three members. The students participated in an entrepreneurship course to orient themselves to an entrepreneurial career by actively exploring the initial steps of the entrepreneurial process. Table 1 shows the participants' demographic information.

Table 1. The Participants' Demographic Information

| | | **Frequency** | **Percentage** |
|---|---|---|---|
| Gender | Female | 15 | 45 % |
| | Male | 18 | 55 % |
| Educational level | Bachelor | 11 | 33 % |
| | Master | 22 | 67 % |
| Program | Food Technology | 16 | 48.5 % |
| | Biotechnology | 6 | 18.2 % |
| | Environmental science | 4 | 12.1 % |
| | Nutrition and Health | 2 | 6.1 % |
| | Forest and Nature Conservation | 1 | 3 % |
| | Consumer studies | 1 | 3 % |
| | Molecular Life Sciences | 1 | 3 % |
| | Organic agriculture | 1 | 3 % |
| | Plant Sciences | 1 | 3 % |
| | | **Mean** | **Std. Error** |
| Age | All | 24.1 | .61 |
| | Females | 24.7 | 1.17 |
| | Males | 23.6 | .58 |

### Study Design and Procedure

A repeated measurement study design is used to explore the effect of group idea generation on individual performance outside the group. This design aligns well with the procedures used in the group-to-individual transfer of learning research (e.g., Schultze et al., 2012). Based on this design, the students participated in a

workshop using an online platform (i.e., https://ideationhub.nl) that could guide them to pass through three idea generation phases, i.e., (1) individual, (2) group, and (3) individual idea generation. The measurement was taken after the individual idea generation phases (See figure 1).

The workshop was conducted in an entrepreneurship course with prior permission from the lecturer. For the sake of anonymity, each student was randomly provided with a username and password for logging into the online platform and participating in the workshop. Moreover, at the beginning of the workshop, informed consent was obtained from the participants. In particular, they were notified that their idea-generation outcomes would only be used for research purposes and that they were allowed to quit the research study; however, no participants declined participation.

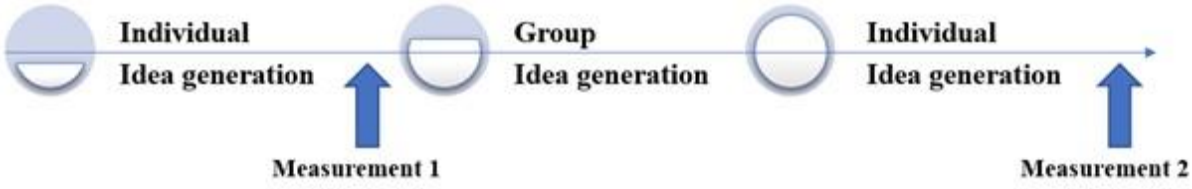


Figure 1. The Study Design

Table 2 shows an overview of the workshop. The online platform used in this study could provide participants with information about the task they were required to accomplish in each phase, control the time they had for completing the tasks, and inform them about the rules they needed to consider while brainstorming in individual and group settings.

Table 2. An Overview of the Workshop

| Phases | Tasks | Time |
|---|---|---|
| (1) Individual idea generation | Reading the problem case | 5 min |
| | Reading individual brainstorming rules | 2 min |
| | Individual idea generation | 10 min |
| (2) Group Idea generation | Reading group brainstorming rules | 2 min |
| | Group idea generation | 30 min |
| (3) Individual idea generation | Idea generation | 10 min |

Sustainable development was chosen as the problem case for generating business, defined as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1987, p. 6). The reason for choosing this problem case is that it is a broad topic familiar to many people (Baggen et al., 2017). Moreover, this problem case is in line with the recommendation to increase awareness

amongst WUR students about sustainable development goals by including and/or discussing them in courses (see WUR, 2019).

At the beginning of the workshop, an explanation was provided of what sustainable development is about, and several specific examples were given, such as energy, climate change, and education. The participants were then asked to imagine: "you are asked to give input for business ideas for new start-ups in the area of sustainable development. These business ideas can concern people, the planet and/or profit and may lead to social, environmental and/or economic gains. What ideas for new start-ups come up in your mind?". In addition, before each idea generation task, the participants had *two* minutes to read the rules they needed to consider for having fruitful individual or group brainstorming, adopted from Paulus et al. (2006).

**Measurement Approach**

Students' idea generation skills were assessed by evaluating the quantity and the quality of their individually generated ideas before and after the group phase based on the criteria adopted from Baggen et al. (2017). In particular, the ideas were scored for:

(1) *comprehensibility* (1 = comprehensible, 0 = incomprehensible). For instance, ideas such as "wearing an extra sweater" or "turning down the heating" were scored as incomprehensible as they were more general recommendations to address sustainability-related issues than an idea for a start-up business. Incomprehensible ideas were excluded from further analysis.

(2) *concreteness*, i.e., whether or not it was possible to visualise or apply the idea (1 = concrete, 0 = not concrete). For instance, "recycling used water for other purposes" could be considered a comprehensible business idea to address a sustainability issue, but since it does not provide enough information, it is hard to visualise and apply the ideas; thus, it was scored as a non-concrete business idea. In addition, the proportion of concrete ideas per participant was also calculated: the percentage of comprehensible ideas that were concrete.

(3) *flexibility*, i.e., the extent to which participants generated ideas in different categories. The categories were based on the examples of sustainable development in the problem case. Each idea was scored into one category, i.e., (1) affordable and adequate food supply, (2) decent housing, (3) energy, (4) climate change, (5) education, and (6) personal health and safety.

In addition, the ideas' *innovativeness* was determined using DeTienne and Chandler's (2004) 6-point scale based upon the following categories: (1) No apparent innovation or not enough information to make a determination; (2) A product or service identical to an existing product/service offered to an underserved market; (3) A new application for an existing product/service, with little/no modification or a minor change to an existing product; (4) A significant improvement to an existing product/service; (5) A combination of two or more existing

products/services into one unique or new product/service; and (6) A new-to-the world product/service, a pure invention or creation.

## Results

The descriptive statistics revealed that participants generated more comprehensible ideas before the group work ($M$ = 5.36, $SD$ = 3.19) than after the group work ($M$ = 4.63, $SD$ = 2.45). However, a high portion of comprehensible ideas was concrete after the group idea generation (86 %) compared to before the group work (62 %). On average, the participants generated ideas in almost the same number of categories before ($M$ = 2.78, $SD$ = 1.15) and after ($M$ = 2.71, $SD$ = 1.22) the group idea generation. In addition, the descriptive results showed that the participants generated more innovative ideas after ($M$ = 2.53, $SD$ = .45) than before ($M$ = 3.03, $SD$ = .52) the group work.

Table 3 shows the descriptive analysis of the individual idea generation outcomes before and after the group idea generation.

Table 3. The Descriptive Statistics of The Individual Idea Generation Outcomes

| | ***Before* the group work** | | ***After* the group work** | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Number of ideas generated | 7.57 | 4.53 | 5.66 | 2.91 |
| Number of comprehensible ideas | 5.36 | 3.19 | 4.63 | 2.45 |
| Number of concrete ideas | 3.34 | 2.11 | 4.06 | 1.81 |
| Number of categories | 2.78 | 1.15 | 2.71 | 1.22 |
| Innovativeness | 2.53 | .45 | 3.03 | .52 |

## Discussion, Conclusion, and Future Studies

The current study's findings indicated that the group-to-individual transfer of business idea generation skills could be facilitated in the hybrid brainstorming sessions. In particular, the findings revealed that the participants could generate fewer comprehensible business ideas after a group idea generation in a hybrid brainstorming session; however, the higher portion of the generated ideas was concrete compared to the individual idea generation before the group work. More importantly, the business ideas generated in the individual phase after group work was more innovative. The reason for these positive findings could be that the group phase of hybrid settings helps individuals reach synergy through peer learning (Al-Samarraie & Hurmuzan, 2018), enabling them to improve their knowledge repertoires and cognitive skills by interacting with more competent group members (John-Steiner & Mahn, 1996; Noroozi et al., 2018). Moreover, the social interactions within groups can be significant sources of knowledge (Johannisson, 1990; Khalifeh et al., 2020) and new ideas and viewpoints (Christensen & Peterson, 1990; Puhakka, 2006) that are essential drivers for idea generation (Gruber et al., 2013).

Synthesizing these disparate ideas and views by individuals after the group work would increase the richness of their available information (MA et al., 2011), further enhancing the positive effect of divergent thinking on their idea-generation skills (Banihashem, Farokhi Tirandaz, et al., 2014; Banihashem, Rezaei, et al., 2014; Gielnik et al., 2012; Kermani et al., 2020; Shahali Zadeh et al., 2016).

The current study's findings indicated that group-to-individual transfer could happen in a hybrid brainstorming session in terms of the average performance of all participants. However, group work does not necessarily improve all the participants' individual idea generation outcomes outside the group. Group members may employ strategies that enhance their group product, but this is not necessarily reflected in their individual performance after group work (Akhteh et al., 2022; Noroozi et al., 2013). For instance, in a group where more active or knowledgeable members complete the task on behalf of the group, less active or knowledgeable members (i.e., free riders) may fail to enhance their individual performance (Prichard et al., 2006).

Moreover, previous research indicated that individuals who were part of a successful group performed significantly better in a subsequent similar task than individuals who were part of an unsuccessful group (Barron, 2003). In this regard, Curseu et al. (2015) referred to group synergy as a significant factor in the group-to-individual transfer that can happen in hybrid settings. The concept of group synergy captures the effectiveness of the collective induction processes in that groups that exceed their average or their best member are those in which generative learning was most effective (McNeese, 2000). In this regard, Curseu et al. (2015) reported that members of synergetic groups better develop their decision competencies through group interaction processes, and members of strong synergy groups obtain the highest cognitive benefits. In this regard, future studies could go more in-depth by identifying the collective synergetic qualities of successful groups that could help their ex-members perform better after the group work.

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