THE USE OF BRAINWALKING FOR INFORMAL TEAM IDEATION IN DESIGN EDUCATION

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ABSTRACT
Understanding the nuances of informal design techniques is not merely an academic exercise, but a practical necessity for designers seeking to excel in their craft. Informal techniques encourage designers to propose any and all potential solutions that come to mind, utilising their given knowledge and intuition, with a focus on idea quantity and diversity. In this paper, the outcomes of a research investigation employing brainwalking as an informal ideation technique are shared. Students revealed evidence for enhanced creative outcomes of teamwork. Key issues are discussed including evidence for the effectiveness or shortcomings of existing informal design techniques, identification if informal design techniques could be better suited to certain design tasks when working in a group, and if informal techniques are capable of enabling better creative results than comparative formal ones.

Keywords: Design thinking, collaborative design, creative constraints, designer experience

1 INTRODUCTION
Designers are met with a tapestry of techniques to aid them through the design process. These techniques aim to encourage creative thinking and offer pathways to craft novel solutions [1]. Each technique brings its own unique strengths to the design process reflecting the balance between intuition and structure in the design process [2]. These categories have manifested themselves as informal and formal design techniques.
These techniques are methods, which we agree with the definition by Stacey et al. [3]; "*a method is a specification of how a specified result is to be achieved"*.
Formal techniques follow a prescriptive approach, providing structure by breaking down a problem based on engineering principles and functional requirements facilitating informed decision making [2]. Examples of formal design techniques include TRIZ, 6-3-5 and, Morphological Analysis.
Informal techniques encourage designers to have a '*no bad ideas'* mentality when it comes to proposing solutions, with a focus on quantity and diversity [4], adhering to a more descriptive design approach rather than a prescriptive approach [3]. Examples of informal design techniques include brainstorming, mind mapping and Osborn's checklist.
Whilst formal techniques provide a systematic way to ensure ideas align with engineering principles and functional requirements, relying on these techniques alone can limit diversity and creativity [5]. Formal techniques are typically used for collaborative design activities as the structure enables a common understanding and process for a team. However, novel techniques such as brainwalking offer an informal approach to ideation which may better suit different designers' preference and learner abilities.
In this paper, brainwalking is introduced as a design tool to enable team ideation in an informal setting. The outcomes of a study investigating students' reflections on the brainwalking technique within an educational setting are shared. The paper concludes with considerations and recommendations for students and educators who may wish to use this technique within the classroom.

2 SUPPORTING LITERATURE
70% of a products life cycle is influenced by the concept generation stage of the design process [5], therefore it is vital that designers make the best use of the techniques available. Both formal and informal techniques have their benefits and suitability. No one technique is universally suitable, requiring designers to assess and select the most appropriate technique for the situation [1]. Typically, when design challenges are more descriptive in nature, informal techniques are more valuable as they allow for broad exploration and blue-sky thinking. Alternatively, when a challenge is prescriptive in nature,

formal techniques are found to be more beneficial [6]. Informal techniques have been found to encourage creativity through innovative thinking [5], whilst formal techniques typically yield heightened refinement through structured problem-centric approaches [2]. Within engineering design, informal techniques are less commonly used in team settings, particularly in education, where collaboration is common and students may benefit from the intuitive, flexible nature of these approaches when confidence or clarity in the design challenge is limited. With this, Literature has a tendency to favour research into formal techniques for collaborative design, either looking at emulating the benefits of informal techniques for formal techniques or the advocacy of formal techniques [7–9]. This dichotomy creates two issues; 1) by trying to force fit the benefits of informal techniques into formal, you lose the intricate refinement typically found in formal methods [5], and 2) research into informal techniques becomes lost or buried as formal techniques come to the forefront of research [2, 10]. These consequences highlight the significance of this research, as by identifying how informal techniques can be used by design teams, expands the techniques available [11].

Design teams employing informal techniques rest in their ability to amplify intuitive creativity, ultimately achieving a comparable level of creative quality to that of individuals [12]. Individual brainstorming can be used as a benchmark of this creative quality, as it is often referred to as "the mother of all idea generation techniques" and is among the most well-known tools for creative problem-solving [13]. The brainwalking technique enables the greatest potential for informal group success, as it effectively blends individual creativity with constructive team relations and skills, achieving a balance across all critical factors. Brainwalking is a variation of the classic brainstorming technique. The technique fosters creative thinking and group collaboration by aiming to generate ideas through active movement and discussion. The process involves participants physically moving between ideation stations within a design space, engaging in discussions of ideas related to the specific topic, and adding to that station with sketched concepts. The active nature of this technique stimulates the brain's associative thinking across the ideation stations, towards the goal of overcoming potential obstacles that might arise in more static settings. To use brainwalking, design teams need to; define the challenge they are solving, prepare visual prompts associated with various aspects of that problem, and setup the design space with those prompts. Then the session commences, encouraging free movement and discussion, where ideas are sketched and added to their ideation station. Participants should freely rotate between stations at least until everyone has visited them all. At the end, ideas should be shared and discussed. Therefore, this research project seeks to explore the effectiveness of an informal technique, in this case, brainwalking in enhancing design creativity with design teams.

3 METHODOLOGIES

Nine final year Masters product design students from the department of Design, Manufacturing and Engineering Management (DMEM) at the University of Strathclyde, UK were asked to participate in two concept generation exercises followed by a focus group. Participants had no prior experience with brainwalking however they had used brainstorming before**.** Each exercise lasted 20 minutes.

Exercise 1 - Individual brainstorming, asked participants to use the brainstorming informal technique to generate novel concepts for a shower. The absence of restrictions aimed to foster unrestricted designer creativity, aligning with the traditional utilisation of brainstorming, emphasising open briefs, creativity, and quantity [9]. The purpose of this exercise was to give participants a reference point based on a traditional technique they were familiar with to compare the brainwalking experience.

Exercise 2 – Brainwalking, began by forming participants into three groups of three participants, and asked groups to collaboratively ideate on the concepts for a new gaming console. Ensuring consistency, the focus remained on creativity and quantity, with no restrictions imposed. Three ideation stations were established, in which the groups would freely move between them, fostering new perspectives, encouraging divergent thinking, and mitigating creative blocks. Each ideation station represented a different aspect of gaming consoles, including the evolution of PlayStation and Xbox consoles, handheld consoles, and how people use gaming consoles. Once completed, participants were placed into a focus group. The focus group utilised the same groups as Exercise 2. Participants were asked to compare the creativity of individual brainstorming versus the group brainwalking.

4 RESULTS

Following an inductive coding approach using audio transcripts from the focus group sessions, 13 codes were identified and finalised, which can be found in ***Table 1***. The codes, examples of quotes which

demonstrate the establishment of the code from the participants response, the frequency in which the participants contributed to understanding of this code and if there was any recurrence of discussion reinforcing confidence in this code. The results explored participants' experiences and opinions on the brainstorming and brainwalking techniques. The focus group consensus of the two experiments highlighted that the group brainwalking technique outperformed the individual brainstorming technique in producing creative solutions. The findings conclude that brainwalking as an informal design technique can be utilised by design teams to effectively ascertain the unhindered benefits of creativity during concept generation.

Table 1. Inductive Coding Schema and Instances from transcript data

Code	Example	Frequency	Recurrence
Wanting Structure	*"Maybe if there was more structure about how the teams move, would have made it easier …"*	22%	3%
Walking	*"… whereas when you're moving around and talking about it, you can get giddy in the idea."*	44%	7%
Time Constraints	*"I think for the individual concept generation task, it does help to have a restricted timeframe, whereas for the team one, maybe it helps to have a longer timeframe."*	33%	4%
Impeding Creativity	*"Yeah, on one hand it was kind of tricky because we've always known showers to be one form factor. It is always a shower coming out of a wall above you aiming at you. So, it was kind of hard to think how you could change that. It's always kind of been the same."*	22%	2%
Facilitating Creativity	*"I think this one (Brainwalking) allows you to be more creative because you're not focused on how many you can get out."*	44%	4%
Group Strengths	*It was definitely easier to build off other people's ideas that were already there, …"*	33%	5%
Group Limitations	*"It took longer to get each idea on paper I think."*	67%	14%
Brainwalking Strengths	*"It's good if you were going to be redesigning something that already exists.*	67%	15%
Brainwalking Limitations	*"… but if you are trying to come up with a new concept or something, I'm not sure it would really work."*	22%	2%
Brainwalking Prompts	*"It definitely helped to have different inspirations, from the group and prompts."*	78%	19%
Brainwalking Flow	*"It was quite difficult to start, but once you got into the flow of it, it was a bit easier to keep the ball rolling."*	56%	11%
Brainstorming Strengths	*"The showers were more realistic ideas."*	56%	11%
Brainstorming Limitations	*"I started with what a shower normally looks like, …"*	33%	3%

Out of the 13 codes, five codes are unique, and eight codes are the complimentary of one another i.e. strengths and limitations. With the unique codes, '*Wanting structure'* refers to instances where participants wanting a formal structure applied to them. '*Walking*' refers to the instances where participants mentioned the inherent nature of brainwalking. '*Time Constraints'* refers to the time constraints impact on the participants experience. '*Brainwalking prompts'* refers to instances where participants reflected on the inspiration sheets provided. '*Brainwalking flow'* refers to the instances when participants commented on the flow of the technique.

For the complimentary codes, '*Impeding Creativity*' and '*Facilitating creativity*' explore the impact of the techniques used on the participants ability to be creative. '*Group strengths*' and '*group limitations'*

explore the impact a group setting had on the techniques used. '*Brainwalking/brainstorming strengths and limitations'* reflect on the aspects of the techniques that impacted on the participants ability to complete the task at hand.

5 DISCUSSIONS

In this section, the authors have detailed the perceptions of the participants to determine the benefits of brainwalking and a suitable Informal technique for team ideation within an educational setting.
From the perspectives of the participants, and in comparison to brainstorming, brainwalking was suggested by participants as producing a greater number of creative outcomes and a more diverse range of outcomes.

5.1 Perspectives on Brainwalking

44% of the participants reflected that brainwalking was a more effective tool in producing creative outcomes. The reasons for this are highlighted by Participants 7 and 4 stating that brainwalking equips designers with tools, such as group work and prompts, to generate concepts for unfamiliar topics. Participants 6 and 1 found the informal nature of brainwalking beneficial, offering freedom from repetition and allowing flexibility in concept quantity, significantly supporting their creative thinking aligning with studies done by Edgecomb [14] and Hamilton [15] stating that when designers lack inspiration [15] or mental imagery [14], they tend to limit their creativity and fixate. All participants noted that brainwalking optimised teamwork by leveraging individual strengths to foster a more creative environment compared to formal techniques.
Participants were able to reflect on brainwalking's limitations; Participant 1 stated that the number of concepts generated within the timeframe was fewer than when using more structured techniques, though they did not relate this to improved quality. Participant 7 suggested that brainwalking is better suited for redesigning existing products rather than creating entirely new ones, in contrast all participants stated that the ideas generated during brainstorming were more realistic and feasible than those from brainwalking, particularly within a limited timeframe. Participant 6 suggested that this was due to the ability to rationalise ideas independently.

5.2 Impact on Creativity

Participants widely acknowledged that brainwalking's collaborative nature fostered creativity by encouraging idea-sharing. Participants 9 and 4 found that working together stimulated their creative processes, while participants 1 and 6 appreciated the informal nature of brainwalking, which allowed them greater freedom in choosing their design focus. Unlike structured techniques, brainwalking facilitated more intentional sketching, emphasising creativity over sheer quantity.
Despite its advantages, some participants noted limitations. Participant 9 felt that brainstorming lacked tools to support creative solutions, while participant 3 suggested that incorporating a design criterion might enhance ideation in brainwalking. Meanwhile, participant 2 experienced pressure to perform in a group setting, which restricted their creative freedom.
Prompts played a crucial role in shaping creative output. While all participants agreed that prompts encouraged novel perspectives on design challenges, participant 1 found certain prompts restrictive, as they felt constrained by specific parameters. In contrast, participants 4, 7, and 9 appreciated the variety, noting that prompts expanded their focus from isolated design elements to the overall user experience.
Overall, participants initially found brainwalking challenging to begin, but once ideas started flowing, sustaining creative momentum became effortless. This suggests that brainwalking is particularly effective in maintaining long-term creative engagement compared to traditional brainstorming.

5.3 Other Contributing Factors

Participants agreed that drawing inspiration from others' ideas made it easier to think of new concepts and sustain creativity. Brainwalking was particularly effective in fostering collaboration, as participants could build upon each other's contributions. However, some limitations arose within group settings. Participants 3, 6, and 9 noted that discussions before sketching reduced the number of ideas generated within the timeframe, and participant 7 suggested that larger groups might struggle with effective communication. Additionally, participant 2 felt constrained by the pressure to perform for the group, which impacted their creative freedom. Time constraints also influenced the effectiveness of the techniques. While participants 3 and 9 found short time limits beneficial for brainstorming, they believed

that brainwalking would be more effective with extended durations. Participant 9 suggested that, given unlimited time, brainwalking could lead to a continuous increase in both the quantity and quality of creative concepts. A key advantage of brainwalking was its incorporation of physical movement. All participants agreed that moving between ideation stations helped maintain engagement and refresh their thinking. Participant 3 specifically linked this movement to fostering imagination, emphasising the importance of physical activity in sustaining creativity.

6 BRAINWALKING RECOMMENDATIONS

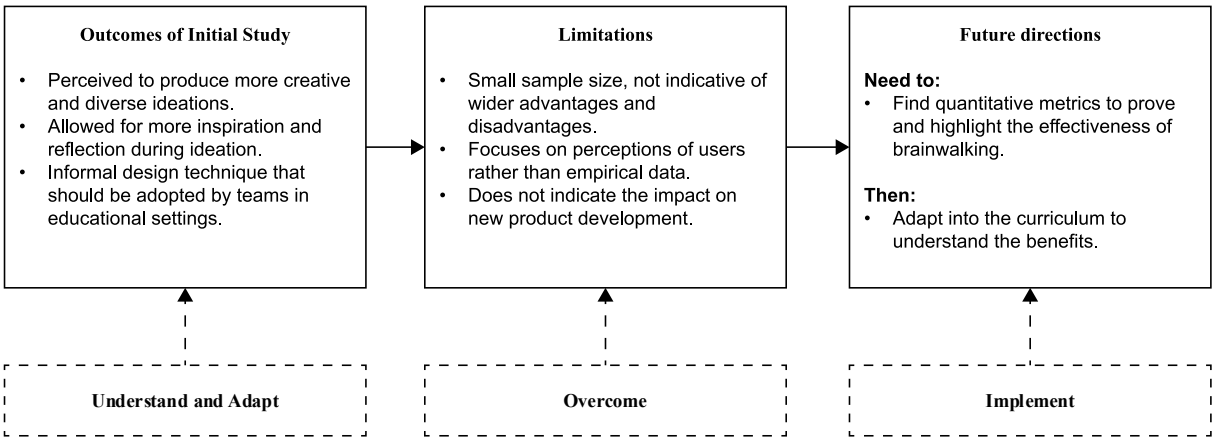

Figure 1. Brainwalking Recommendations

The outcomes of this study are shown in Figure 1. Analysis of the results affirm that brainwalking is a useful informal design technique, enabling design teams to leverage their strengths for high-quality creative outcomes. brainwalking emerges as an effective approach for fostering creativity in design teams. As such, this study recommends that brainwalking should be encouraged for use in design group collaborations, with high merit for inclusion in educational contexts due to its demonstrated efficacy. A key limitation of this study was the small sample size of participants within a single focus group. As a result, the findings cannot be interpreted as a comprehensive representation of all designers' experiences with the techniques. Future research should prioritise expanding participant numbers, potentially through multiple focus groups. Another limitation originates from the subjective opinions of the studies' participants, meaning that the findings are inherently influenced by individual perspectives, potentially introducing bias. Future research should introduce quantitative measures or diverse data sources that could enhance the robustness and reliability of the conclusions drawn from the study.

7 CONCLUSIONS

This research project aimed to investigate the effectiveness of brainwalking as an informal design technique to enhancing the creative outcomes of students working in group collaborations. The experimental work reveals that students reflected on the success of brainwalking to be of equal or greater success and there is evidence that the technique fosters creativity, collaboration, and inspiration among design students. Participants appreciated physical movement, finding it refreshing and engaging, which they linked to enhanced imaginative thinking. They appreciated the visual prompts at each ideation station, which helped them think of the task in ways they otherwise wouldn't have, finding new inspirations to promote their creativity. Moreover, the group work aspect of brainwalking successfully addressed the critical factors for design group success, allowing participants to leverage each other's ideas, skills, and feedback, resulting in more diverse and creative designs. These findings highlight the value of informal methods within design groups, an aspect often overlooked in literature and establish brainwalking as a viable technique that balances informality while facilitating group collaboration, ultimately enriching the collective creative process.

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