Comparing Ideation Techniques for Games Education

SCAMPER, Gamicards, Brainstorming

Mikhail Fiadotau
School of Digital Technologies
Tallinn University
Estonia
fiadotau@tlu.ee

Martin Sillaots
School of Digital Technologies
Tallinn University
Estonia
martins@tlu.ee

ABSTRACT

We conducted a comparative study of two structured (SCAMPER, Playgen AddingPlay card kit) and one unstructured (free brainstorming) ideation techniques, aiming to establish their suitability for game design education. We collected data about the techniques' productivity, ease of use, and enjoyability from 100 participants in 60-minute game ideation workshops. Contrary to expectations, the data revealed no statistically significant differences between the techniques. The unexpected results led us to reconsider some of our starting assumptions, pointing to the complex nature of counting and evaluating ideas. Based on this, the discussion outlines some suggestions for future research into ideation in games education.

CCS CONCEPTS

• Applied computing → Computer games

KEYWORDS

digital games, game design, games education, ideation, creativity

ACM Reference format:

Mikhail Fiadotau and Martin Sillaots. 2020. Comparing Ideation Techniques for Games Education: SCAMPER, Gamicards, brainstorming. In *Proceedings of ACM ICGJ conference (ICGJ'20). ACM, New York, NY, USA, 5 pages.* https://doi.org/10.1145/1234567890

1 Introduction

Modern education has increasingly sought to promote creative thinking in learners, recognizing that such thinking is not an innate ability and can be developed. Yet, actually developing it is no trivial task. Indeed, innovative and original ideas are not always present even in spheres that may appear inherently creative, such as game design. Students in game design programs, for example, often fall into the trap of trying to recreate their favorite games rather than coming up with original ideas [13]; even as they become industry professionals, some, to quote game designer Randy Smith, "accidentally make a career out of being a fan" [5], perpetually paying homage to established classics. Generating original ideas gets even more challenging under pressure, for example, when one is working on a limited time frame during a game jam or a short-term student project.

Thankfully, various methods exist that aim to facilitate idea generation, many of which are employed by game designers in professional and game jam contexts [7,8]. But what specific techniques should be taught to aspiring game designers in the classroom? And is there any actual evidence that structured techniques yield better results in the context of game creation?

To find the answers to these questions, we conducted a series of workshops introducing two approaches to idea generation—the Playgen AddingPlay card kit and SCAMPER, a universal ideation technique—as part of an intensive course on educational game design. We aimed to investigate how productive, easy to use, and rewarding the techniques are compared to each other and to regular brainstorming. Our hypothesis was that both SCAMPER and Playgen cards would show improvement over brainstorming in terms of ease of use, number of ideas generated, and user enjoyment. We also hypothesized that SCAMPER may be somewhat more difficult to use due to not providing ready-to-use prompts. To verify these hypotheses, we created a survey, which we used to collect feedback from the workshop participants. This short paper provides an overview of our process, findings and the reflections they produced.

2 Theoretical background

Definitions of creativity are elusive [4,10]. It is not just that we cannot agree on its underlying mechanisms; there is no consensus even as to *where* creativity is to be found. The term "creative" may be used to describe ideas and things (e.g. computer games) or people.

Even if we limit the discussion to human creativity, there are two fundamentally different ways to understand its nature. One can be called the domain-centric view and focuses on the interpersonal, cultural, and field-specific dimensions of creativity, viewing it as an emergent social phenomenon rather than an individual cognitive process or skill. This view is exemplified by Csikszentmihalyi's systems model of creativity, which regards the creative process as an intrapersonal phenomenon that emerges out

ICGJ'20, August, 2020, Osaka, Japan
 978-1-4503-0000-0/18/06...$15.00
https://doi.org/10.1145/1234567890

of interactions between talented individuals, a field of experts in a particular area, and the broader cultural domain [3]. The other understanding, conversely, can be called the creator-centric view and approaches creativity as an individual process that largely happens in the mind of a person: Arthur Cropley, for example, describes creativity as a "'style' of applying intelligence" characterized by openness, flexibility, and playfulness [2]. This is not to say that the second understanding ignores the social and interactional dimensions of creativity: it is widely accepted that creativity is an incremental process building on existing accomplishments in the field [12], as well as that social interactions and group activities such as brainstorming can benefit it, including in education [6].

There is, additionally, a distinction between "big C Creativity" and "small c creativity": the former refers to the visionary, groundbreaking work of a genius, while the latter focuses on smaller, situational manifestations of ingenuity and unconventional problem-solving [12]. Whether the cognitive mechanisms underlying these two kinds of creativity are the same or different is a matter of debate, but with regard to "small c" creativity at least, most experts agree that it is to some extent present in every person and can be developed further [4]. The two major constituent parts of "small c" creativity are ideation, i.e. the ability to generate new ideas, and evaluation, which is needed to contextualize the created ideas, analyze their strengths and shortcomings, and select the most promising ones [11]. Ideation is thought to rely primarily on divergent thinking (freely exploring multiple solutions), whereas evaluation mostly involves convergent thinking (analyzing ideas in a logical way).

Various ideation techniques exist that can help structure the creative process and break idea generation down into operationalizable steps. Some of these (such as brainstorming) are widely known and practiced; others are more specialized. Some are individual techniques, while many others are designed for group ideation. Some do not require any props; others are card-based or use physical items such as building blocks. Peters, Loke, and Ahmadpour have suggested that ideation techniques can belong to one or more of the following types: methods, prompts, components, concepts, stories, embodiment, and construction [9].

The use of ideation techniques in education is widespread, as is research into them [1,4]. Several studies also exist that examine ideation in the context of game design, ranging from research into professionals' ideation practices in the game industry [8] to discussions of how new ideas are generated during game jams [7]. These studies have confirmed that "ideas do not come about by accident" and game creators employ a wide range of both formal and idiosyncratic ideation techniques; at the same time, they point to the lack of formal training on ideation as a challenge for game design program graduates when they enter the industry [8].

It is at the intersection of these two fields, game design and education, that research into ideation remains something of a lacuna. Some game design textbooks cover the practicalities of game ideation [5], but there has been little attempt to date to study individual techniques and their application in games education.

3 Methodology

The starting point for this study was the need to choose which ideation techniques to cover in an intensive course on learning/serious game design, during which participants would pitch and select game ideas, form teams around them, and create game prototypes. We decided to incorporate an activity that would give students first-hand experience of a specific technique, while explaining several more in brief. A plethora of options were available to choose from: individual and group techniques, general and game-centered techniques. Ultimately, we decided to split students into groups and try two techniques in parallel. The first one was SCAMPER, a universal ideation technique that enables the creation of new ideas based on existing products through a set of basic operations (Substitute, Combine, Adapt, Modify/Magnify, Put to Another Use, Eliminate, Rearrange/Reverse) [7]. The second technique was Playgen AddingPlay, a "gamicard" product: a card game specifically designed to facilitate game ideation by offering randomized prompts of four types: game mechanics, social mechanics, victory conditions, and motivators. This particular pair of techniques were chosen because of their contrasting nature: the former is universal in scope and based on modifying existing ideas, whereas the latter focuses on games and aims at generating entirely new ideas from randomized elements.

Each technique was introduced through a 60-minute workshop. The first five minutes were spent explaining the technique and the structure of the workshop; participants were also grouped semi-randomly (some participants wanted to stay in the same group, which was accommodated); group sizes varied between the workshops, but were between three and six participants. After that, participants were given prompts to work with and had 10 minutes to ideate individually; they were then asked to discuss their ideas in groups for 15 minutes and select one to present (each participant was instructed to keep track of how many ideas were generated). Following that, groups were given 20 minutes to develop their ideas for presentation in class, covering such aspects as learning/serious goal, entertainment goal, genre, challenges/mechanics, target audience, and selling point. After that, each group presented their idea briefly (2–3 minutes). For the Playgen group, participants chose a card of each of the four types at random (they were allowed to change one card and trade one more with another team); for SCAMPER, participants were given a number of existing digital and non-digital games (chess, Monopoly, *Snake, Breakout, Super Mario Bros, Civilization, Minecraft, The Sims*) as optional prompts and asked to apply any of the SCAMPER operations as they deemed fit. In a later iteration, we decided to introduce a control group, which was asked to brainstorm without receiving any prompts or guidance on the process; other than that, the format remained the same: 10 minutes for individual ideation, 15 minutes for group discussion, and 20 minutes for idea refinement.

After the workshops, participants were asked to fill out short paper questionnaires (the intensive nature of the course made it difficult to collect more extensive feedback). In line with established practice in creativity and ideation research [10,11], our

approach to evaluating the results was based on participants' self-assessment; we did not want to impose a rigid set of criteria defining what good ideas are or to use expert evaluation, both due to practical limitations and to the fact that such experts would not be familiar with the "baseline" levels of creativity and game experience displayed by the diverse body of participants. The questionnaire contained the following questions (Question 7 was not asked of the brainstorming group):

1. *How easy was it to come up with new ideas?* (5-point Likert scale; 1=very easy .... 5=very difficult)
2. *How much did you enjoy the ideation experience?* (5-point Likert scale; 1=not at all … 5=greatly)
3. *How many ideas did you generate?* (number)
4. *How many of those did you like?* (number)
5. *How many ideas did your team discuss?* (number)
6. *How many of those did you like?* (number)
7. *Did you find the technique useful*? (yes/no)
8. *Any additional comments?* (freeform text)

Overall, 100 responses were collected from a diverse sample of continuing education and university-level students from various nationalities, including Estonia, Greece, Spain, Turkey, and the UK. No demographic information was collected, however. The participants had varying degrees of familiarity with gaming and game design, but most had had little formal training in the subject. The responses were grouped by the ideation technique; arithmetic means were calculated for the numeric values. A one-way analysis of variance was then used to determine whether there were statistically significant differences between the groups.

4 Results

Our initial hypothesis was that structured ideation techniques would be easier to use, more enjoyable, and more productive than unstructured brainstorming. However, the data offer no support for that. Of the three approaches, SCAMPER was in fact marginally more difficult to use, but ANOVA found no statistically significant difference between them ($F(2,81)=0.95$; $p=0.39$). Likewise, the reported levels of enjoyment were marginally higher in the Playgen and SCAMPER groups compared to regular brainstorming, but not in a statistically significant way ($F(2,81)=0.29$; $p=0.75$). Contrary to our expectations, members of the brainstorming group reported generating the most ideas, but the difference approached statistical significance without reaching it ($F(2,81)=2.46$; $p=0.09$). The reason behind the slightly higher number of ideas generated by the brainstorming group could have to do with the fact that, without being constrained by specific prompts and methods, members of that group could rely on existing game ideas they may have been waiting for an opportunity to pitch; it could also be due to brainstorming being a well-established and familiar technique that participants could readily use without additional cognitive effort. It is notable that the standard deviation for Question 3 was very high due to a large variation in the number of reported ideas: some participants claimed to have produced as many as 11, while others came up with 1–2 (one Playgen user, in fact, did not come up with any).

	Playgen (N=40)	**SCAMPER** (N=38)	**Brainstorming** (N=22)
1. Difficulty	2.35 (SD=1.30)	2.71 (SD=0.95)	2.64 (SD=1.14)
2. Enjoyment	3.84 (SD=1.13)	3.90 (SD=0.87)	3.69 (SD=1.21)
3. Own ideas	3.09 (SD=2.43)	3.03 (SD=1.72)	4.18 (SD=2.86)
4. Liked own ideas	2.03 (SD=1.53)	2.06 (SD=0.97)	3.09 (SD=1.85)
5. Group ideas	1.79 (SD=0.92)	2.31 (SD=1.38)	2.14 (SD=1.49)
6. Liked group ideas	0.83 (SD=0.65)	0.76 (SD=0.33)	0.84 (SD=0.42)
7. Useful?	96% yes	92% yes	-

Figure 1: Results of the ideation workshop questionnaire

Curiously, the sole statistically significant difference was between the number of their own ideas that participants liked ($F(2,81)=4.40$; $p=0.02$). A Tukey HSD was conducted, which confirmed that the brainstorming group reported liking significantly more of their own ideas than both the Playgen ($p=0.02$) and SCAMPER ($p=0.03$) groups. This in part has to do with the higher total number of ideas the brainstorming group generated, but the percentage of liked ideas was also higher (74% compared to 66% for Playgen and 68% for SCAMPER). This may relate to the fact that participants in the Playgen and SCAMPER groups were constrained by the prompts and procedures of these structured techniques, whereas the brainstorming group was free to ideate without these constraints; additionally, there is again the possibility that respondents in the brainstorming group were relying on (and had grown attached to) their pre-existing ideas.

The numbers of group ideas discussed and those of them the participants liked were not significantly different between the groups. Notably, the number of group ideas that participants reported liking is below one for all three groups. This statistic is problematic, since some respondents chose to use fractions (such as 0.5) in their responses, presumably to indicate that they *partly* liked one of the ideas. However, the fact that all three groups averaged less than 1 for Question 6 indicates that some group members may have been unhappy with the discussion and decision-making in the group, feeling that their own ideas and input were not given enough consideration. Similar frustrations have been reported in other studies of group ideation [8].

Overall, then, the data suggest no clear advantage to using structured ideation techniques over unstructured brainstorming. At the same time, the vast majority of respondents in both Playgen and SCAMPER groups felt that these techniques were useful for game designers. Their free-form feedback largely supports this, with "good," "helpful," and "fun" being recurrent terms. The feedback was not, however, universally positive. Some participants felt frustrated that the exercise was too short and thought they were not given enough time; this criticism was particularly common in the SCAMPER group, suggesting that it is a more time-consuming technique. Several participants, especially in SCAMPER and Playgen groups, lamented that ideation was challenging due to their limited exposure to digital games. One Playgen user said they wished "the cards would be easier to use," while a participant in the SCAMPER group pointed out that,

while the approach provided some initial answers to the prompts, "some answers bring more complicated questions."

5 Discussion

The discrepancy between our initial hypotheses and the results—SCAMPER and Playgen offered no improvement over unstructured brainstorming and were not significantly different between each other—led us to revisit some of our initial assumptions and research design choices. We came to realize, for example, that asking people to keep track of their ideas is inherently problematic due to vast individual differences in how people approach ideation: some will come up with a small number of ideas and think each of them through, while others will generate many ideas without considering any of them deeply. Some respondents may also be more experienced with ideation or perform better under a time constraint, and existing knowledge of games, which is an asset in this activity, varied significantly between the participants. The biggest challenge, perhaps, lied in the lack of clarity as to what constitutes a separate idea. If one came up, for example, with two variations of the same basic idea (e.g. "*Minesweeper* with physical walking in virtual reality" and "*Minesweeper* with physical walking in augmented reality"), would that count as one or two ideas? It is no surprise, in short, that the numbers of individual ideas participants reported were so dispersed. A longer, more structured introduction could have addressed some of these challenges by providing a shared set of guidelines to follow, but a 60-minute workshop offered no time for such an introduction.

The selected approaches themselves proved largely incommensurate: Playgen AddingPlay gives its users a specific set of prompts to work with, whereas SCAMPER is much more open-ended and requires more initial cognitive effort and, accordingly, more time. Designing comparable workshops that follow symmetric procedures for the three approaches was for this reason problematic. Indeed, several groups in the Playgen workshops did not use the full 10 minutes allocated for individual ideation and jumped to group discussion instead, which suggests that the prompts created by the cards made the initial ideation much faster. Unstructured brainstorming, which was meant to function as a control group, did not entirely fit that bill: brainstorming is, after all, an ideation technique in its own right—just one that is well-established and familiar to many.

The survey did not examine the qualitative side of the ideas, reducing them to numbers and participants' self-evaluations. But it is in this absent qualitative aspect that interesting differences could have come through. On an anecdotal level, the facilitators noticed, for example, that SCAMPER tended to produce ideas for high-concept games describable in one sentence: "Monopoly, except you have to donate as much money to charity as possible," "*Snake* combined with a quiz, where you have to 'eat' the right answer to grow," and so on. By contrast, Playgen ideas were more elaborate and less easy to summarize. Both types of ideas could be used to create a game, but comparing and assessing them is problematic. The respondents' self-evaluations did not follow any set criteria, effectively boiling down to how self-critical they were; asking them to reflect on *what* they liked (or did not) about their ideas could have been more informative.

Another concern is that the reported enjoyment levels may have been affected by the facilitators' personalities and presentation. In addition to the authors, several graduate students acted as workshop facilitators, with each facilitator possessing a different teaching style and a different level of commitment to the time allocation and overall schedule (often, groups were so engaged in discussion that it was difficult to interrupt them and force them to start presenting).

The participants' varying degrees of familiarity with digital games and the domains of serious games and game-based learning, which the course focused on, suggest that instead of a one-size-fit-all approach, a more differentiated and context-specific approach could be used. To this end, we have developed the Digital Learning Games Idea Generation Machine (http://dlg.tlu.ee/), a randomized idea generator for educational games, which delivers prompts (and optional additional information) for game genre, target audience, serious goal, game design element, and learning theory. The effectiveness of this solution will be investigated in future research.

6 Conclusion

Our data suggest that there is no significant difference between structured and unstructured ideation techniques in games education in terms of enjoyment, productivity, and ease of use. It could be that idea generation is inherently enjoyable regardless of the specific technique used, while the other factors have more to do with the ideator's background and experience with games.

At the same time, it is difficult to generalize the findings from this initial survey. Its utility perhaps lies rather in the fact that it challenges several simplistic assumptions about ideation (ideas can just be counted; participants' self-evaluation of ideas can be compared across different techniques; etc.), which we had started the project with. A study with a deeper qualitative focus may have yielded more insights into the ideation process. Conducting such a study, however, presents a considerable challenge in the context of an intensive course, which affords little time for collecting data—or, for that matter, a game jam where the participants are focused on delivering a game in a short span of time. Possible solutions could involve recording and analyzing the idea pitches later, doing a focus group interview with the facilitators rather than the participants, or adopting a participatory observation approach and joining the ideation teams.

ACKNOWLEDGMENTS

We would like to thank Magnus Moar and Penda Tomlinson of Middlesex University London for their support in running the pilot workshop for this study, as well Tanja Välisalo of the University of Jyväskylä for thought-provoking discussion on the role of ideation in games education. We are also grateful to our graduate students at Tallinn University for helping conduct the workshops: Manisha Khulbe, Toshifumi Sasaki, Melik Demirel, and Betül Sünter.

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