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STRATEGIES FOR STIMULATING CREATIVITY IN DESIGN EDUCATION

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ABSTRACT
Designers are increasingly challenged by demands defined by environmental concerns, technological optimization, logistics and functional efficiency. In order to handle this complexity, designers have to be academically trained in a relevant manner, and we understand that relevant methodology in design education is a key issue. The diversity of these different aspects - from an abstract philosophical, ideation and conceptualization level, to a concrete detail solving one - requires an ability to grasp flexibly the nature of the actual problem. Academically, these challenges are addressed in different ways in design schools worldwide. In our institution, The Institute of Design (IDE), an effort has been made to explore and evaluate the effects of different design methods as part of our educational training during the foundation study. The starting point was: How can we -in order to make design students mentally 'flexible'- stimulate and thereby improve design student's creativity through the execution of different stages of a product design process? A set of different design projects and workshops with divergent focus areas was provided to first year design students. The thematic divergence in these activities has produced a valuable body of experience, which seems to articulate a firmer understanding of which pedagogical structure works well. A key factor here is mental elasticity, or the ability to mentally fluctuate between a convergent and divergent thinking through the design process. This paper presents and discusses the experiences gained from these design projects in relation with this theory.

Keywords: Strategy, creativity, process, mental elasticity, idea stimulus

1 INTRODUCTION

1.1 The scope
The scope and reference of this paper is the foundation level courses of our Master study in industrial design. IDE is part of a specialized university, and each class of typically 25 students is organized in a separate studio. After having evaluated the student submissions over the last years, we realize that the student's level of commitment and creative performance during their individual assignments has been insufficient. Our experience is that the students were not willing to take sufficient risk when working through their practical exercises, both on an abstract, conceptual level, and a fragmented, detail level. This recognition inspired us to investigate the student potential further on. How can we stimulate the opposite - a risk-willing attitude? Our philosophy suggests that industrial design is innovation driven, so we acknowledge a highly relevant need to investigate this theme and to develop new tools for stimulating creativity in our design education. One cannot fail to see the increasing demand for designers who must be able to grasp the increasing diversity and complexity of future markets. Our mission is to strengthen the student's ability to perform as motivated and conscious professionals in this context. Future designers may not only provide relevant solutions to decision makers but also influence the future by holding philosophical and ideological stances themselves.

1.2 Definitions
When discussing terms like creativity, innovation, entrepreneurship and related terms, one easily faces a multitude of different comprehensions, dependent on professional context and background. Being in the midst of daily instruction of our students, the terms 'creativity' and 'innovation' are often objects of mixed comprehensions. In our academic context the term *creativity* could be defined as the design student's ability to generate and produce genuinely new ideas, suggestions and solutions, and to

communicate and disseminate these results in a descriptive manner, custom made to the intended recipient. These results should be provided in such a manner that the very core of the result -in the end- is clearly comprehended by specific target groups, as well as decision makers outside academia, holding corporate key positions.

2 BACKGROUND

2.1 The research field

Within the field of creativity, a large amount of theory is found. Perhaps the best known method is the process of brainstorming. A well known source for creative thinking, Alex F. Osborn, also called the 'father of brainstorming', provided The Creative Problem Solving Process CPS, also known as the Osborn-Parnes CPS process [1], developed in collaboration with Sidney J. Parnes. What makes CPS so particularly interesting is its approach. The reason why the Osborn-Parnes CPS process distinguishes itself from other creative problem solving methods is the use of both convergent and divergent thinking during each step of the process, and not just when generating problem solving ideas. Each step begins with divergent thinking with a broad search for a multitude of alternatives. This is followed by convergent thinking, enabling the process of critical evaluation and selection. Basically, our approach in design methodology supports this theory. Another dominant contributor within the field of problem solving methods is Horst Geschka [2] who categorizes the different creativity methods into five basic categories of technique; free association, confrontation, structured association, combination and imagination. According to Geschka, people with a certain creative potential have a set of abilities in common, being the foundation for creative thinking; association, abstraction, combination, variation and mental movement of different structures between areas without any relations. Creative techniques or idea generating methods represent formal heuristic principles –or independent thinking. Principles for generating ideas intuitively are: association and structural movement. Other principles, supporting a more systematic-analytical nature are: Variation, combination and abstraction. In his book 'Slagkraft' 2007 [3], Erik Lerdahl suggests that there is no contradiction between working systematically, and thinking in a free and associative manner. This paper supports our attitude, because creative methods definitely prove useful in the development of new thoughts. Donald Norman [4] suggests that different modes of learning need to be accommodated in the design of instruction; Needs - Analysis – Design requirements / specifications - Ideation process - Conceptualization process - Design – overall- and detail process – Visualization – Dissemination. This approach accords with our own understanding of the critical stages of the design process.

2.2 Selecting a method

One has to distinguish clearly between organized creativity sessions for a group of students, and the individual creative process performed by each student during a design assignment. Another important recognition regarding creativity is that, as students are individuals with individual properties and abilities, there is no such thing as an ideal method to stimulate creativity. Our experience shows that the real challenge is to choose an appropriate method in accordance with the specific constraints of the design assignment, being dependent on context and situation. Some students are rational, while others have a more artistic attitude, and this has to be taken into consideration when facilitating a creativity session. Generally, when facing a conceptual problem, a method stimulating a holistic view often seems appropriate - typically brain-storming processes. When facing a concrete problem, a method stimulating a fragmented view often seems appropriate - typically brain-writing processes. This relates to Edward De Bono's [5] theory which discusses the power of lateral thinking in developing new ideas.

2.3 Group dynamics

One important aspect playing an impact when stimulating creativity in group mode is the fact that this is a collective environment. A reference to this is found in the theory of group dynamics and group processes. As a field of study, group dynamics has roots in both group psychology and sociology. An intriguing aspect of this body of theory is the view of a social group as an entity. This entity has qualities that somehow cannot be understood just by studying the individuals who together make up the group. As teachers, we have to be sensitive to these mechanisms. The history of group dynamics - or group processes- has a consistent, underlying premise: The whole is greater than the sum of its

parts. Gestalt psychologist Max Wertheimer [6] identified this fact, stating that there are entities where the behaviour of the whole cannot be derived from its individual elements nor from the manner these elements fit together. Our observations support this, by acknowledging the often impressive outcome of group collaboration, making a result that never could have been produced by individuals.
When it comes to the theory of group dynamics, designers –or artistic-oriented professionals- have generally a quite low index when compared to typical group behaviour because of their tendency of being quit self-sufficient and their rather high level of professional self-awareness. It seems that undergraduate students on first year level has not yet developed these typical characteristics, each individual being too young and too un-experienced to have matured and developed sufficient personal self-awareness or strong influence from their professional environment.

2.4 Premises for group creativity

When discussing the potential of a creativity session, the terms and conditions for carrying out this session is critical for its outcome. There are certain rules that should be considered when staging a creativity process. Basically, in order to gain valuable results from creativity sessions, one has to facilitate the session in such a way that each individual's potential is released, by encouraging free expressions. In terms of group dynamics each class develops its own internal set of social codes or norms established and supported by dominant or loud speaking individuals in the class. These codes or norms tend to either limit or support individuals thinking 'out of the box'. Gustav Le Bon [7] suggests that social action refers to an act which takes into account the actions and reactions of individuals or 'agents'. Part of our theory is the assumption that creating a stimulating and creativity-supporting atmosphere in a studio, builds on a positive, collective attitude in class, which we have tried to establish.

3 MENTAL ELASTICITY AND IDEA STIMULUS

3.1 Mental elasticity as phenomenon

One way of understanding mental elasticity as a phenomenon (figure 1), is to imagine how one may handle graphic information in a digital map, where one is able to zoom in and out, using a digital device, as different layers of information are either revealed or hidden depending of magnification.

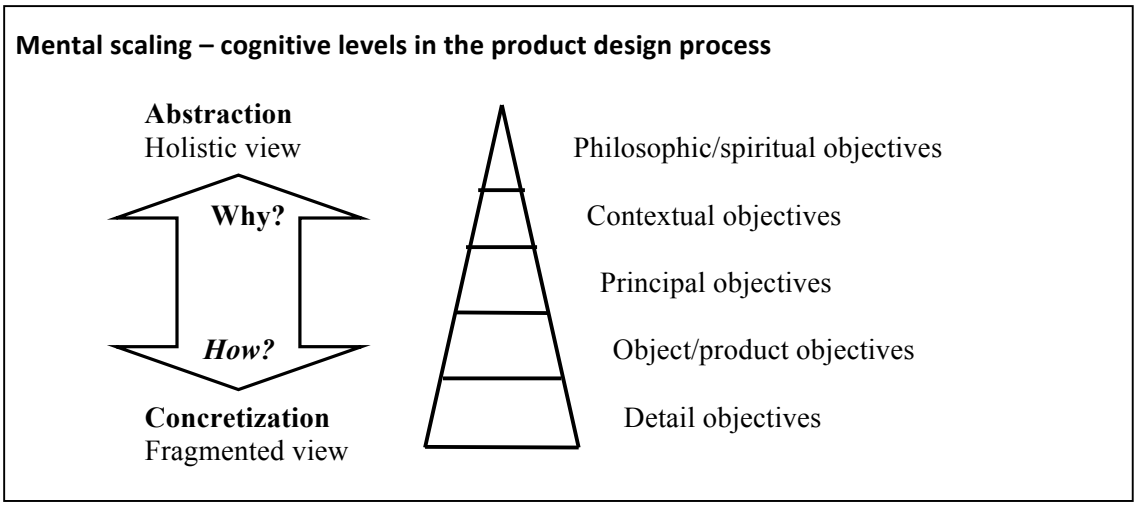

Figure 1. Mental scaling – cognitive levels in the product design process

Another description of the term mental elasticity is mental scaling, which in this case is the student's ability to change mindsets between a broad divergent thinking, and a convergent search for a solution, when being in a creative process. This paper supports the idea that *each step* of this mental shifting is needed throughout each phase of the design process. A problem can be cognitively challenging, being interpreted as a philosophical problem or even an attitude issue. Conversely, the problem may be physically oriented, as its response may require actual artifacts or physical attributes. The theoretical framework for mental elasticity is found in the theory of creativity and cognitive psychology. Eysenck, M. W. and Keane, M. T. [8], discuss mental scaling influenced by reasoning and decision making, and the dilemma of choosing alternative courses of actions. Another theoretical reference is found in

theory of the trial and error method for innovative problem solving, where Yuri Salamatov [9] acknowledges the importance of incorporating the rules of dialectic thinking into the theory of creativity. This supports our theory of the importance of relevant instructions in teaching. When being engaged in instructing and teaching industrial design students, we always try to make the students recognize that design problems may lie at different levels on a mental "ladder" or framework. A given design problem requires - and corresponds - with a search for a design solution on the similar mental level. This asks for a practical tool for organizing these issues, and the principle of mental elasticity seems to address this need.

3.2 The design cases

By recognizing a need for both for divergent, conceptual thinking, and convergent, detail approach during the design process, we decided to define the student assignments on an abstract, conceptual level, demanding a wide ideation process, through the conscious use of semi-abstract terms:

- **Object for flattening textile** - the word *iron* was never used
- **Object for drying hair** - the word *hair dryer* was never used
- **Object for cutting wood** - the word *electric saw* was never used

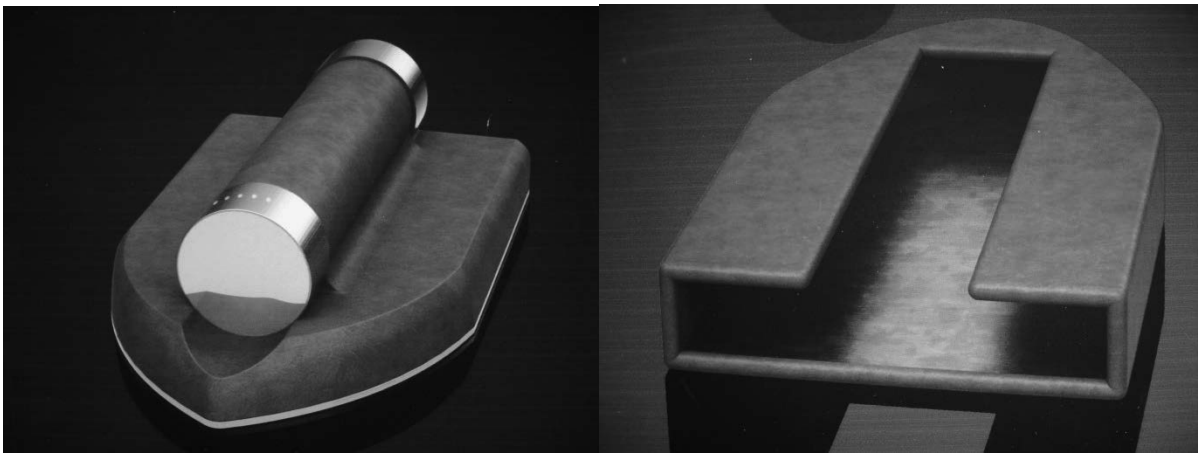

Figure 2. Result of a creativity session; leather coated iron with pouch

3.3 Idea stimulus - examples

In order to apply this mode of using semi-abstractions as idea triggers, the use of form characteristics - more specifically antonyms - has been explored. These antonyms were deliberately chosen in order to stimulate free associations with opposite values and the shifting between opposite mental positions:

- Form based antonyms: geometric-amorphous, dynamic-static, active-passive, stable-unstable etc.
- Value-based antonyms: hot-cold, friendly-dangerous, inviting-repellent, relaxed-tense etc.

In figure 2, an example is shown from one of the student submissions where a leather coated iron with a pouch was designed as result of a creativity session where a radical approach to both function and use of unusual materials –using the 'forced relations' method- was carried out. This solution is in contrast to regular irons and represents a new way of utilizing materials in new contexts.

4 STUDENT CAPABILITY

4.1 Student capability parameters – group mode

After having facilitated creativity sessions both in group and individual mode during the last years, we have defined a set of parameters which have emerged during the assignments. These parameters have proved relevant as criteria to be considered for evaluating the effect of our creativity sessions:

4.1.1 Physical parameters for creative thinking

- Mission – what is the challenge or task
- Facilities – do the surroundings stimulate creative thinking? Room, temperature, light, colours etc.

- Number - of participants, too few, too many?
- Age span - distribution of age, too narrow age-gap between participants?
- Sex – tendency, majority of male/female or an even mix?

4.1.2 Psychological parameters for creative thinking

- Background – diversity of heritage and environmental background, ethnicity, cultural influence
- Personality – diversity of psychosocial capabilities, span of divergent personality characteristics
- Constraints - a pre-agreed limitation / map of the field of search for solution
- Inspiration – stimuli to develop a new mindset / new thinking
- Catalyst/stimuli – triggers to perform / taking action, making new suggestions
- Attitude – level of personal conformity versus opposition
- Cognition - potential of cognitive reasoning
- Mental elasticity – ability to fluctuate between divergent and convergent thinking
- Courage – ability and willingness to confront or being in opposition to conventions

One example of how inspirational parameters can influence the end result is visualized in fig. 2, where a certain stimuli was given to develop a new mindset applying a 'forced relations' thinking to materials, or rather breaking the chain of logical relations between materials know from existing products. The material leather was 'forced' into an un-natural context being an iron with pouch. This rather interesting suggestion would not likely be produced without dissolving the constraints of the task by a certain level of opposition to conformity as well as a certain level of personal courage.

4.2 The chain of related abilities - individual mode versus group mode

Relating to creativity sessions in group mode and individual mode, it seemed useful to develop a model for comparing the relevant premises necessary for a successful outcome, each factor being dependent of the previous (figure 3). A relevant suggestion (output) is not possible without thinking in an appropriate mode and spending the necessary amount of time. Thinking in the right mode builds on a certain level of opposition or challenging mindset. This oppositional or challenging mindset seems not obtainable without individual courage or enthusiasm. Courage and enthusiasm builds on a certain catalyst/stimulus (input). Sufficient stimulus/catalyst is not obtainable without the appropriate surroundings. Choosing the right environmental conditions -facilitation- is not possible without knowing the exact scope or constraints of the specific task and the field of problem.

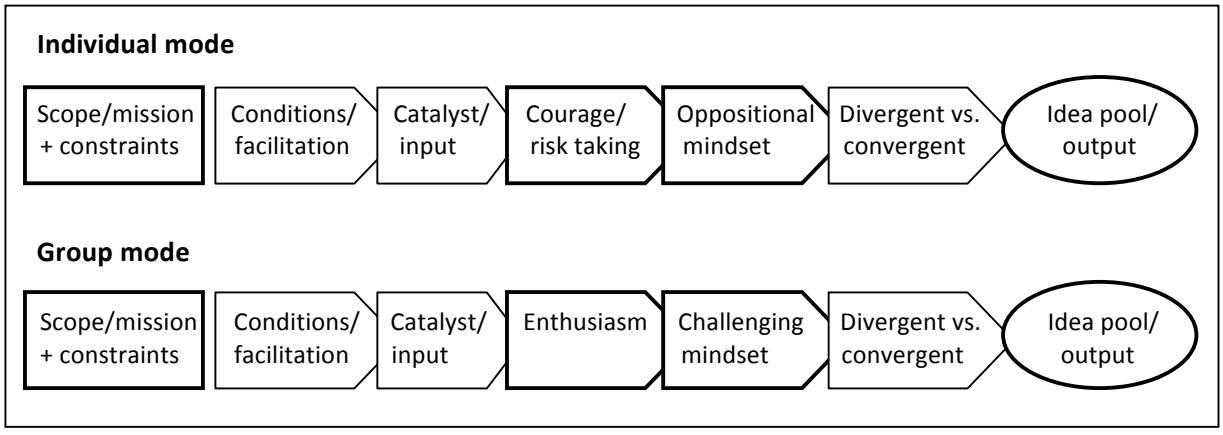

Figure 3. The chain of related abilities in individual mode versus group mode

5 RESULTS AND REFLECTIONS

5.1 Output of the research

When examining our efforts retrospectively, we believe that some of our core intentions have been answered. We have explored the parameters which seem critical for triggering the necessary courage and enthusiasm needed for developing mental elasticity and risk-taking as idea-generating abilities.

- In individual mode, a critical premise for creativity is a *risk- taking* mode, which demands the establishment of an oppositional state of mind, dependent on personal courage. This is a

consequence of and relating to the individual, personal responsibility, being the nature of individual assignments.

- In group mode, an opportunistic state of mind and level of courage seems less critical, due to the nature of a group session lacking the personal pressure and responsibility; quantity means less pressure, and more confidence and comfort.

A fruitful outcome of the creativity group session is dependent on building a *collective* enthusiasm.
The quality of the produced outcome -the idea bank- is only measurable against the defined problem definition. The level of enthusiasm will more or less indicate the qualitative level of the produced outcome of the session. However, we acknowledge that neither enthusiasm nor courage as phenomenon is lightly to be measured in a scientific manner. We have not been able to actually qualitatively measure courage as phenomenon in depth. In particular, we acknowledge that thematic divergence through the assignments is crucial, in order to force consciously the students into mental fluctuations, rather than allowing each student to dwell with themes which suit their own personality and interest best. Our strategy to provide practical exercises both on abstraction and fragmentation level proved fruitful in breaking personal boundaries during assignments, as well as for fluctuating between divergent and convergent problem solving. If all of the abilities in figure 3 are supported in group mode, our experience suggests that the group is likely to produce a substantial number of suggestions. Our experience also indicates that the use of mood triggering stimuli, like movies, music, humour, physical exercises and shifting environment, has proven supportive to this mood, aiming at thinking in a free and associative manner. Referring to student parameter characteristics and group dynamics, a diverse group of people with mixed backgrounds in general seem to produce a broader spectrum of ideas and a richer idea-bank than a homogenous group of people seem to do.
When it comes to the theory of group dynamics within group psychology, our survey suggests that our group of undergraduate students in first year level are too young and with a limited amount of self-awareness and professionalism to clearly comply with the characteristics of artistic and creative professionals. Therefore, the theory of group dynamics is not clearly applicable to our group of design students, because they still lack a sufficiently strong influence from their professional environment.

6 FUTURE DISCUSSION; STRATEGIES FOR STIMULATING CREATIVITY

The challenges to designers seem to increase, and the design tasks seem to develop into increasingly complex and multi-disciplinary fields of practice. Strategies for stimulating creativity in academia seem to be more important than ever, and critical factors for stimulating courage and risk-taking must be raised as an important discussion. Is it possible to qualitatively describe and measure courage as a phenomenon? Do others have experiences from conscious stimulation of mental elasticity? We invite educational trainers from other institutions to comment on our thoughts and to forward their own experiences from other approaches to providing strategic tools for creativity and to discuss these theories further on.

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