Reimagine, redesign and transform

Enhancing generation and exploration in creative problem finding processes in visual arts education

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CHAPTER 5

THE RELATIONSHIP OF GENERATION AND EXPLORATION ACTIVITIES WITH ORIGINALITY OF VISUAL ARTS DESIGNS

1. INTRODUCTION

In visual arts, learning to become original implies one has to know, to a certain degree, what is novel, relevant and surprising in this constantly changing field of art. In a previous study (Chapter 4), we found that both visual generation and visual exploration explained differences in the originality of visual arts products. This outcome confirmed earlier findings of Getzels and Csikszentmihalyi (1976) that visual exploration was related to the originality of visual arts designs. More detailed insight into visual exploration activities as constructive perception (Suwa, 2003) and into the relationship of these activities with the originality of visual arts designs is needed to provide insight into how to improve learning and instruction in visual arts. In this study, we examined to what extent exploration activities, and generation activities within each type of exploration, explain differences in the originality of visual arts designs of Grade-11 students.

2. THEORETICAL FRAMEWORK

2.1 *Originality in visual arts*

Art, as Armstrong (1998) argued, can be perceived as a space of imagination, of reflective enquiry, of purposeful play and invention. In visual arts, artists continuously transcend and transform categories (Hammershøj, 2014) and visual artworks can therefore be presented in different and sometimes unexpected forms: as a conceptual work, a performance, or as a process of explorative inquiry (Smith & Mathur, 2014). Visual artists – as explained by Van de Vall (2008) – aim to continuously elicit new aesthetic experiences and to generate new meanings through their artworks. This reasoning explains why originality is considered one of the driving forces in art due to which art changes constantly. Originality in visual arts has been related to activities that combine, restructure and transcend conventional ways of thinking and designing, visualizing and perceiving (Suwa, 2003; Verstijnen, van

Leeuwen, Goldschmidt, Hamel, & Hennessey, 1998a). Therefore we agree with other authors (Boden, 2004; Bresson, 2004) that originality in visual arts can be defined as transformed concepts or emotions that were visualized in a radical innovative way. About transformations in art, South African painter Dumas (2012) explained: 'Art is there to remind us, that all laws about what is beautiful and valuable, were made by humans and can be changed by them.'

2.2 *Generation and exploration in visual arts*

In visual arts, designing an original product starts with problem finding, i.e. defining and constructing a problem as the longitudinal study on visual arts students at college level by Getzels and Csikszentmihalyi, (1976) has shown. They discovered that artists using a problem finding approach, produced art works that were more original compared to artists using a different approach. The problem finding process demands *conceptual* generation towards an original concept to visualize and *visual* generation towards an original concept to visualize. For *Conceptual generation* we follow the definition of Runco (2008) which means that conceptual generation is thinking in many, different directions towards an original idea. *Visual* generation we split into two types of generation activities. First, *envisioning*, which means mentally representing an idea or image to be visualized in an art product (Efland, 2004). Second, *visual perception*, which includes sensorimotor activities such as perceiving existing images that may provide inspiration for an original image to be further explored (Ellamil, Dobson, Beeman, & Christoff, 2012).

In addition to both types of generation two types of exploration activities are also important in problem finding processes (Getzels, 1975). *Conceptual exploration* is experimenting with existing concepts that were generated to construct novel concepts for an original visualization, for example through combining or abstracting concepts for designs. *Visual exploration* is experimenting with images that were generated to construct novel *visual designs* through, for example combining or abstracting in sketching. Visual and conceptual exploration activities include explorative activities in *association*, but especially in *combination* and *abstraction*.

2.3 *Matrix of generation and exploration activities*

During creative processes in visual arts, different generation and exploration activities may interact. Generation and exploration activities can be categorized and then organized along two dimensions: *Remoteness*, the more remote the ideas and images, the higher the chance of an original outcome and, *Abstractness*, the more abstract the concepts and visual designs, the higher the chance of an original outcome. From this we constructed a matrix of four categories of generation and three categories of exploration, resulting in 12 combinations of generation and exploration activities (Appendix D).

Generation. In line with Benedek, Könen, and Neubauer (2012) we define generation towards original ideas or images as less or more remote from a certain stimulus.

Based on literature on different ways of generating, we distinguish four types of generation activities that can be organized along the level of remoteness: (1) *incremental thinking*, (2) *flexible thinking*, (3) *remote thinking* and (4) *synthesizing thinking*. The level of *incremental thinking* is on generating through knowledge retrieval and involves step-by-step thinking. Incremental thinking indicates a low level of remoteness, due to generating ideas that are rather close to a certain stimulus (Ross, 2006). The level of *flexible thinking* indicates generating via switching between different semantic or visual categories (Nijstad, De Dreu, Rietzschel, & Baas, 2010). The level of *remote thinking* means generating from an entirely different perspective, which is more remote from a stimulus compared to incremental thinking and flexible thinking and it often involves mental leaps (Perkins, 1994; Ross, 2006). Finally, the level of *synthesizing thinking* indicates generating a combination of very remote ideas or images through analogical thinking, based on envisioning and more specific, on combining these remote ideas or images through mental blending (Benedek, et al., 2012; Boden, 2004).

Exploration. In line with literature on different types of cognitive activities in creativity by Hunter, Bedell-Avers, Hunsicker, Mumford, and Ligon (2008); and by Soderberg, Callahan, Kochersberger, Amit, and Ledgerwood, (2014) we grouped exploration activities towards original ideas into three types: A) *association*, B) *combination* and C) *abstraction*. These types vary in the level of abstractness, running from concrete to abstract.

Exploration usually starts at the level of A) *association*, in which images and ideas explored are related to existing images and ideas and therefore are relatively concrete *(associate freely,* A1*)*. These existing images and ideas are reimagined through envisioning or through images perceived and selected, and these can be flexibly connected *(associate flexibly,* A2*)*. But these existing images and ideas are not redesigned, even though mental leaps in association might lead to novel associations through *dissociation* (A3) or *bisociation* (A4), they remain related to concrete ideas and images (Benedek, et al., 2012).

At the level of (B) *combination,* envisioned or concrete concepts and/or images are constructed from parts of existing concepts and/or images generated. These concepts and images are visually constructed and re-formed. This re-forming can be done through progressive step-by-step construction, i.e. *adapting* (B1) just one visual element or through *merging* (B2) different images into one, through *recombining* (B3) more remote aspects or functions, or through synthesizing by *reconnecting* different contexts. In combination, re-formed designs are abstracted from reality to some extent: by an adaptation in form or materials, or by reconnecting different contexts (Ludden, Schifferstein, & Hekkert, 2008).

Finally, at the level of (C) *abstraction*, concepts and images explored did not exist before (for the designer and/or in the field of art and design). Activities at the level of abstraction are the most complex ones of conceptual and visual exploration, because a creator has to think at a deep, structural level (Boden, 2004). Concepts or images are *constructed conceptually* (C1), or *deconstructed* (C2), or *restructured* (C3), or *transformed* (C4). *Transformation* may lead to the highest chance of origi-

nality in visual arts, yet it is also the most complex activity. In line with Boden (2004) we understand transformations to be radically novel, original concepts and visual designs that could not have been thought of before by a designer. Because of the complexity involved in abstraction, externalization through for example sketching, as Verstijnen et al., (1998b) showed, may be needed to restructure and transform ideas and images into original visual arts designs. Series of preliminary sketches, intermediate products or portfolios are therefore important sources for studying activities in generation and exploration in visual design processes as Jaarsveld & van Leeuwen, 2005 also demonstrated.

Exploration in visual arts. Exploration has been related by Suwa (2003) to a very specific *visual* type of activity, called *constructive perception*. By constructive perception an idea or image generated is further explored, using external information from the design process. In constructive perception, visual perception is one of the driving forces: Once a specific external visual effect – that was unintended – is detected, it then drives further visual exploration using visual design strategies as *adapting (B1)* colours, shapes or materials, or *recombining (B3)* different forms or functions or *restructuring (C3)* a composition, to express a specific concept in a visual design. According to Suwa (2003), constructive perception demands of a visual designer to be self-aware of the ways in which his or her own visual perception underlies a specific interpretation of a design and to arrive at novel interpretations, it is important to find novel ways to detect unintended specific perceptual features of a design that may evoke novel interpretations. Constructive perception therefore demands skills in visual perception and refined procedural knowledge and skills acquired through experience in visual designing, on how and when to use visual principles as composition, form, light, space as visual materials and techniques to *transform* (C4) a specific concept or emotion into an original visual art design.

2.4 *Purpose of this study*

In the current study, we examined generation and exploration activities in creative visual arts processes in the context of secondary education. Referring to the matrix in Appendix D, we were interested in the relationship of types of exploration activities and generation within each type of exploration, with the originality of visual art designs.

This means that we focus on (simultaneous) occurrence of the three levels of exploration, and to what extent activities in exploration were remote from the stimulus, since we expect that the more *remote* ideas and images are, the more these will explain differences in originality of visual art designs. Our research question was:
"To what extent do students' exploration activities explain differences in the originality of the visual art designs?"

3. METHOD

3.1 *Participants*

Eleven students (10 females, Grade-11, aged 16-17) from one secondary school class of visual arts education participated. They attended optional visual arts education in studio art production as an exam subject at pre-university level. Students and their parents provided their passive consent to participate. These participants attended a project of a semester in the pre-final school year with one 100-minute lesson of studio art production a week. The first author was their teacher. In the first seven weeks of the project – during the problem finding process – we collected 283 portfolio pages from these students' visual art portfolios. Each portfolio page contained one or more images and one or more texts, or only images or only texts. Then the 283 portfolio pages were structured into 196 portfolio-events based on indications from the students, which portfolio pages formed one unit. These portfolio-events were used as coding units.

3.2 *Procedures*

Procedure data collection. In the first seven weeks of a regular arts curriculum project of a semester, students worked individually on their problem finding process to create an original visualization of the theme 'Tech*no*bodies & Sensorium'. This theme involved the relationship between (digital) technology and the human senses in contemporary art, focusing on students' reflections on the role of embodied experiences in a digitalized society. Students were invited to generate as many, different kinds of original ideas or images for visualizing this theme in their problem finding process.

Portfolio-events. Each week during the lesson, students were asked to document their problem finding processes in portfolios. These portfolios were A4 format dummies with written and visualized pages with students' brainstorm ideas and images such as collages, visual experiments and sketches or design experiments, evaluations and reflections. After eight weeks, the teacher photographed all portfolio pages (N=283). Students were then asked to indicate which portfolio pages formed one particular event, which resulted 196 portfolio-events (147 events with images and 49 events with texts only) that were used as input for the analyses. Prior to coding and analysis portfolio-events were anonymized

Lessons and assignments. Students were familiar with the use of portfolios to document their creative processes, i.e. their ideas, images and written reflections on the theme of 'Tech*no*bodies & Sensorium'. No teacher evaluation took place, as we wanted to observe and describe students' actual problem finding processes without any interference by the teacher or influence of grading.

Student reflections. At week three and seven of the problem finding process, all students participated individually, without a teacher present, in a thinking aloud reflection on the first part of their problem finding process, using their portfolio as stimulus. These sessions were videotaped and transcribed. Transcripts of students'

reflections were used as supportive materials for coding students' exploration activities. To provide background information in addition to students' reflections, in week seven, the teacher orally described each problem finding process of every student based on the portfolios.

3.3 *Measures*

Exploration activities. Exploration activities were coded as documented in portfolio-events. Each event was separately coded for each of the three levels of exploration: *association, combination* and *abstraction*, since we wanted to include simultaneous occurrence of the three types of exploration. For each of levels, the level of remoteness was coded. This level of remoteness was understood as generation activities at four levels: 1= *incremental*, 2= *flexible*, 3= *remote* and 4= *synthesizing*. Absence of a particular level of exploration was indicated by a 0.

Three visual art teachers including the first author, coded each portfolio-event for each of the three levels of exploration, indicating the level of remoteness of each of them (see Appendix D). The first author explained this matrix of generation and exploration activities to the other two raters. The three teacher-raters received all subsets of portfolio-events, arranged per student (in random order and anonymized) and in chronological order. Each rater had a different order of students to prevent rating-effects. They also received supportive material, transcribed reflections from the students (from week 3 and 7) and transcribed descriptions of the portfolio-events by the teacher (from week 7). In two pilot rounds, a set of three events were coded independently by each rater for each of the three levels of exploration. Afterwards, ratings were discussed, and rules for coding were adapted, for example we considered the theme of Tech*no*bodies and Sensorium as the *given stimulus* from which students started their associations and used this to code the levels of remoteness in association. Then, in five sessions of approximately three hours all 196 events were coded by the three raters.

The final scores that were used in the analyses were the scores of rater 1, except if both other raters had the same score that differed from rater 1. In that case, the scores of the other raters were used. The association between the raters' scores and the final scores used in the analyses was satisfying: for *association* with a Spearman's ρ of 0.76 (rater 1), 0.60 (rater 2) and 0.61 (rater 3), for *combination* a Spearman's ρ of 0.87 (rater 1), 0.68 (rater 2) and 0.77 (rater 3); and for *abstraction* Spearman's ρ of 0.88 (rater 1), 0.60 (rater 2) and 0.54 (rater 3).

Originality of visual arts designs. The originality of each visual arts design was established by the results from a Comparative Judgement exercise in the Digital Platform for the Assessment of Competences (www.d-pac.be). Thirteen expert raters (visual arts teachers) were provided with distributed randomly drawn pairs of portfolio-events (only events with visual designs, N=147) and were asked to indicate which one evidenced a higher originality of visual arts design. In total, 2193 comparisons were made. Subsequently, data (wins-losses) were analyzed using joint maximum likelihood analysis (Linacre, 1998; Wright & Panchapakesan, 1969), re-

sulting in a rank order of portfolio-events and a logit score for each portfolio-event. This logit score reflects how much more likely it is that a portfolio-event will receive the higher originality score compared to an average portfolio-event for this group of events (i.e. the reference/0 point of the scale is close to the mean of the logit scores).

The reliability of the rank order was calculated using the Scale Separation Reliability (SSR; Bramley, 2015), which indicates to what degree the score distribution is not due to measurement error (Andrich, 1982; McMahon & Jones, 2014). A minimal measurement error implies that the relative position of the items on the scale is quite fixed (Andrich, 1982). The SSR for the rank order resulting from 2193 comparisons was 0.849 indicating an acceptably high internal consistency of the rank order (Jones, Swan, & Pollitt, 2015), especially taking into account that a non-adaptive algorithm is used (Bramley, 2015).

We subsequently inspected Judge Infit measures (Lesterhuis, Verhavert, Coertjens, Donche, & De Maeyer, in press; Pollitt, 2012) to determine whether any assessor deviates from the group consensus by making judgements which are at odds with the eventual rank-order. One judge was identified to misfit and the comparisons from this judge were omitted. For the remaining 2024 comparisons from 12 expert raters, the rank order was calculated anew, resulting in a slightly higher reliability level (SSR= 0.852). The re-estimated logit scores for the portfolio-events, reflecting the originality of visual arts design, are used in the analyses as dependent variable.

3.4 *Data analysis*

We performed multi-level regression analyses to examine the relationship between the level of exploration (association, combination and abstraction) and originality of visual arts design of the same event. In these analyses, the 147 portfolio-events were included with images only). For each level of exploration, four categories were included in the analyses referring to the level of remoteness with 0 (absence) as reference category. Three types of models will be presented. First, in a variance components model (Model 0) the variance components were examined of portfolio-events (level 1) and student (level 2). Secondly, in one model per level of exploration activity (*association, combination* and *abstraction*) the relationship of that particular exploration activity and originality of the portfolio-events was estimated (Models 1a, 1b and 1c). Thirdly, in a final model (Model 2) the three levels of exploration were included in one regression analysis.

4. RESULTS

The results are presented in Table 1. The results of the variance components model (Model 0 in Table 1) indicate significant differences between portfolio-events ($\sigma^2 e_{0ij}$), but not between students ($\sigma^2 u_{0j}$). This means that the originality in our sample seems to vary on the level of portfolio-events only. The variance partition coefficient (Goldstein, 2003) equals 0.89, which means that 89% of the variance in the

originality of visual arts design of portfolio-events is due to differences between events.

Models 1a, 1b and 1c show significant relations between the level of remoteness of activities for each type of exploration and the originality of visual designs of portfolio-events. Model 1a shows that for association, the most remote activities, *dissociate* (A3) and *bisociate* (A4) are significantly related to originality, explaining 2% of the variance at the event level. Model 1b shows that all categories of combination, *adjust* (B1), *merge* (B2), *recombine* (B3) and *reconnect* (B4), are significantly related to the originality of portfolio-events, explaining 5% of the variance in originality at the event level. Finally, model 1c indicates that all categories of abstraction, except for *construct conceptually* (C1), are significantly related to the originality of portfolio-events with 5% explained variance in originality at the event level.

The final model (Model 2) that included all three types of exploration shows that two types of exploration activities, Abstraction and combination, are significantly related with originality of visual design of portfolio-events. For combination, the more remote activities – *adjust* (B1), *merge* (B2) and *recombine* (B4) – are, the more original an event. For abstraction, the more remote activities – *restructure* (C3) and *transform* (C4) – are, the more original an event. All relationships are positive, except for *construct conceptually* (C1). The later means that the less students construct conceptually, the more original an event is. In total, 31% of the variance in originality at the portfolio-events level is explained by these exploration activities showing the importance of combination and abstraction for the originality of visual art design. None of the four categories of association were significantly related with originality in visual design of portfolio-events. From the regression coefficients and standard errors indicated in Model 2, we can see that the lowest levels in terms of remoteness of combination, *adjust* (B1) and *merge* (B2), and the highest level of abstraction, *transform* (C4) show the strongest relationship with the originality of the visual design of the portfolio-events.

5. DISCUSSION AND CONCLUSIONS

5.1 *Discussion*

We examined which exploration activities could explain variance in the originality of visual art designs as documented in portfolio-events. To examine this, we coded for all events for three types of exploration – *association, combination* and *abstraction* – the *level of remoteness* ranging from 1 to 4. We found that three categories in combination, *adjust* (B1), *merge* (B2) and *recombine* (B4), and two categories in abstraction, *restructure* (C3) and *transform* (C4), explained 31% of variance in originality of visual designs of portfolio- events.

Table 1. Multilevel regression analysis with association, combination and abstraction as independent variables and originality scores on portfolio-event level as dependent variable (N=147)

	Model 0 Variance-components	Model 1a Association	Model 1b Combination	Model 1c Abstraction	Model 2 Final
	B (s.e.)	*B (s.e.)*	*B (s.e.)*	*B (s.e.)*	*B (s.e.)*
Constant		-1.903 *0.722*	-1.366 *0.249*	-0.514 *0.140*	-1.889 *0.621*
Fixed effects					
Abstraction (reference category=0; *n*=74)					
Construct conceptually (C1, *n*=25)				n.s.	-0.626 *0.268*
Deconstruct (C2; *n*=22)				0.621 *0.276*	n.s.
Restructure (C3; *n*=17)				0.876 *0.321*	0.947 *0.421*
Transform (C4; *n*=9)				1.745 *0.421*	2.245 *0.549*
Combination (reference category=0; *n*=26)					
Adjust (B1, *n*=34)			1.167 *0.309*		1.247 *0.293*
Merge (B2, *n*=43)			1.228 *0.295*		1.296 *0.292*
Recombine (B3; *n*=31)			1.499 *0.326*		1.039 *0.363*
Reconnect (B4, *n*=13)			1.580 *0.424*		n.s.
Association (reference category=0; *n*=3)					
Associate freely (A1, *n*=14)		n.s.			n.s.
Associate flexibly (A2, *n*=34)		n.s.			n.s.
Dissociate (A3, *n*=63)		1.682 *0.735*			n.s.
Bisociate (A4, *n*=33)		2.053 *0.756*			n.s.
Random effects					
Level 2 (student) $\sigma^2 u_{0j}$	0.127 *0.107*	0.069 *0.079*	0.063 *0.072*	0.003 *0.046*	0.094 *0.076*
Level 1 (portfolio-event) $\sigma^2 e_{0ij}$	1.593 *0.193*	1.512 *0.183*	1.374 *0.166*	1.417 *0.171*	1.094 *0.133*
2*loglikelihood (IGLS Deviance)	493.440	483.123	469.085	468.641	438.595

Note: N= number of students included in the model; '*s.e.*'= standard error. Only significant fixed effects (with α=0.05) are printed; non-significant effects are printed with 'n.s.'

The univariate models with either *association*, *combination* or *abstraction* activities generally indicated that the more remote exploration activities were, the more the visual designs of the portfolio-events were rated as original. These univariate effects can be related to the findings from other studies with respect to the particular exploration activities. With respect to *association*, in the study of Benedek et al., (2012) higher levels of remoteness in association, i.e., *dissociate* (A3) and *bisociate* (A4) were found to be related to higher originality of *ideas* generated. The findings from our study add similar conclusions for *visual* art designs. With respect to *combination*, Finke, Ward, and Smith (1992) and Gilhooly, Fioratou, Antony, and Wynn (2007) demonstrated the importance of remoteness in *combination*, to arrive at original ideas and images. However in our findings all categories of remoteness in combination seem to be important. For example, combining through merely *adjusting* (B1) visual features is less remote, but was also found to be related to originality of visual designs, as were the other categories of combination. This is in line with findings on visual design strategies using adaptations of existing forms with new materials only (Ludden, et al., 2008). With respect to *abstraction*, the importance of externalized (visual) explorative activities for creating original visual designs is in line with studies of Suwa (2003) and Verstijnen et al., (1998a; 1998b). These studies also showed that creative discoveries in *visual design* – i.e. rich, colourful, complex, effective imagery (Schlegel, et al., 2015) – benefit from externalizations and for exploring at a deep and, structural level.

5.2 *Limitation*

This study focused on the relationship between exploration activities and the originality of visual art designs in a problem finding process of creative design. An issue might be that we have coded the level of remoteness within each of the three types of exploration. Alternative methods could have been to provide two scores – one for the level of generation and one for the level of exploration – or to provide one score which refers to one category from the matrix about generation and exploration. However, in both cases this would exclude simultaneous occurrence of the three types of exploration. This more detailed analysis of exploration activities –- probably at the expense of a more detailed analysis of generation activities – is in alignment with the findings of our earlier study (Chapter 4 from this thesis) in which the importance of exploration activities for the originality of visual art designs was established. Moreover, comparing these different levels of exploration seemed to be important, since findings by Finke et al., (1992), Jaarsveld and van Leeuwen (2005), Suwa (2003) and Verstijnen et al., (1998a; 1998b) all indicated exploration activities in both combination and abstraction were related to the originality of a visual design.

5.3 *Ideas for future research*

To produce originality in visual designs, a visual designer also needs self-awareness to control his or her own creative visual arts process, i.e. find ways on when and how to persist in focused attention, while preventing fixedness on conventional ways

of representing and on when and how to be flexible and open minded, to detect seemingly 'irrelevant' external visual-sensory information that may lead to original ideas or images. Cognitive processes involved in creativity may therefore be related to different generation and exploration activities. We expect there may be differences in the way different cognitive processes are related to either *conceptual* or *visual* generation and exploration activities. For example, Zabelina Colzato, Beeman, and Hommel (2016) showed that the process of cognitive control (i.e., focusing, goal directed behaviour, concentration), is important to deliberately go beyond the usual through inhibition of dominant uses. These authors also showed the importance of cognitive flexibility as an alternative route to arrive at original ideas or images. Cognitive flexibility means flexible switching between either opting for a goal directed strategy, or opting for automatic processes and accept internal self-generated thought or external visual-sensory information. Insight from further (empirical) studies into the relations between these cognitive processes and the way these may support generation and exploration activities in specific ways, may be important for improvement of learning and instruction in creativity. These kinds of studies may provide new ways in which to differentiate learning activities and pedagogical activities to optimize learning in visual arts education for every individual student. Based on the type of strategy a student often uses, he or she could be stimulated – for example through explicit metacognitive strategy instruction (Van de Kamp, Admiraal, & Rijlaarsdam, 2016) – to use a different strategy. In this way, students who are often using a goal-directed strategy in exploration that is less remote, may be stimulated to conduct exploration activities that are more remote (i.e., either try to dissociate or bisociate). These association activities might subsequently lead to explorative activities in more remote categories in *combination*, in casu to *recombining* or *reconnecting* in order to arrive at more original ideas.

In future research, effects of different types of instruction on students' generation and exploration activities could also be examined. Enhancement of students' skills in generation and exploration has been demonstrated before, for example through observational learning (Groenendijk, Janssen, Rijlaarsdam, & Van den Bergh, 2013b) or through explicit strategy instruction (Van de Kamp, Admiraal, & Rijlaarsdam, 2016). Both types of instruction, seem to support students' metacognition, through observational learning of modeling of creative activities in generation and exploration, reflection of these observations and explicit instruction on metacognition about strategies in divergent thinking. But these studies did not examine effects on both conceptual and visual generation and exploration strategies. Yet these types of instruction might have the potential to trigger both types of generation and exploration strategies and consequently the originality of visual designs.

5.4 *Concluding remarks*

Originality – one of the major driving forces in visual arts – aims at the production of original conceptual or visual ideas for a design through generation and aims at the actual production of original visual designs through exploration. In this study, we

examined to what extent exploration activities could explain differences in the originality of visual designs. Our conclusion is that the three levels of exploration activities are of major importance in explaining differences in originality of visual arts products, with in general the more remote the exploration activities were, the more original the visual art design.