REIPE Revista de Estudios e Investigación en Psicología y Educación

eISSN: 2386-7418

2024, Vol. 11, No. (2)

DOI:https://doi.org/10.17979/reipe.2024.11.2.10672

Influence of mental image and creativity in the artistic process through strategies of unpredictability

Influencia de la imagen mental y la creatividad en el proceso artístico a través de estrategias de imprevisibilidad

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Abstract

This study focused on the field of imagination and creativity in the classroom by proposing a creative learning experience to a group of 92 fine arts students. Following a theoretical reflection on strategies of unpredictability in artistic creation, participants were asked to develop an artistic project in which chance intervened at some point in the creative process. Our objective was to evaluate the influence of image control, creative thinking, and creative experiences on the realization of an artistic project. Two expert judges measured the originality, the elaboration, and the total score of each project. The results demonstrated the importance of mental imagery and creative thinking in artistic creation. Image control and creative thinking influenced the originality of the project. It can be interesting to develop creative learning experiences that involve imagination and creative thinking in the classroom. In addition, future research work is proposed.

Keywords: mental image; image control; creative thinking; creative experiences; artistic strategies.

Resumen

Este estudio se centra en la imaginación y creatividad en el aula mediante una experiencia de aprendizaje a un grupo de 92 estudiantes de bellas artes. A partir de una reflexión teórica acerca de las estrategias de imprevisibilidad en la creación artística, se solicitó a los participantes del estudio la creación de un proyecto artístico donde el azar intervenga en algún momento del proceso creativo. El objetivo que nos hemos planteado es evaluar cómo influye la capacidad de control de imagen, el pensamiento creativo y las experiencias creativas en la realización del proyecto artístico. Dos jueces expertos midieron la originalidad, la elaboración y la puntuación total de proyecto. Los resultados ponen de manifiesto la importancia de las imágenes mentales y el pensamiento creativo en la creación artística. El control de imagen y el pensamiento creativo influyeron en la originalidad del proyecto. Se anima a los docentes a plantear en el aula experiencias de aprendizaje creativas que impliquen la imaginación y el pensamiento creativo. Además, se proponen futuros trabajos de investigación.

Palabras clave: imagen mental; control de imagen; pensamiento creativo; experiencias creativas; estrategias artísticas.

The role of mental imagery in creativity is well known (Denis, 1990; LeBoutillier & Marks, 2003). Researchers highlight the potential of mental imagery to overcome the limits of the perceptual process, in creating objects, situations, or projects with greater flexibility and fantasy (Busca et al., 2021, Kosslyn et al., 2006, Mareovich, 2022). The findings of May et al. (2020) provide some support for the idea that domain-specific creativity can be enhanced by developing skills in the use of mental imagery to produce novel ideas and that this also enhances domain-general flexible thinking. This is proven by the use of mental imagery in the design of new products (Busca et al., 2021; Dahl et al., 1999), or to benefit the creative process (Vellera & Gavard-Perret, 2016).

Anyone can use their capacity for imagination (Finke, 1990), but visual artists are clear examples of its use in creating their work (Varnedoe, 2006). They must often conjure up images (image activation) and they must modify these images as they plan their works (image manipulation). Building on this premise, Drake et al. (2021) examined how fine arts students performed on three image activation tasks: vividness of visual images, recognition of out-of-focus images, and imagining the underlying structure of a drawing (abstraction). In addition, utilising a mental rotation task, they examined the ability to manipulate images. The results confirmed that art students excelled on vividness of visual images and abstraction.

In a series of works Pérez-Fabello and cols. (Pérez-Fabello, 2020; Pérez-Fabello & Campos, 2007a, b, c, Pérez-Fabello et al., 2014, 2016) studied different types of mental image abilities in groups of fine arts students, comparing these skills with artistic exercises or academic performance in the fine arts degree. Thus, Pérez-Fabello and Campos (2007a) examined the influence of artistic experience on the mental image capacity of fine arts students. The authors compared first and last year undergraduate students on the basis of their performance in 2 tests of visual imagery capacity and 3 drawing tests involving representation, transformation of spatial relations, and visual memory. Students who had undergone a longer period of art training performed significantly better on all 5 tests. The results indicated that art training can improve imaging capacity. In addition, they found that students' image vividness capacity had an influence in the execution of an artistic exercise related to spatial skills and spatial manipulation (Pérez-Fabello & Campos, 2007b). They also demonstrated the significant influence of image control on the completion of a drawing exercise focused on the pictorial representation of space. Participants with high scores on the image control test obtained significantly higher scores on the artistic exercise assessment (Pérez-Fabello et al., 2014).

The results of studies on academic performance were not as consistent. Pérez-Fabello and Campos (2007c) assessed the relationships between image vividness and image control and artistic academic performance in drawing, painting, sculpture, and complementary

subjects. Image control correlated with academic performance in fine arts in all areas studied. However, Pérez-Fabello (2020) found no significant correlation between object or spatial image processing and academic performance in academic blocks of painting, drawing, or sculpture. However, it has previously been shown that the object-image cognitive style is preferred by fine art students over the spatial or verbal cognitive style and that the object-image cognitive style influenced the results of a fine art exercise that was evaluated by expert judges (Pérez-Fabello et al., 2016).

Chance, as a method of artistic creation, has marked 20th and 21st century art. Different authors have reflected on the methods used by artists to distance themselves from the work (Apostolou, 2019, 2021; Apostolou et al., 2022; Ham, 2009, Malone, 2009; Susik, 2016). Malone (2009) in her exhibition "Aesthetics of Chance" presents the dynamic tension between chance and control in the works of artists whose creative processes involved chance throughout the twentieth century. The use of chance or other types of unpredictability implies a limitation of the artist's control in the creative process. For example, for Ham (2009) the Dadaists renounced control to emphasise the absurd, while the Surrealists surrendered conscious control to connect with the unconscious, the part of the mind resistant to control. Susik (2016) notes that the methods of the Dadaists pitted chaos against control, as opposed to the Surrealists who reduced artistic agency to a passive role. Apostolou (2021) considers that the use of processes involving unpredictability, which were considered novel by the avant-gardes of the 20th century, is today integrated into the creative processes of contemporary artists, but a system of studying them together was needed. For this, based on the study of works and creative processes of contemporary artists from 1970 to 2020, he created a classification system of the different types of unpredictability, which are often grouped under the term chance. These types of unpredictability can affect the artistic creation depending on their source and the stage of the creative process in which they are introduced. The objective was to analyse the tension between control and unpredictability in the creative process of contemporary art by identifying different strategies for limiting control.

Lopata et al. (2022) based on research in cognitive science and the neuroscience of creativity promote the notion that creative modes of thinking are legitimate and important learning objectives supporting creativity. Given that creativity is a 21st century educational priority (Newton & Newton, 2014, Setiamurti et al., 2024, Zulkifli et al., 2022), it seems necessary for educators to begin to consider how to design learning experiences that support it. Moreover, creative exercises involve the development of higher-order skills according to Bloom's taxonomy, which considers creativity as superior to evaluation within the cognitive domain (see, Cuenca et al. 2021). Furthermore, we believe that imagination plays a crucial role in reorganising previous information and creating a new pattern or structure (Busca

et al., 2021, Kosslyn et al., 2006, Mareovich, 2022). Thus, the aim of this study was to assess how image control capacity, creative thinking, and creative experiences influence the development of a creative project involving the aforementioned strategies for limiting control in the creative process, such as the use of chance. The independent variables were image control ability (individuals high and low in image control), creative thinking (students high and low in creative thinking), and creative experiences (subjects high and low in creative experiences). Originality, elaboration ratings, and the total score of the art project were used as dependent variables.

Method

Participants

The sample consisted of a total of 92 undergraduates, of which 66 were women, and 26 were men in their second year in the Fine Arts degree. The mean age was 19.95 years, (*SD* = 1.93), range 18 to 29 years.

Instruments

The participants were given the following tests: To measure image control we used the Spanish version (Pérez-Fabello & Campos, 2004) of the Gordon Test of Visual Imagery Control (Gordon Test) (Richardson, 1969). To measure creativity, we used the scale Something About Myself (SAM) from the Khatena-Torrance Creative Perception Inventory (KTCPI, Khatena & Torrance, 1976), and the Spanish version (Sánchez-Bernardos & Avia, 2004), of the Creative Experiences Questionnaire (CEQ, Merckelbach et al., (2001).

The Gordon Test

The Gordon Test (Richardson, 1969) measures participants' ability to control visual imagery and consists of 12 items in which individuals are asked to imagine a car in various colours, positions, and states of motion. They are then asked to rate each response on a 3-point scale where "no" is scored 0, "unsure" is scored 1, and "yes" is scored 2. The total score ranges from 0 to 24 points. Higher scores indicate better image control. Pérez-Fabello and Campos (2004) obtained a Cronbach's alpha of .69.

The Creative Perception Inventory

The Creative Perception Inventory (KTCPI, Khatena & Torrance, 1976) is a test of creative perception consisting of two independent scales: the “What Kind of Person Are You?” (WKODAY) and the “Something About Myself” (SAM). The SAM was used, which consists of 50 questions measuring different dimensions of creative personality through six scales: Environmental Sensitivity, Initiative, Self-Affirmation, Intellectuality, Individuality, and

Artistic Ability. We used the total scale score. Cronbach's alpha was .79 (Khatena & Torrance, 1998).

The Creative Experiences Questionnaire

The Creative Experiences Questionnaire (CEQ, Merckelbach et al., (2001) measures fantasy propensity through 25 statements that participants have to answer "yes" if it applies to them or has happened to them, or "no" if it does not apply to them or has not happened to them. The maximum score is 25. Merckelbach et al. (2001) obtained a Cronbach's alpha of .89.

Procedure

We presented a learning experience based on a reflection about strategies involving unpredictability in artistic creation supported by a slide presentation. The theoretical presentation lasted 10 minutes. Subsequently, the participants were asked to propose an artistic project in which unpredictability intervened at some point in its process. The participants were allowed 25 minutes to complete the task. Two factors of the project were measured, its originality and its elaboration. These factors are two of the four subcategories proposed by Torrance in his test of creative thinking (Torrance, 1966; i.e. fluency, flexibility, originality, and elaboration), and are all still used as measures of creativity (Hirshfield & Koretsky, 2021; Hui & Juho, 2022; Runco & Acar 2012).

Originality was assessed in terms of the novelty and relevance of the project on a scale of 1 to 10. Elaboration counts the number of significant details, giving one point for each detail that helps explain the project. Both factors are evaluated independently by two artists with extensive experience and professors from the Faculty of Fine Arts (University of Vigo, Spain). The degree of agreement between them was .99 for originality and .95 for elaboration (see two examples of art projects in the Appendix).

During one of their regular classes participants were given a folder containing the ad hoc test on unpredictability strategies in art, the Control Test, the SAM, and the CEQ. The "ad hoc" test was conducted first, and then the participants completed the image control test and the two creativity tests. These three tests had their own written instructions and no time limit. The total time taken was approximately 55 minutes. All students were assured their results would remain anonymous and confidential and written informed consent was obtained from each participant.

The study was conducted in accordance with ethical rules contained in the Declaration of Helsinki of 2013 and was approved by the authors' university ethics committee (protocol number: 0001-F-2022-03-25).

In order to divide the participants into high and low on the Control Test (Mean = 21), the SAM (Mean = 33), and the CEQ (Mean = 12), the mean score on each test was taken

into account. Participants who scored above the group mean were considered high in image control ability, creative perception, and creative experiences; and participants who scored below the group mean were considered low in image control ability, creative perception, and creative experiences.

Data Analysis

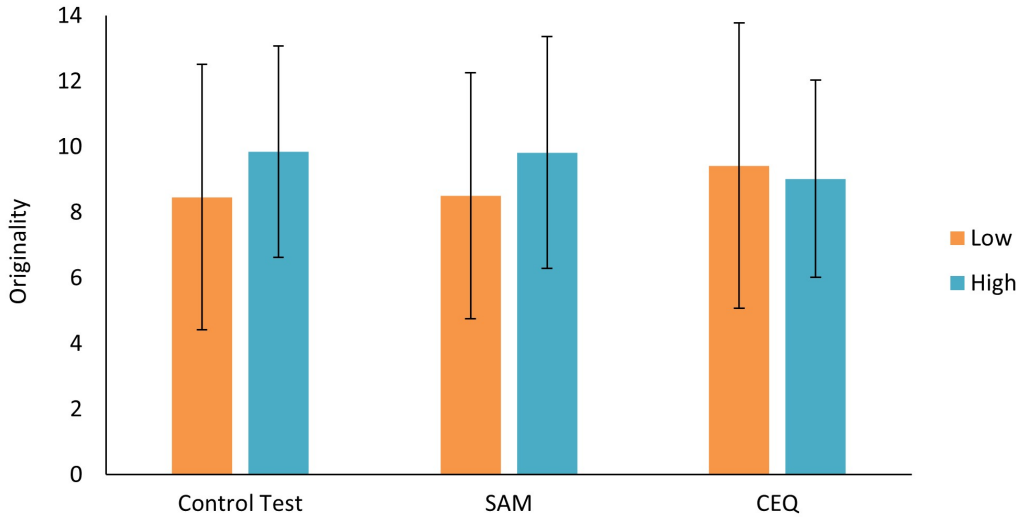
Statistical analysis was performed using the IBM SPSS Statistics, Version 25.0, statistical software (IBM Corporation, Armonk, NY, USA). The internal consistency of the tests was calculated by Cronbach's alpha (Cronbach, 1951) and McDonald's Omega coefficient (Hayes, & Coutts, 2020, MacDonald, 1999). To find out how image control capacity (high and low in the Control Test), creative perception (high and low in creative thinking), and creative experiences (high and low in creative experiences) influenced fine arts students, three ANOVAs were conducted —2 Control Test (high and low in image control) x 2 creative perception, SAM (high and low in creative perception) x 2 creative experiences, CEQ (high and low in creative experiences)—, with the dependent variable in each ANOVA being the originality score, elaboration score and total score (the sum of the previous two), respectively.

Results

Firstly, we analysed the reliability of the tests used in this study by means of Cronbach's alpha (α) and McDonald's Omega coefficient (ω). In the Control Test, we obtained α = .87 and ω = .87, in the SAM α = .81, ω = .82, and in the CEQ α = .69, ω = .67. We then analysed the originality scores of the art projects to find out whether there were significant differences between high (M = 9.85, SD = 3.22) and low (M = 8.46, SD = 4.05) performers in image control ability (Control Test), between high (M = 9.82, SD = 3.53) and low (M = 8.50, SD = 3.75) performers in creative perception (SAM) and between high (M = 9.02, SD = 3.01) and low (M = 9.42, SD = 4.35) performers in creative experiences (CEQ) (see means and standard deviations in Figure 1).

Figure 1

Means and standard deviations of the originality score, as a function of image control (Control Test), creative perception (SAM), and creative experiences (CEQ).



The results (see, Table 1) indicate that image control influenced originality. Fine arts students with high image control scored significantly better on originality than students with low image control. Creative perception also exerted a significant influence on originality. Students with high creative perception scored significantly higher on originality than students with low creative perception. However, no significant differences in originality were found between those high and low in creative experiences. Interactions between the variables were not significant.

Table 1

Result of analysis of variance of the originality score, as a function of image control (Control Test), creative perception (SAM), and creative experiences (CEQ).

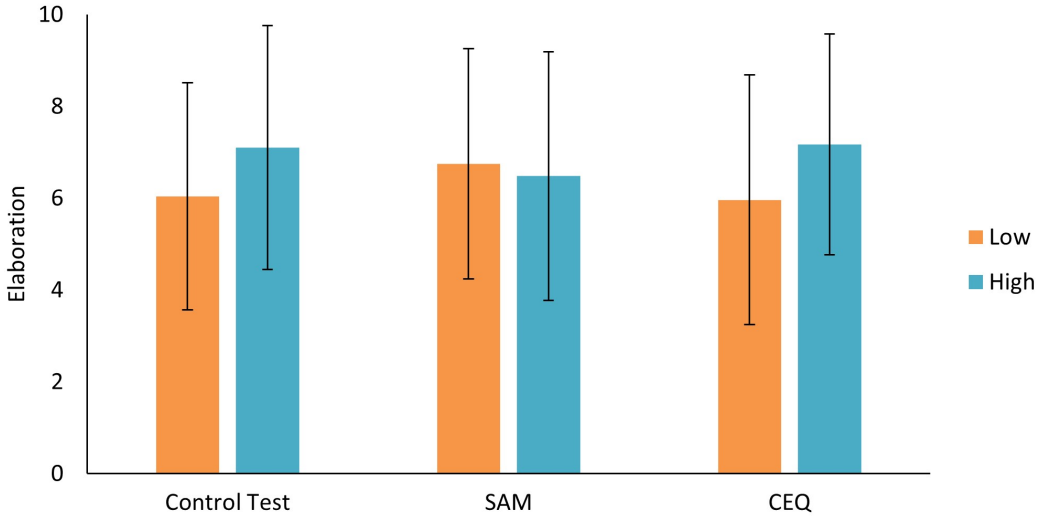
	F	p	η_p^2	β
Control Test	8.15	.01	.15	.80
SAM	7.27	.01	.13	.75
CEQ	3.36	.07	.07	.44

We also analysed whether there were significant differences in elaboration between high (M = 7.10, SD = 2.66) and low (M = 6.04, SD = 2.47) scorers in image control ability (Control Test), between high (M = 6.48, SD = 2.71) and low (M = 6.75, SD = 2.51) performers in creative perception (SAM) and between high (M = 7.17, SD = 2.40) and low (M = 5.96, SD =

2.72) performers in creative experiences (CEQ) (see means and standard deviations in Figure 2).

Figure 2

Means and standard deviations of the elaboration score as a function of image control (Control Test), creative perception (SAM), and creative experiences (CEQ).



We found (see Table 2) no significant differences between high and low on image control, between high and low on creative perception, nor between high and low on creative experiences. Interactions between the variables were not significant.

Table 2

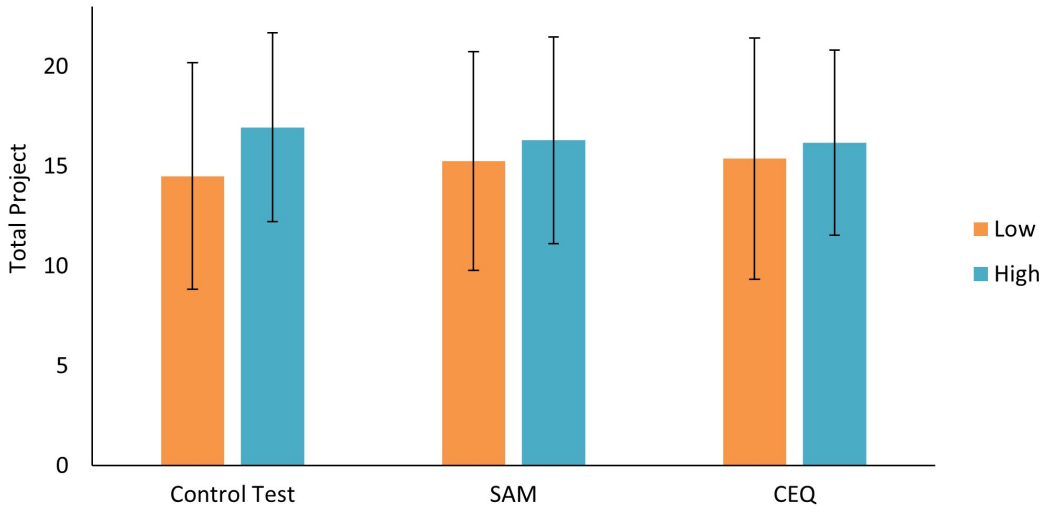
Result of analysis of variance of the elaboration score, as a function of image control (Control Test), creative perception (SAM), and creative experiences (CEQ).

	F	p	η_p^2	β
Control Test	2.70	.11	.05	.36
SAM	0.17	.68	.01	.07
CEQ	1.72	.20	.04	.25

Finally, we wanted to find out whether there were significant differences in the total project score between high (M = 16.95, SD = 4.74) and low (M = 14.50, SD = 5.68) performers in image control ability (Control Test), between high (M = 16.30, SD = 5.18) and low (M = 15.25, SD = 5.48) performers in creative perception (SAM) and between high (M = 16.18, SD = 4.64) and low (M = 15.38, SD = 6.04) performers in creative experiences (CEQ) (see means and standard deviations in Figure 3).

Figure 3

Means and standard deviations of the total project score, as a function of image control (Control Test), creative perception (SAM), and creative experiences (CEQ).



The results (see Table 3) showed that image control significantly influenced art project outcomes. Fine arts students with high image control capacity obtained better total scores on the art project than students with low image control capacity. However, no significant differences in total scores were found between students scoring high in creative perception and those scoring low. Neither were there differences between high and low performers in creative experiences. Interactions between the variables were not significant.

Table 3

Result of analysis of variance of the elaboration score, as a function of image control (Control Test), creative perception (SAM), and creative experiences (CEQ).

	F	p	η_p^2	β
Control Test	7.48	.01	.14	.76
SAM	2.41	.13	.05	.33
CEQ	0.62	.61	.01	.08

Discussion

Firstly, we found the reliability of the Control Test higher than that in previous studies (Pérez-Fabello & Campos, 2004). Secondly, the reliability found in the SAM is also slightly higher than that found by Khatena and Torrance (1998). Finally, the reliability of the CEQ was found to be lower than that found by Merckelbach et al. (2001). Both the Control Test and

the SAM achieved “good” reliability, and the CEQ was “acceptable”, according to the criteria of George and Mallery (2003) for Cronbach's alpha and according to the criteria of Dunn et al. (2014) for McDonald's omega.

The results showed that students with higher image control capacity scored higher in originality and in the total score of the project compared to students with lower image control capacity. These results confirm those obtained in previous studies, in which image control seems to have an important weight in the outcome of artistic exercises (Pérez-Fabello et al., 2014), as well as in artistic academic performance (Pérez-Fabello & Campos, 2007).

Students high in creative thinking performed better on originality than students low in creative thinking. Previous studies did not find such strong results. Pérez-Fabello et al. (2007c) used the Creative Perception Inventory (KTCPI) and the Creative Experiences Questionnaire (CEQ) to measure creativity and compared it to the academic performance of fine arts students. The authors only found significant positive correlations between creative experiences and performance in drawing classes. Additionally, creativity as measured by the CEQ explained only a small part (9%) of the performance in drawing.

Mental images and creative experiences influence creative proposals, therefore, we consider, like Lopata et al. (2022), that it would be interesting to promote exercises of this type in the classroom in order to achieve a deeper level of involvement by the students that allows them to assist their learning.

Limitations and future lines of research

The strength of this study is its innovative approach of an artistic exercise in the classroom, combining theoretical reflection alongside the development of a creative project. The results demonstrate the possibilities of reinforcing certain types of mental imagery abilities and creative experiences that favour creative processes (Busca et al., 2021; Dahl et al., 1999; Vellera & Gavard-Perret, 2016). The main limitation of this work is the sample of students belonging only to the artistic field, as well as gender inequality, which limits the scope of the results.

Given the involvement of images in the creative process, it would be interesting to consider, in future studies, how mental imagery training influences the improvement of the creative process It would also be desirable to study different types of image measures in order to find out what type of image is most appropriate in different creative exercises. Identifying the influence of imagination on creative approaches in different academic fields could also be an objective of future studies.

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Receipt date: 14 April 2024
Revision date: 21 July 2024
Acceptance date: 26 July 2024
Publication date: 15 December 2024

An appendix follow

Appendix
Examples of artistic projects

Example of an artistic project with a high level of originality and elaboration (above the group mean)

1. Title (a title that summarises the project):
"throw" with certain objects, "use" with other objects.
2. Now, develop your project by indicating, as much as possible: objectives, method, means, formalisation, time projection, dissemination, expectations, etc.

This is a process in which the public interacts at all times Each participa t voluntarily chooses an object to throw/use: a knife, a pistol/shotgun, a heavy ball, a glass bottle marbles. Afte choosing one of these objects, he/she is taken to an enclosed space where he/she can choose a surface: a large piece of plasticin or fresh clay, a pillow, a target, a matt ess or a rock surface. The chosen surface is placed verti ally or hung on the wall. The participa t's eyes are then blindfolded, making it impossible for him/her to control the throwing/using force of the object to be thrown/used, or to see and choose where to hit.

The process of choosing and using the object (a strike, a cut, ...) as well as the impact surface will lead to a di erent result.

This process will be repeated with a large number of participants, around 100 participants.

The aim is to play with control, the arti t chooses the elements and gives control to the participa t and, at the same time limits the control by preventin his/her vision. The arti t cedes control of the creati e process to the participa ts who follow a partiall random process.

Example of an artistic project with a low level of originality and elaboration (below the group mean)

1. Title (a titl that summarises the project):
The basic of watercolours.
2. Now, develop your project by indicating, as much as possible: objectives, method, means, formalisation, time projection, dissemination, expectations, etc.

The idea is to experiment with the fi st brushstroke in order to control the amount of pigment and the proportio of water through a process of trial and error. It would be aimed at beginners in the watercolour process.

The aim is to achieve a safe brushstroke by controlling the amount of pigment and/or water.