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Dung My Le^{1*}

Phuong Thi Hang Nguyen^{1,*}

Giang Thao Pham²

Thu Nguyen Anh Phan²

Trang Phan Quynh Le²

Khanh Hoang Bao Bui³

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¹Faculty of Psychology and Education, The University of Danang - University of Science and Education, Danang city, Vietnam

²Le Quy Don High School, Da Nang city, Vietnam

³Cats College Canterbury, 58 New Dover Road, Canterbury, Kent, United Kingdom



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Dung My Le^{1*}, Phuong Thi Hang Nguyen^{1,*}, Giang Thao Pham², Thu Nguyen Anh Phan², Trang Phan Quynh Le², Khanh Hoang Bao Bui³

¹Faculty of Psychology and Education, The University of Danang - University of Science and Education, Danang city, Vietnam

²Le Quy Don High School, Da Nang city, Vietnam

³Cats College Canterbury, 58 New Dover Road, Canterbury, Kent, United Kingdom

* Corresponding Author

Email: nthphuong@ued.udn.vn

ABSTRACT

Creativity is a vital personality quality of each individual. Each person has their potential for creativity, and it can be nurtured and developed in an appropriate and safe environment. The purpose of the study was to find out which factors from schools and students themselves affect creativity as well as the association between creativity and age, gender and giftedness of students, which then a basis to adjust and establish appropriate methods from schools, families, and students themselves to develop elements and their creativity. The study was conducted on 108 high school students in three grades from giftedness and non-giftedness schools. The data was collected through a survey method using a self-constructed questionnaire and drawing creativity test TCT-DP to determine students' creativity levels and personal information. The study's finding, which uses mathematical methods and one-way analysis of variance, reveals that factors affecting elements and creativity level are objective factors including education environment from school; behavior of teachers, and subjective factors including interests, perspectives, and thoughts of students. It was also found that there were no significant differences in the components of creativity and creativity among students in different grades, gender, and groups of giftedness schools.

Keywords: creativity, cognitive elements, students, conative, education environment

INTRODUCTION

Everyone has creative potential, but the outward manifestation is very different due to different internal and external obstacles. Many research results in the psychology of creativity find that external contextual factors and internal subjective factors influence creating new, unique products. These effects are complex non-linear. Creating an open environment, encouraging risk-taking, changing perspectives, and especially passionately pursuing work are important factors that positively influence the birth of innovative products. Amabile (1983) affirms that the environment influences students' intrinsic motivation for creativity. Finally, a person needs a suitable working environment, open and suitable for creative ideas. Someone may have all the resources needed to think creatively, but creativity is unlikely to happen without a supportive environment (forum to present ideas, e.g.). There is strong evidence that children are more creative when living in a safe environment and free from social exclusion (Miller & Gerard, 1979).

Parents of creative children tend to feel personally secure and be highly competent. Relationships between creative children and their parents tend to be neither overly close emotionally nor hostile and detached, but marked by respect, independence, and freedom (Miller & Gerard, 1979). According to research by George (2007), positive and negative moods of family members and family living habits affect the creative development of children. These studies Cox (1926) confirm that all the most significant differences for individuals are family and developmental conditions.

In an educational environment, classmates, learning pressure, or the personality and behaviour of teachers impact the creativity of students. In particular, the general atmosphere of the open class is meant to encourage intrinsic motivation, which then is a foundation to develop creativity. Research by Deci et al. (1981) indicates that creativity can be strengthened by attitudes of teachers towards autonomy and self-determination in students' work. Creativity is also partly influenced by the teacher's personality (Rosenthal et al., 1974).

Nwazuke et al. (2002) argued that an environment where a child finds himself/herself could foster or inhibit creativity. Though a child may have the innate or genetic ability for creativity, parents and teachers have roles to enhance and foster creative traits. Dingedine (2003) asserted that family support, availability of learning materials, and social pressures are factors that influence the development of creativity.

Competing for rewards for making the "best" product, making commitments, and conducting activities due to external causes is also said to have a detrimental effect on creativity. Acknowledging creativity and achieved results may even lead to higher creativity (Amabile, Collins, et al., 1996; Amabile & Gryskiewicz, 1987). Imagination is essential to creativity. There are differences in imagination between different ethnic groups depending on whether the social context of the group facilitates the development of the imagination or not and whether there is plenty of free space or not for creative activity. Baas et al. (2008) suggest that creativity is enhanced most by positive mood states that are activating and associated with an approach motivation and promotion focus (e.g., happiness), rather than those that are deactivating and associated with an avoidance motivation and prevention focus (e.g., relaxed). Maybe everyday creativity is not the creation of talented people, but it is a little creativity every day, each doing a little bit in cooperation to build a new lifestyle. These are small changes, but these small changes lead to significant differences in the long run.

Amabile (1983) pointed out that individuals may have certain traits and abilities favourable for creativity, but whether these will actually result in creative results depends on their intrinsic motivation. Additionally, under certain circumstances, extrinsic motivation has positively affected creativity.

The task-oriented internal motive is the main engine of creative activity. Research by Amabile (1983); Amabile, Conti, et al. (1996) and other scholars has shown the importance of this type of motivation for creative work and argues that it is difficult for people to do something creatively in their field unless they love and focus on the work passionately because of the attraction of work content rather than because of the reward. Children's intrinsic motivation and creativity can be enhanced if teachers and parents facilitate debate to increase inner excitement and enjoyment of learning. Many scholars believe that creativity can be developed through training, creating the environment, and enhancing motivation (Amabile, 1983; Cropley, 1992; Sternberg & Lubart, 1996). Creativity can be nurtured and developed. People learn to acquire the necessary knowledge and discover creative problem-solving rules with whole motivation. Without adequate motivation, knowledge of any kind is not helpful for creativity. A critical condition for new ideas to emerge is to create a safe and open working and learning environment, encouraging group work, discussion, cooperation, and a space for relaxation. Cox (1926) study of people with an average IQ of about 154 showed that creative people have confidence in their abilities and strong character in terms of motivation and effort. The third group of researchers demonstrated that confidence in one's creativity is an important motivator to perform creatively (Carmeli & Schaubroeck, 2007; Farmer et al., 2003; Tierney & Farmer, 2011).

Aranguren and Irrazabal (2012) research results show a statistically significant difference in the average creativity index among individuals who pursue artistic activities higher than those who do not. Lystopad et al. (2017) revealed the peculiarities of shaping the creative drive of future professionals with the help of Edward de Bono's technique of "Six Thinking Hats" in the lessons of the subject. Preliminary results show that most students are characterized by a lack of confidence in themselves and their low motivation to succeed. After applying the "Six Thinking Hats" technique to the educational process, motivation to succeed increased in most respondents, which means it is an appropriate tool for developing coping with students' problems skills and increasing creative motivation. To overcome obstacles to creative thinking such as habits, established patterns of perception, fear of taking risks, it is necessary to think openly, practice how to change positions, and change views by using De Bono's six thinking hats method, developing ideas according to brainstorming methods, developing ideas using divergent and horizontally thinking, etc. It is essential to create an environment for a state of relaxation occurs, encouraging group work and play where there is space for idea sharing and the activation of creative ideas.

Creative thinking has two aspects: Divergent Thinking (intellectual ability to think of many original, diverse and elaborate thoughts) and Convergent Thinking (intellectual ability to logically evaluate critique and choose the best ideas from a selection of ideas). It was initially felt that only gifted or special people could be creative. Research has proved that only specific attributes are required to be creative (Olatoye & Oyundoyin, 2007). A creative person requires passion and commitment, a fresh way of looking at things, understanding people, an entrepreneurial willingness to take risks and work hard, and convincing people that the new idea is good or better. Creativity is fostered or inhibited by specific environmental pressures. People are more creative when they absorb relevant categories and information, and that requires you to be critical and evaluative as you decide which information to look for (Mumford et al., 2003).

Research by Scheliga (1988) found highly significant differences and superiority in the creativity (according to TCT-DP-Total) of non-or semi-professional musicians who are composers to a group working in a scientific-technical institute love to listen to music. Herrman (1987) studied the effects of different training styles with two student soccer teams regarding various personality traits (from achievement motivation to creativity). Over several years the one team had been trained by its coach in an authoritarian, autocratic way (ATM); the other team by its coach in a more open and democratic style (DTM). According to the expectation that a more democratic education allows for more creative development and behaviour, the average score in the TCT-Total of this last group (DTM) is very high and significantly better (28.5 points) than that of the ATM (19.5 points).

Here especially the category "New Elements" as well as two others, namely "Humour" and "Connections made by a theme", are responsible for this result.

A certain amount of intelligence is required for creativity. However, beyond that point, more or less intelligence does not determine how creative a person is, and the level of intelligence required for creativity is sometimes relatively low in a surprising way. Urban (2004) asserted that people with low academic achievement do not necessarily have low creative potential, and people with high academic achievement do not necessarily exhibit high levels of creativity. Research by Jellen and Urban (1986) shows a low positive relationship between the average level of academic achievements (i.e. the form of school) and the test scores, specifically, low academic achievers do not necessarily have low creative potential, and high academic achievers do not necessarily display high levels of creativity. For example, Palaniappan (2008) compared the creativity levels of Malaysian and American students. He reported that American students are significantly superior to their Malaysian counterparts in general creativity and its components, namely fluency, flexibility, originality, and elaboration. However, there was no significant relationship between creativity and academic achievement. There was also no significant difference in the academic achievement of Malaysian and American students. The critical point here is that a group of more creative students may not necessarily be academically better than a group of less creative students. This research suggests that highly creative persons are not necessarily high academic achievers.

In Nigeria, Olatoye and Oyundoyin (2007) reported no difference between male and female students on general creativity tests. There was also no significant difference between male and female students on each component of creativity, namely fluency, originality, flexibility, and creating motivation. Some of the findings showed male superiority over females (Torrance, 1981); some female superiority over males (Orioux & Yewchuk, 1990); yet others did not indicate any difference between male and female respondents (Tegano & Moran, 1989). Some psychologists opined that creativity is commonly found more among males than females due to sex-role differences emphasized in society (Howard, 1995). Math is a creative neutron bomb and one of the leading causes of math anxiety (Luu-Thi et al., 2021). In the study of Olatoye et al. (2010), there is no significant difference between male and female levels of creativity and academic achievement. Naderi et al. (2008) also found no gender difference in creativity as a whole. According to Miller and Gerard (1979), gender differences in creativity are absent in most samples of very young children. However, differences appear and widen developmentally, with older girls doing better on verbal tests and older boys on figural tests.

According to Nwosu (2004), creativity cannot be created, but it can be nurtured or cultivated, and it can also be destroyed. When a study reports no significant influence or relationship between creativity and achievement, there is likely to be a problem in such a system. Gardiner (1980); Songer et al. (2002) believe that all the classrooms should be a modelled garden. The teacher is the gardener who needs to cultivate students' potential to grow into creative adults. Cronin (1989) asserted that though the importance of creativity is universally recognized, its cultivation in our classrooms is paradoxically neglected.

METHODS

Participants

We used a stratified random sampling method in gifted and non-gifted schools, including three grades and two genders (male and female). One hundred eight high school students from 15-17 years old in Da Nang City participated in a survey and took a creativity test. Students from these schools were randomly selected using a quota sampling method (quota sampling). The survey instrument was distributed through an online survey application. The data distribution was done through Google Form, an application developed by Google Inc.

Design and Construction

Questionnaire

The questionnaire was built based on theory from domestic and foreign research and documents on groups of factors affecting creativity in students. It was developed to find out the current status and their schools relating to creativity.

The experiment was asked to mark the answers that are most appropriate and true to their reality in the questionnaire. The questionnaire consists of 5 parts revolving around perceptions, expressions, and status of students in terms of subjectivity and objectivity related to creativity. More specifically, in part about learning about the current state of education to develop creativity for students at school and at home, the research team learned about the frequency of organizing and taking place related activities. Four choices correspond to four frequencies: never, rarely, sometimes and often. With each level, convert to a score from 1-4 in turn. Next, in the section on expressions of creativity, a group of questions including 21 expressions ask students to tick the right choice for themselves.

The question set was designed and scored on a 5-point format type continuum scale ranging from 1 to 5:

- 1 represents Level 1
- 2 represents Level 2
- 3 represents Level 3

- 4 represents Level 4
- 5 represents Level 5

Test for Creative Thinking - Drawing Production

"Test zum Schöpferischen Denken - Zeichnerisch (TSD-Z)" (Urban & Jellen, 1995), or, in English, "Test for Creative Thinking - Drawing Production (TCT-DP)" (Jellen & Urban, 1986) is a creativity test used in this research considering not only divergent, quantitative aspects but aspects of quality, like content, composition and elaboration too. Other components stressed in the literature include risk taking and breaking boundaries, unconventionality, affection, and humour.

TCT-DP drawing test: The TCT-DP test has only one page on which many textures are given that stimulate the subject's freedom to continue drawing. The test asks the subject to redraw a complete picture with six available strokes called six textures. The participants also wrote the necessary information in the section on the test page, such as full name, gender, class, school, time of testing, and the picture subject. The total time required for completing the drawing test is 15 minutes.

The conceptual deliberations led to the following set of fourteen key criteria, which constitute as a whole the TCT-DP construct and also serve as evaluation criteria (Jellen & Urban, 1986):

- Continuations (Cn): Any use, continuation or extension of the six given figural fragments.
- Completion (Cm): Any additions, completions, complements, supplements made to the used, continued or extended figural fragments.
- New elements (Ne): Any new figure, symbol or element.
- Connections made with a line (Cl) between one figural fragment or figure and another.
- Connections made to produce a theme (Cth): Any figure contributing to a compositional theme or "gestalt".
- Boundary breaking that is fragment dependent (Bfd): Any use, continuation or extension of the "small open square" located outside the square frame.
- Boundary breaking that is fragment independent (Bfi) from the "small open square" located outside the square frame.
- Perspective (Pe): Any breaking away from two-dimensionality.
- Humor and affectivity (Hu): Any drawing which elicits a humorous response, shows affection, emotion, or strong expressive power.
- Unconventionality, a (Uc, a): Any manipulation of the material;
- Unconventionality, b (Uc, b): Any surrealist, fictional and/or abstract elements or drawings;
- Unconventionality, c (Uc, c): Any usage of symbols or signs;
- Unconventionality, d (Uc, d): Unconventional use of given fragments.
- Speed (Sp): A breakdown of points, beyond a certain score limit, according to the time spent on the drawing production.

The creative thinking of the subject is evaluated according to the total number of test points, i.e. according to the total score of all 14 criteria, which in theory is a maximum of 72 points. Each participant will achieve a corresponding total test score. Based on the total test scores, Urban divided the subjects into seven groups of potential creative levels A, B, C, D, E, F, G. In which A is poor, B is low, C is average, D is average good, E is good, F is high, G is excellent (extremely high).

Table 1: Specifying scores to each element of the creativity level according to TCT-DP Test

	<i>Criteria</i>	<i>Total</i>	<i>Detailed Explanation</i>
<i>Flexibility</i>	Cth; Cm; Pe	18 points	The ability to transform received information and transfer it from one point of view to another, the ability to redefine things and phenomena in a whole new way.
<i>Originality</i>	Uc,b; Uc,c; Uc,d	9 points	Innovative products that contain unusual and surprising breakthroughs. The ability to think far into the unknown has not yet shown a surprising difference in the implementation of ideas from the standard solutions commonly used in everyday life.
<i>Fluency</i>	Bfi; Cl	12 points	The ability to combine individual elements of a situation, the ability to make associations with known ideas held in memory, to combine individual elements of things into a complete, meaningful picture.

<i>Redefinition</i>	Ne; Uc,a; Bfd; Hu	27 points	The ability to compose data based on synthesizing, structuring elements to form a formal structure in a new form.
<i>Elaboration</i>	Cn; Sp	12 points	Exploiting the knowledge and skills they have learned to develop solutions that have practical implications for their personal lives, especially those that have practical significance for social life festival.

Procedures

The survey process was conducted under all the respondents' consent by signing the consent form. The respondents were assured of the confidentiality of their responses and the importance of their role. They were asked to answer and complete each question based on their own experience. At the end of the questionnaire, participants are required to complete the General Information part, including gender, academic year, school, academic performance, behaviour performance, hobbies, and aptitude.

After completing the questionnaire about creativity, students will conduct the TCT-DP drawing creativity test with a maximum time of 15 minutes. The research team also mentioned to the students the need for creativity test-taking as well as the credibility of the grading process. They will be informed about the relationship and importance of completing both the questionnaire and creativity test, respectively.

Because completing the questionnaire and the test requires a lot of time and space, the participants were persuaded and supported by the research team both psychologically and spiritually. The research team will have a general training session in advance for the participants on how to do creative tests and the requirements to keep in mind, and the research team will design a very detailed test guide (including time, notes, how to print test papers, how to submit papers, etc.)

The participants took two creative tests online and self-timed, ensuring to honestly followed the set time limit. When doing a creative test, the subject must do it in objectively guaranteed conditions. The test should take place in a quiet and comfortable atmosphere, the time pressure must be eliminated, and there should be no distracting noises that distract attention.

Method of Data Analysis

In this study, the authors determined that the reliability of the questionnaire was 91.1%, and the error of 8 was .05. Data were analyzed using Statistical Package for Social Sciences (SPSS). All the research questions generated for this study were answered at .05 alpha level using a two-tailed test. Differences in genders, ages, and external factors such as school and family are identified through the Oneway Anova analysis from data collected through surveys using questionnaires and creative tests.

RESULTS

Table 2: The creativity of high school students								
		<i>Flexibility</i> (max 18)	<i>Originality</i> (max 9)	<i>Fluency</i> (max 12)	<i>Redefinition</i> (max 27)	<i>Elaboration</i> (max 12)	<i>Combined</i>	
<i>Gender</i>								
<i>Male</i> (n = 31)	M	12.065	3.903	2.903	7.903	6.516	33.290	
	SD	2.6196	2.0225	2.9366	3.8846	2.5281	8.2470	
<i>Female</i> (n = 77)	M	12.234	3.299	3.182	8.481	6.286	33.481	
	SD	2.9060	1.9872	3.1860	4.4592	1.9116	9.0896	
<i>Academic year</i>								
<i>Grade</i> (n = 16)	10	M	13.125	3.187	3.812	8.688	5.563	34.375
		SD	3.0304	1.9050	3.8681	4.9358	1.9311	10.3851
<i>Grade</i> (n = 37)	11	M	12.189	3.459	3.405	7.757	6.297	33.108
		SD	2.7773	2.1807	3.1221	4.0511	1.8983	8.5172

Grade 12 (n = 55)	M	11.909	3.564	2.691	8.582	6.618	33.364
	SD	2.7707	1.9414	2.8407	4.2977	2.2401	8.6845
<i>School</i>							
Gifted school (n = 62)	M	12.194	3.323	3.323	7.887	6.403	33.129
	SD	2.9075	2.0786	3.1869	4.2777	2.0682	8.8029
Non-gifted school (n = 46)	M	12.174	3.674	2.804	8.891	6.283	33.826
	SD	2.7187	1.9097	3.2009	4.2907	2.1568	8.9202
M: Mean; SD: Standard Deviation							

From the above table, it can be seen that in both sexes, "flexibility" has an average score that is much superior to the rest, almost double and triple with M in men and women respectively 12.065 and 12.234. Next in both genders are "redefinition" and "elaboration", while in "redefinition" the female has a higher M than the male (M for female = 8.481 and M for male = 7.903) then in "elaboration" for male again has M of 6.516 higher than female with M of 6.286. The two components with the lowest M in both sexes are "originality" and "fluency." Similar to the last two attributes, in "originality", male is M = 3.903 is higher than female by .604, while in "fluency", female has a higher M than male by .279. "fluency" in both sexes is also the lowest M with M in male is 2.903 and female is 3.182. Thereby it can be seen that in some attributes, female is superior to male, and in some attributes, it is the opposite, but the difference is not too much; there is still a difference in the components. The composition of creativity overall remained similar and did not affect the overall level of creativity in both sexes.

According to the table, we find that there is not too much difference in creativity between grades. Creativity at level C, i.e. Average level, accounted for the highest rate in all three grades, in which grade 12 had a higher rate than the other (43.75% for grade 10, 35% for grade 11 and grade 12 is 64.45%). In other levels, there are similar ratios and not too much difference. Occupying the second most rate is level D, i.e. Fairly good, and this ratio is valid for all three grades. Grade 10 is evenly distributed at Low, Medium, Good and Good levels with 18.75% at each level; there are no students at low and high levels. For grade 11, the second-highest rate is the average of good with 32.43% and scattered students at the remaining levels, especially 2.7% at the poor level. Grade 12 has 5.45% at a high level of creativity and no students at a low level.

Nearly a large number of students are moderately creative. All three grades have the highest ratio at Average and then Fairly Good, equivalent to 2 levels in the middle compared to 7 levels. Therefore, there is a need for a suitable program to enhance creativity, and this program can be compatible with all grade levels.

The table above shows that, in all three blocks, "flexibility" is the component with the highest M, reaching $\frac{2}{3}$ of the maximum score. Grade 10 achieved a higher average score than the other two grades. Next, the second-highest M in all three primary grade blocks is "elaboration". In this factor, grade 12 has the highest M, which proves that grade 12 students perform better in "elaboration. The factor "fluency" is the factor with the lowest M, but grade 10 students are entirely developed in this factor when the M is relatively high compared to the common ground.

It can be seen that there is not too much difference in creative composition between classes, although the difference still exists but is not too significant.

Through the analysis of each factor affecting the two groups of schools, it can be seen that there is a difference in the factors between the two groups of schools. However, this difference is very little and even insignificant. It can be seen that in both groups of specialized and non-specialized schools, "flexibility" has the highest average score, and the average score of specialized schools is higher than that of non-specialized schools. However, the difference is minimal, precisely 12.194 and specialized schools. Non-specialized school is 12.174. With "fluency" and "elaboration", students from specialized schools have better understanding and proficiency in these two factors with average scores of 3.323 and 6.403, respectively. Meanwhile, with the two factors "originality" and "redefinition", on the contrary, the group of school students often outperforms when they have a higher GPA. Regarding "originality", the school usually has an M of 3.674, and the specialized school is lower when it has only 3.323; with "redefinition", the school usually has an M of 8.891, and it is higher than a specialized school.

Thereby, it can be concluded that students in each school group will have their strengths in each element of creativity. Although the rate of creativity is similar on average, students in specialized schools have better

ability in "fluency" and "elaboration". Moreover, students from non-specialized schools are superior in two factors: "originality" and "redefinition". "flexibility" developed in both groups of schools.

Table 3: Effects of gender, academic year, school on students' creativity

Variables	Sig. of Levene Statistic	Sum of Squares	df	Mean Square	F	Sig.
Gender	.838	.800	1	.800	.010	.920
Academic year	.565	18.363	2	9.181	.116	.890
School	.741	12.831	1	12.831	.164	.687

Sig of Levene statistic of 3 influencing factors is .838; .565; .741 (> 0.05) respectively, so at 95% confidence hypothesis H₀: "Equal variance" is accepted, and rejected hypothesis H₁: "Different variance". Thus, the results of ANOVA analysis can be used.

The results of ANOVA analysis with significance levels of .920, .890, and .687, respectively, are all greater than .05, so the observation data is not enough to confirm a difference in creativity levels between the two groups: gender group, academic year and school.

Table 4: The relation between factors inside students and the components that make up creativity

Subject		Level 1	Level 2	Level 3	Level 4	Level 5	Combined
		<i>The average score of elaboration (max 12)</i>					
1. The ability to see problems and access information from different perspectives	M	9.000	5.857	6.543	5.609	7.842	6.352
	SD	0	1.6762	1.9755	1.9491	2.0073	2.0972
2. Don't let the feeling of inferiority and inferiority take over you, but always find a way to rise	M	5.667	6.000	5.786	6.156	8.235	6.352
	SD	.5774	1.8127	1.7503	2.1633	1.9535	2.0972
		<i>The average score of flexibility (max 18)</i>					
3. The level of interest in the arts	M	11.625	12.800	10.895	11.767	13.022	12.185
	SD	3.0677	2.7749	3.3316	2.5822	2.5165	2.8157
M: Mean; SD: Standard Deviation							

It can be seen that the elaboration of students is correlated with their ability to see problems. Although there is a difference between poor and other levels, it is impossible to draw the most objective conclusion because the number is too small. However, it can be seen that for students with a high ability to see problems from different perspectives, elaboration is also higher with 7.842 points.

Regarding the third factor, the level of interest in arts, although there is an unequal fluctuation between levels when score gradually increases from level 1 to 2 but decreases at level 3 and then increases again at levels 4 and 5. There is a noticeable difference at level 5 compared to the remaining levels.

Table 5: Effects of subjective elements on students' manifestation of creativity

Variables	Sig. of Levene Statistic	Sum of Squares	df	Mean Square	F	Sig.
Subject 1*elaboration	.776	77.604	4	19.401	5.084	.001
Subject 2*elaboration	.118	74.279	4	18.570	4.826	.001
Subject 3*flexibility	.537	73.487	4	18.372	2.442	.050

Sig. of Levene Statistic of 3 influencing factors is .776; .118; .537, respectively (> 0.05), so at 95% confidence hypothesis H_0 : "Equal variance" is accepted, and rejected hypothesis H_1 : "Different variance". Thus, the results of ANOVA analysis can be used.

The results of ANOVA analysis with the significance level of .001; .001; .050, respectively, are all less than .05, so the observational data is sufficient to confirm that there is a difference in elaboration expression level between (1) individuals who can look at problems from many different perspectives (2) always rise without letting a feeling of inferiority overwhelm them, and there is a difference in the expression of flexibility between students. Students have different levels of interest in art.

Table 6: The relation between external factors and the manifestation of flexibility

Subject		Never	Rarely	Sometimes	Always	Combined
4. Frequency of extracurricular activities of the school	M	11.333	8.571	12.500	12.417	12.185
	SD	3.7859	3.6904	2.4678	2.7503	2.8157
5. How often students are encouraged to give teachers' views	M	9.500	11.000	13.281	11.806	12.185
	SD	2.1213	5.6569	2.6056	2.7457	2.8157
M: Mean; SD: Standard Deviation						

External factors affecting creativity come from the school and the teachers themselves. It can be seen that the expression level of flexibility of the group of schools that organize extracurricular activities is sometimes and consistently slightly higher than the other frequencies and also more significant than the average level.

Regarding the degree of manifestation of flexibility, the frequency with which students are encouraged to express their views has yielded exciting results. When the teacher always encourages, the student's flexibility is lower than sometimes encouraged ($11.806 < 13.281$).

Table 7: Effects of objective elements on students' flexibility

Variables	Sig. of Levene Statistic	Sum of Squares	df	Mean Square	F	Sig.
Subject 4	.432	101.665	3	33.888	4.720	.004
Subject 5	1.250	66.050	3	22.017	2.927	.037

Sig. of Levene Statistic of 3 influencing factors is .432; 1.250 ($> .05$), respectively, so at 95% confidence, hypothesis H_0 : "Equal variance" is accepted, and hypothesis H_1 is rejected: "Different Variances". Thus, the results of ANOVA analysis can be used.

The results of ANOVA analysis with the significance level of .004; .037, respectively, are less than .05, so with the observed data, there is enough condition to confirm that there is a difference in the expression level of

flexibility between (1) frequencies for organizing extracurricular activities (2) frequencies that encourage students to express their views of the teacher.

Table 8: Post-Hoc test						
(I) Subject 4	(J) Subject 4	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rarely	Never	-2.7619	1.8490	.138	-6.428	.905
	Sometimes	-3.9286*	1.0684	.000	-6.047	-1.810
	Always	-3.8452*	1.1068	.001	-6.040	-1.650
(I) Subject 5	(J) Subject 5					
Always	Never	2.3056	1.9660	.244	-1.593	6.204
	Rarely	.8056	1.9660	.683	-3.093	4.704
	Sometimes	-1.4757*	.5827	.013	-2.631	-.320

After an in-depth analysis of Oneway Anova, we have the following results:

Among the four frequencies of organizing extracurricular activities in schools, there is only a statistically significant difference between rare and sometimes and rare and always. More specifically, schools organized rarely have lower flexibility than students in institutions organized sometimes or always. That leads to a difference in the creativity level of students in schools with different frequencies of extracurricular activities.

In terms of subject 5, there is only a difference between the regular group and the sometimes group as the always group has lower flexibility than the occasional group. It is possible that over-stimulation also puts pressure on students and harms flexibility.

DISCUSSION

The sample, literature, and self-reported measurements were the main research limitations. Even if it was large, the samples for this current study came from some high schools in Da Nang, Vietnam, which may not be sufficient to represent the entire high school education in Vietnam and socio-cultural influences from different parts of Vietnam. Furthermore, this study only used questionnaires, which could bias the findings. It was a cross-sectional study, which does not allow us to conclude causal relationships between research variables. Future studies should address these limitations, and creativity factors should be investigated further.

CONCLUSION

The level of creativity displayed by high school students in Da Nang is predominantly on the average side of the distribution spectrum. Moreover, creativity cannot be predicted by external factors such as gender, grade, or giftedness, but rather by internal factors such as the way a person handles difficulties, one's confidence in one's own talents, and one's sense of personal efficacy. The extent of students' excitement for art has an impact on their level of originality, and vice versa. Schools and teachers have a significant role in the development of creativity, particularly in the development of flexibility. Students' potential to be creative will be hampered, though, if you schedule an overwhelming number of extracurricular events or continuously encourage them to express themselves.

REFERENCES

1. Amabile, T. M. (1983). The Social Psychology of Creativity: A Componential Conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357-376. <https://doi.org/10.1037/0022-3514.45.2.357>
2. Amabile, T. M., Collins, M. A., Conti, R., Phillips, E., Picariello, M., Ruscio, J., & Whitney, D. (1996). *Creativity in Context: Update to the Social Psychology of Creativity* (1st ed.). Routledge. <https://doi.org/10.4324/9780429501234>

3. Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the Work Environment for Creativity. *Academy of Management Journal*, 39(5), 1154-1184. <https://doi.org/10.5465/256995>
4. Amabile, T. M., & Gryskiewicz, S. S. (1987). *Creativity in the R&D Laboratory* (Technical Report No. 30). Center for Creative Leadership.
5. Aranguren, M., & Irrazabal, N. (2012). A Scale for the Evaluation of Creativity Behavior in Different Domains: Development and Design. *Ciencias Psicológicas*, 6(1), 29-41.
6. Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A Meta-Analysis of 25 Years of Mood-Creativity Research: Hedonic Tone, Activation, or Regulatory Focus? *Psychological Bulletin*, 134(6), 779-806. <https://doi.org/10.1037/a0012815>
7. Carmeli, A., & Schaubroeck, J. (2007). The Influence of Leaders' and Other Referents' Normative Expectations on Individual Involvement in Creative Work. *The Leadership Quarterly*, 18(1), 35-48. <https://doi.org/10.1016/j.leaqua.2006.11.001>
8. Cox, C. M. (1926). *Genetic Studies of Genius. II. The Early Mental Traits of Three Hundred Geniuses*. Stanford University Press.
9. Cronin, L. L. (1989). Creativity in the Science Classroom: Why It Is as Essential as a Microscope? *The Science Teacher*, 56(2), 35-36.
10. Cropley, A. J. (1992). *More Ways than One: Fostering Creativity*. Ablex Publishing.
11. Deci, E. L., Nezlek, J., & Sheinman, L. (1981). Characteristics of the Rewarder and Intrinsic Motivation of the Rewardee. *Journal of Personality and Social Psychology*, 40(1), 1-10. <https://doi.org/10.1037/0022-3514.40.1.1>
12. Dingledine, R. (2003). *Creativity: Environment and Genetic Factors*.
13. Farmer, S. M., Tierney, P., & Kung-Mcintyre, K. (2003). Employee Creativity in Taiwan: An Application of Role Identity Theory. *Academy of Management Journal*, 46(5), 618-630. <https://doi.org/10.5465/30040653>
14. Gardiner, W. L. (1980). *The Psychology of Teaching*. Thomson Brooks/Cole.
15. George, J. M. (2007). Creativity in Organizations. *Academy of Management Annals*, 1(1), 439-477. <https://doi.org/10.5465/078559814>
16. Herrman, W. (1987). *Auswirkungen unterschiedlicher Trainingsstile auf Leistungsmotivation und Furcht vor Mißerfolg, Selbstachtung und Selbstkonzept, Aggressives Verhalten sowie Kreativität* [Unveröff. Diplomarbeit, Psychol. Institut II, Universität Hamburg].
17. Howard, R. M. (1995). *The Gender Plagiarist* Annual Penn. State Conference on Rhetoric and Composition, USA.
18. Jellen, H. G., & Urban, K. K. (1986). The TCT-DP (Test for Creative Thinking-Drawing Production): An Instrument that Can Be Applied to Most Age and Ability Groups. *Creative Child & Adult Quarterly*, 11(3), 138-155.
19. Luu-Thi, H. T., Ngo-Thi, T. T., Nguyen-Thi, M. T., Ly, T. T., Nguyen-Duong, B. T., & Tran-Chi, V. L. (2021). An Investigation of Mathematics Anxiety and Academic Coping Strategies Among High School Students in Vietnam: A Cross-Sectional Study. *Frontiers in Education*, 6, 1-14. <https://doi.org/10.3389/educ.2021.742130>
20. Lystopad, O. A., Mardarova, I. K., & Kuk, T. (2017). Forming Students' Motivation for Creativity by Means of Edward de Bono's "Six Thinking Hats" Technique. *Science and Education*, 8, 93-96. <https://doi.org/10.24195/2414-4665-2017-8-14>
21. Miller, B. C., & Gerard, D. (1979). Family Influences on the Development of Creativity in Children: An Integrative Review. *The Family Coordinator*, 28(3), 295-312. <https://doi.org/10.2307/581942>
22. Mumford, M. D., Connelly, S., & Gaddis, B. (2003). How Creative Leaders Think: Experimental Findings and Cases. *The Leadership Quarterly*, 14(4-5), 411-432. [https://doi.org/10.1016/S1048-9843\(03\)00045-6](https://doi.org/10.1016/S1048-9843(03)00045-6)
23. Naderi, H., Abdullah, R., & Aizan, H. T. (2008). Male Versus Female Intelligence among Undergraduate Students: Does Gender Matter? *Asian Journal of Scientific Research*, 1(5), 539-543. <https://doi.org/10.3923/ajsr.2008.539.543>
24. Nwazuoke, I. A., Olatoye, R. A., & Oyundoyin, J. O. (2002). Environmental Factors as Predictors of Creativity among Senior, Secondary School Students in Oyo State. *Ife Journal of Behavioural Research*, 4(1), 85-93.

25. Nwosu, A. A. (2004). Teachers Awareness of Creativity Related Behaviours in the Science Classroom Implication for National Development. *Journal of Science Teachers Association of Nigeria*, 39, 22-30.
26. Olatoye, R. A., Akintunde, S. O., & Ogunsanya, E. A. (2010). Relationship between Creativity and Academic Achievement of Business Administration Students in South Western Polytechnics, Nigeria. *African Research Review*, 4(3a), 134-149. <https://doi.org/10.4314/afrrrev.v4i3.60164>
27. Olatoye, R. A., & Oyundoyin, J. O. (2007). Intelligence Quotient as a Predictor of Creativity among Some Nigerian Secondary School Students. *Educational Research and Review*, 2(4), 92-95. <https://doi.org/10.5897/ERR.9000204>
28. Orioux, J., & Yewchuk, C. (1990). Correlates of Creative Performance in High School Students. *Canadian Journal of Special Education*, 6(1), 50-60. <https://eric.ed.gov/?id=EJ421396>
29. Palaniappan, A. K. (2008). Influence of Intelligence on the Relationship between Creativity and Academic Achievement: A Comparative Study. *The International Journal of Learning: Annual Review*, 15(7), 267-278. <https://doi.org/10.18848/1447-9494/CGP/v15i07/45850>
30. Rosenthal, R., Baratz, S. S., & Hall, C. M. (1974). Teacher Behavior, Teacher Expectations, and Gains in Pupils' Rated Creativity. *The Journal of Genetic Psychology*, 124(1), 115-121. <https://doi.org/10.1080/00221325.1974.10532708>
31. Scheliga, J. (1988). *Musikmachen und die Förderung der Kreativität* [Unveröff. Diplomarbeit, Psychol. Institut II, Universität Hamburg].
32. Songer, N. B., Lee, H.-S., & Kam, R. (2002). Technology-Rich Inquiry Science in Urban Classrooms: What Are The Barriers To Inquiry Pedagogy? *Journal of Research in Science Teaching*, 39(2), 128-150. <https://doi.org/10.1002/tea.10013>
33. Sternberg, R. J., & Lubart, T. I. (1996). Investing in Creativity. *American psychologist*, 51(7), 677-688. <https://doi.org/10.1037/0003-066X.51.7.677>
34. Tegano, D. W., & Moran, J. D. (1989). Sex Differences in the Original Thinking of Preschool and Elementary School Children. *Creativity Research Journal*, 2(1-2), 102-110. <https://doi.org/10.1080/10400418909534303>
35. Tierney, P., & Farmer, S. M. (2011). Creative Self-Efficacy Development and Creative Performance Over Time. *Journal of Applied Psychology*, 96(2), 277-293. <https://doi.org/10.1037/a0020952>
36. Torrance, E. P. (1981). *Toward the More Education of Gifted Children in Creativity: Its Education Implications* (2nd ed.). Kenda.
37. Urban, K. K. (2004). Assessing Creativity: The Test for Creative Thinking - Drawing Production (TCT-DP): The Concept, Application, Evaluation, and International Studies. *Psychology Science*, 46(3), 387-397.
38. Urban, K. K., & Jellen, H. G. (1995). *Test zum Schöpferischen Denken-Zeichnerisch (TSD-Z)*. Swets.