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## Effects of motivation on creativity in the art and design education

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### ABSTRACT

Creativity plays a vital role in enhancing students' performance in art and design education. The impact of motivation on education is a vital aspect that educators must take into account to promote the creativity of students. Therefore, this study aimed to explore the effect of students' motivation on their creative activities in Russian art and design education, and simultaneously validate the self-developed Motivation for Creativity Questionnaire (MCQ). This study involved 193 Russian undergraduate students from Kazan Federal (Volga Region) University. The results from EFAs and construct validity measures stated that the developed questionnaire could reliably measure the factors of students' motivation and creativity in Russian art and design education. The intrinsic motivation had a positive significant impact on students' creative performance of divergent thinking, originality of ideas, persistent attitude, and intellectual risk-taking. Achievement motivation also had significant and positive effects on students' creativity: divergent thinking, originality of ideas, persistent attitude, and intellectual risk-taking. This study suggests that educators in Russian art and design education can promote students' creative performance by nurturing both intrinsic and achievement motivations, focusing on areas such as divergent thinking, originality of ideas, persistent attitude, and intellectual risk-taking.

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## 1. Introduction

In the realm of art and design education, there have always been challenging tasks such as problem-solving, critical thinking, harmonious communication, coping with the rapid development of technology, self-learning, self-regulation, and developing socio-cultural traits (Hocking, 2016). Additionally, there is a need for skills in analyzing, synthesizing, diverging, and generating insights across different domains (Brown, 2009). Moreover, students have to deal with ambiguities and articulate with right questions, identifying and formulating possibilities and potentials from different sectors (Panke, 2019). Therefore, creative competence (the ability to produce new valuable ideas) is necessary to overcome such interdisciplinary changes to generate better ideas and concepts in art and design education (Hocking, 2016). There is also an increased emphasis on creativity as a key aspect of art and design education by different researchers (Bastos & Zimmerman, 2017; Hocking 2016; van de Kamp et al., 2015; Sowden et al., 2015; Zwirn & Zande, 2017). Therefore, many researchers and practitioners (Amabile et al., 1996; Chamakiotis et al., 2013; Ickson et al., 2014; Zhu et al., 2018) become noticed the importance of creativity and investigated the major factors influencing students' creativity in art and design education.

One study (Amabile et al., 1996) explained that three components are encouraging to improve students' creativity: expertise, creative thinking skills, and intrinsic motivation. Another study (Zhu et al., 2018) also pointed out that collaborative teamwork and intrinsic motivation had a significant and

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positive relationship with students' creativity. Teachers' encouragement (extrinsic) and intrinsic motivation can also increase students' creative process work. Students' failure avoidance motivation can undermine students' creativity in the art and design education processes (Icekson et al., 2014). Moreover, another study averred that technology, teams or organizations, and individuals' motivation levels are also influencing factors on creative performance (Chamakiotis et al., 2013). Timing issues (Wang et al., 2010), multi-level enabling and restraining or failure-avoiding factors (Rieger et al., 2020), and divergent thinking (Silvia et al., 2008; Zhu et al., 2019) are also influencing students' creative learning process.

Among many factors influencing students' creativity, there was a common factor agreed by the above authors (Amabile et al., 1996; Chamakiotis et al., 2013; Icekson et al., 2014; Rieger et al., 2020; Silvia et al., 2008; Zhu et al., 2019). It is a *motivation factor* that is also described as a prerequisite for effective effort in creative performance in art and design educational (Hocking, 2016).

Considering all data we have from scholars, it is possible to admit that the creative potential of a person is not fully realized if the person is not motivated to do it. In turn, creative solutions cannot be found if a person is not motivated to apply skills (Runco, 2005). These results obtained by scientists allowed us to look at the question of the relationship between the phenomenon of creativity and motivation factors from a new angle and see the research gap. Despite the significant impact of motivation on creative design (Amabile et al., 2005; Eisenberger & Aselage, 2009; van de Kamp et al., 2015), scholars and teachers frequently assess creativity without recognizing the essential motivational factors influencing design activities. This often leads to evaluations and efforts to enhance creativity that overlook personal motives. Consequently, more emphasis is placed on the procedural aspects of creativity rather than underlying the motivational drive behind creative endeavors. This research gap clears the dust from the idea of conducting a study to investigate the effects of motivational factors on students' creativity in art and design education.

## 2. Literature review

### 2.1. Motivation

The term, motivation, is universally accepted as one of the crucial factors affecting students' performance and behavior (Orhan, 2017). In fact, motivation stems from the Latin verb, 'movere' meaning 'to move'. Therefore, it is the process of leading to the provocation, ceaselessness, enthusiasm, and attribute of behavior (Brunstein & Heckhausen, 2008). It was also defined by different educators and researchers in different ways, and however, they commonly agreed that it is a kind of drive, energize and action (Kian et al., 2014; Strenacikova & Strenacikova, 2020). Individuals' motivation starts with the recognition of their innate urge/desire followed by their achieving drive which is accompanied by physical actions to achieve that drive (see Fuller et al., 2008).

In Self-Determination Theory (STD), motivation is one of the reasons that can change behavior. To apply it in the education setting, it is a kind of power or driving force that students can perform school activities (Guay et al., 2010). According to SDT, the degree or quality of motivation varies to different levels based on self-determined functioning (Breva & Galindo, 2020). However, all different types/levels of motivation stem from two main types such as *intrinsic motivation* and *extrinsic motivation* (Bravo et al., 2017). Many studies have shown that there is a significant connection between intrinsic motivation and creativity. Scholars investigated the influence of intrinsic and extrinsic motivation on the creativity of stories invented by 115 children aged 15 to 10. The findings indicated that the children who were promised a reward produced less imaginative stories than those who were not promised a reward (Amabile & Pillemer, 2012). In another experiment, Amabile et al. (2005) studied the influence of extrinsic motivation on poets with many years of creative experience. Results from the study showed that the group with extrinsic motivation wrote significantly fewer creative poems than the group with intrinsic motivation. Another type of motivation, *achievement motivation*, (Miksza, 2011; Strenacikova & Strenacikova, 2020) is also a crucial factor influencing students' performance in art and design education. The study conducted in Iran states that there is a significant relationship between creative activity and achievement motivation (Ghasemi et al., 2011). In contrast to achievement motivation, *failure avoidance motivation* is

associated with psychological characteristics and, as a result, negatively affects the creative potential of a person. Concerning the creative tasks in art and design education, some students have some emotions such as fear, anxiety, stress, and willingness to protect themselves from the risky performance of creations (Schüler et al., 2013). There is a sufficient amount of research work that confirms that failure avoidance motivation reduces the level of creativity (Friedman & Förster, 2002, 2005; Elliot et al., 2008; Mehta & Zhu, 2009; Lichtenfeld et al., 2012). Failure avoidance motivation becomes a concern to be considered in creative activities of art and design education (Icekson et al., 2014). The theory, SDT which averred that different levels or types of motivations have different functions (Breva & Galindo, 2020), gave us the clue to investigate the consequences of these above motivational factors on students' creative performance. In this study of art and design education, therefore, the focus will be on investigating the impact of four different types of motivation – *intrinsic motivation*, *extrinsic motivation*, *achievement motivation*, and *failure avoidance motivation* – on creative works.

### **2.1.1. Intrinsic motivation**

It refers to individuals' automatic willingness to the curiosity and interest, to identify and solve problems, and to develop and practice their skills and abilities even when they do not get any physical rewards (Di Domenico & Ryan, 2017). It also 'refers to doing something because it is inherently interesting or enjoyable' (Ryan & Deci, 2000, 55). SDT put forward that intrinsic motivation is related to human needs such as autonomy, competence, and other emotional affairs that can enhance subsequent task performance (Zhu et al., 2018).

### **2.1.2. Extrinsic motivation**

It refers to a person's engagement in a task not because of its intrinsic qualities but because of effects that come from his/her surroundings or based on instrumental reasons (Guay et al., 2010). It is also the most controlled form of motivation, and it occurs when a person is motivated extrinsically by the use of rewards (financial incentives or social recognition) or punishment (penalties or exclusion by society) (Donald et al., 2020).

### **2.1.3. Achievement motivation**

It refers to a person's opinion or belief concerning his/her skill to achievement with enthusiastic efforts or actions based on willingness to achieve (Elliot et al., 2008). The achievement motivation for individuals is available by their targeted goals, expectations, strong will, perspectives, and beliefs, which encourage their efforts of achieving indestructible desired outcomes (Strenacikova & Strenacikova, 2020).

### **2.1.4. Failure avoidance motivation**

It refers to a person's motivated behavior which is directed by his thoughts of negative outcomes (Heimerdinger & Hinsz, 2008). A person with failure avoidance motivation may have some kinds of cognitive and psychological problems such as fear, text anxiety, and self-protective processes which can create a low performance (Schüler et al., 2013).

## **2.2. Creativity**

Creativity is a key concept in art and design education (Zwirn & Zande, 2017). One of the fundamental goals of educators from the art and design education field is to help students develop self-confidence and creative competency enough for them to be able to perform tasks autonomously, smoothly, and resiliently (Choi et al., 2019). Therefore, the concept of 'creativity' is a skilled pursuit that encourages students to generate valuable and admirable ideas and actions in their respective areas (Zhu et al., 2018). Within the Experiential Learning Theory (ELT) framework, learning is viewed as a process of the comprehensive knowledge acquisition through experiencing, sensing, thinking, and behaving (Kolb, 1984; Schumacher & Festing, 2023). ELT is underpinned by two essential principles; firstly, that learning emerges from experiences, and secondly, that individuals do not consistently learn through identical methods. Therefore, creativity is not only an integral aspect of education but also a dynamic force that propels individuals to explore and cultivate their unique learning pathways.

Creativity is also defined by some educators (Wang et al., 2022) as a person's unique and pragmatic ideas/concepts which arise from current practical situations, products, services, and performances. It is also an essential skill for students to look for ways of solving different problems and to generate the appropriate or novel actions for fulfilling their requirements (Yuan et al., 2019). Research by Gilford and others supports the theory that divergent thinking is an indicator of creativity potential (Runco, 2010). Solving creative problems during art and design processes requires generating different possible solutions, divergent thinking, in turn, allows us to identify important problems and find creative ways to solve them (Williams, 2004). *Originality* is an integral aspect of creativity, as it involves deviating from typical and established modes of thinking to produce novel and innovative ideas (van de Kamp et al., 2022). According to Corazza (2016), originality is the criteria that help to distinguish creative activity and creative products from other activities. Creative solutions cannot be found without originality because it contains a sense of uniqueness (Shaun, 2001). Another element of creativity is a *persistent attitude* that encourages ceaseless hardworking (Kim, 2017). According to Balkin (1990) the person, which is involved in creative processes, is often persistent and patient. In the study of Gralowski (2018), teachers were asked to identify the profile of the students in accordance with the adaptive style of creativity, these students were characterized by a sufficient level of persistent attitude, problem-solving ability, openness to experience, etc. To be creative requires *intellectual risk-taking*, which, in turn, leads to considerable improvements in quality of life and well-being, creates an opportunity for entrepreneurs to meet with partners, promotes the creation of new products and inventions, and as a result, makes the profits from creative activities (Shen et al., 2018). Intellectual risk-taking is also endeavoring to explore the unknown (Choi et al., 2019). Moreover, the significant relationship between risk-taking and creativity has been shown by the studies of achievement motivation theory (Dewett, 2006; Zhou & George, 2001) and by the theory of creativity's investment (Sternberg, 2006), both these studies admitted that intelligent risk-taking is a prerequisite for creativity. Many researchers suggested for the development of creative outputs in art and design education that educators should encourage students' *divergent thinking* by abandoning stereotyped thinking (Sowden et al., 2015), their *originality* that goes beyond the usual ways (van de Kamp et al., 2022), their *persistent attitude* that encourages the ceaseless hardworking (Kim, 2017), and their *risk-taking* - endeavoring to explore the unknown (Choi et al., 2019). Therefore, we consider these four factors of divergent thinking, originality, persistent attitude and risk-taking to evaluate students' creativity in art and design education. Therefore, we consider these four factors of *divergent thinking*, *originality*, *persistent attitude*, and *intellectual risk-taking* to evaluate students' creativity in arts and design education.

### 2.2.1. Divergent thinking

It is a strategy of knowing how good performance can be created under which circumstances and contexts (van de Kamp et al., 2015). It is also the ability to produce different possibilities of answers regarding one quiz or question related to fluency, flexibility, and originality (Zhu et al., 2019). The research (Sun et al., 2019) also stated that the capacity of thinking divergently is a valid signal of a person's creative performance.

### 2.2.2. The originality of ideas

It is a kind of creation of new fashion and ideas by combining with previous ideas and concepts so that it can become something that was never performed or expected before (Shareef, 2018). In art and design education, originality is assessed by the unusual concepts or ideas of students in creating arts or designs (Kim, 2017). It is one important aspect of creativity that can be defined as the generation of ideas that are original and useful (Ostermaier & Uhl, 2020). This originality characterizes the ability to put forward ideas that differ from the obvious, trivial, or well-established ones. Highly original personalities are characterized by high intellectual activity and non-conformity. The originality of solutions implies the ability to avoid obvious and trivial answers (Humble et al., 2018).

### 2.2.3. Persistent attitude

It refers to a tendency to keep working or striving until the end even though the success is uncertain or it is leading towards failure (Petty et al., 2014). It is also defined as continuously striving and committing

to goals regardless of immediate rewards (Kim, 2017). It is one of the most critical creative attitudes. Creative persons are passionate about and committed to their goals, which compels them to persist physically and mentally. Instead of giving up, innovators switch from a focused, persistent attitude to an unfocused, spontaneous attitude (Kim, 2017).

#### **2.2.4. Intellectual risk-taking**

It refers to an enthusiastic performance of individuals taking a risk in some uncertain or unknown situations of scientific performance (Tyagi et al., 2017). This kind of risk-taking helps to predict who will engage in more creative activities and who will have more significant and recognized creative achievements (Beghetto et al., 2021). A new study from an international team of researchers shows that risk-taking is an important part of creativity. The research points to a specific kind of risk-taking – intellectual risk-taking is a form of adaptive risk-taking that refers to actions that expose a person to the possibility of failing, such as trying to learn new skills or trying out new ideas (Beghetto et al., 2021).

### **2.3. Measures of creativity**

Assessing students' creative work, many types of creativity tests involve different factors/variables measuring students' creativity. Before the 21<sup>st</sup> century, many researchers (Frederiksen & Ward, 1978; Friedlander, 1983; Majumdar, 1975; Sinha & Singh, 1987) used different types of creativity tests for middle, high, and college students. These tests measured students' fluency, flexibility and originality in the creative work of science. In the 21<sup>st</sup> century, these tests were scientifically validated by different authors (Ateşgoz et al., 2021; Hu & Adey, 2002) and used in different fields of education. Furthermore, several models of creativity measures are also available in the field of education. For example, the Integrated Constraints in Creativity (ICIC) model based on students' exclusionary and focusing skills in the creative activities in mathematics (Tromp et al., 2022); the Torrance Test of Creative Thinking assessed students' fluency, originality, resistance, abstractness and sophistication in the creativity of arts (Hahm et al., 2019); and the PISA's creative thinking test involved factors of generating diverse ideas, generating creative ideas and evaluating and improving ideas from science, arts and mathematics (Lucas, 2022).

In the field of art and design education, one study (Lewis, 2019) measured the junior-design students' creativity in arts by the creativity climate model/questionnaire in which five dimensions such as challenge, freedom, idea support, trust/openness, and dynamism/liveliness. And another study (Wang et al., 2010) assessed students' art creativity by some factors in the creativity questionnaire; fluency, flexibility, originality and elaboration. The participants are 230 students who specialized in art and design education from the Department of computer-aided media design at Chand Jung University in Taiwan. Furthermore, to assess 98 architecture students' creativity in design education, the Consensual Assessment Technique (CAT) was used by another study (Watters & Jayson, 2020). Three main variables such as novelty, usefulness and appropriateness, were applied in the CAT assessment.

The above studies showed that many creativity assessments measured different factors of creative performances from different fields of study (e.g. science, mathematics, arts, design and so on). In our study, we plan to assess the creative performance of university students from the art and design education field. Therefore, we will have to use our self-developed creativity measurement scale to be able to assess our research objectives.

### **2.4. The role of motivation in creative activities**

Many studies have shown that there is a significant connection between motivation and creativity. Initially, preference was given to the hypothesis that with intrinsic motivation the person achieves a higher level of creativity than with extrinsic motivation. Amabile et al. (2002) tried to test this hypothesis by examining the influence of two types of motivation on writing a poem. The results showed that under the influence of intrinsic motivation, children compose more creative poems than under the influence of extrinsic motivation. Amabile assumed that intrinsic motivation would positively influence creativity, while the influence of extrinsic motivation would be negative. Amabile and Pillemer (2012)



investigated the influence of extrinsic motivation on the creativity of stories invented by 115 children (ages 15 to 10). The results showed that children in the group with the promised reward came up with less creative stories than the children in the group without the promised reward. Furthermore, according to a study by Zhu et al. (2018), there was no significant correlation between students' extrinsic motivation and their creativity in art education. However, when students' intrinsic motivation was low, extrinsic motivation was strongly related to creativity. And students' divergent thinking in creative activities can be influenced by both cognitive and social aspects such as intelligence, personality, intrinsic motivation, and environment (Sun et al., 2019). Zhu et al. (2018) also exclaimed that students' intrinsic motivation can increase their creativity in learning histories for numbers. Above all studies (Amabile et al., 2002; Amabile & Pillemer, 2012; Sun et al., 2019; Zhu et al., 2018) pointed out that extrinsic motivation did not have positive effects on students' creativity, and however the intrinsic motivation had positive significant impacts on students' creative performance.

Concerning failure avoidance motivation, it negatively affects the formation of minimal skills for creative self-expression, thereby reducing creativity (McClelland, 2007). Furthermore, there was a body of research with strong evidence that avoidance motivation reduces creativity is abundant (e.g. Friedman & Förster, 2002, 2005; Elliot et al., 2008; Mehta & Zhu, 2009; Lichtenfeld et al., 2012; Ickson et al., 2014).

Regarding the achievement motivation for creativity, one study (Strenacikova & Strenacikova, 2020) also exclaimed that students who have strong achievement motivation are willing to pay higher attention to their creative performance and higher mastery levels. Moreover, some studies (Friedman & Förster, 2005; Elliot et al., 2008; Mehta & Zhu, 2009) also averred that achievement motivation had positive and significant effects on a person's successful activity because the strong enthusiasm for creation can raise his/her innate urge/desire of creativity (Strenacikova & Strenacikova, 2020).

Students' divergent thinking is important; however, it can be lost for creative performance in learning when they have no motivation to learn due to time constraints (Paek et al., 2021). Then, another study (Beghetto et al., 2021) also put forward that there was an inter-relationship between motivational factors and divergent thinking in creative performance. Students' divergent thinking can also be enhanced by their extrinsic motivational factors in the classroom setting (Chen et al., 2020).

The originality of creative activities is positively correlated with students' motivational factors (Takeuchi et al., 2020). Moreover, children's extrinsic motivation has a moderate relationship with their creative originality and persistent attitude toward their creative activities (Shi et al., 2021). This statement was also supported by another study (Shumakova, 2021) that the external motivation by parents promoted students' imaginative creativity such as originality and elaboration.

Considering students' persistent attitude in the creativity measure, one study (Yuan et al., 2019) dawned upon the importance of their intrinsic motivation for developing their persistent attitudes in creative activities of art and design education.

Furthermore, students' intellectual risk-taking is positively related to their intrinsic motivation for learning activities (Lucas, 2022; Tehrani-Doost et al., 2020). This finding is also supported by another study (Rubio et al., 2003) that students' intellectual risk-taking behaviors can be increased by their inherited interests and curiosity. And Gürkan (Şeker, 2013) also averred that there is something behind students' intellectual risk-taking behaviors for creative performance, and it is definitely 'the motivation'.

## **2.5. Russian art and design education**

In the modern Russian school, art education is implemented in the process of compulsory study of the subject area 'Art', the subjects 'Music' and 'Fine Arts' from grades 1 to 7. In grade 8, these subjects are studied based on the options for an exemplary curriculum as part of the implementation of the compulsory part of the educational program of basic general education. In the 9th grade, the integrated course 'Art' is studied by schoolchildren when implementing part of the curriculum. Within the framework of another way, familiarization with art has an informal character. It is also implemented in kindergartens, general education and art schools, and specialized secondary and higher educational institutions for the humanities and non-humanities. It is understood that sections in various areas of art in educational institutions, specialized centers for aesthetic or artistic education, choir, dance and theater groups, circles of

children's and youth creativity, etc., will help children of different ages to decide on preferences in the field of arts (Alekseeva et al., 2011).

Art and design higher education in Russia is implemented within the framework of bachelor's (4 years) and master's (2 years) degree programs. Since such subjects as 'Technology' and 'Fine Arts' are not included in the list of the Unified State Exam (USE), universities have the right to conduct creative tests (drawing, painting, composition and etc.), but as additional subjects for the competition in the list of entrance tests USE in literature or social studies is included (Kozlovskiy et al., 2010).

The two-level training did not provide an increase in the quality of vocational education; and taking into account the tangible decrease in the level of preparation of applicants at school, this only complicated the situation in vocational education in Russia (Kozlovskiy et al., 2010). There are two years of master's degree, perhaps during this time, the student will be able to turn into a professional. However, there is clearly a lack of design thinking, research, and design skills to study markets and introduce products to them, as a team and individual art-project work (Carlgren et al., 2016). Moreover, all of these factors are significant only if learners have a strong basis of connection between themselves and their teacher. This foundation relies on the teacher's comprehensive understanding of the subject matter, their perspective, cultural knowledge, and intelligence, as well as their dedication, proficiency, kindness, and moral values. However, the most crucial element is the teacher's humanistic approach towards each student, coupled with a genuine desire for their individual success (Roshchin & Filippova, 2020).

## 2.6. Research aim and questions

This study aims to investigate the effects of students' motivation on their creativity in Russian art and design education. Therefore, it addresses the following research questions.

RQ<sub>1</sub>: To what extent can the MCQ reliably and validly measure the factors of students' motivation (intrinsic, achievement, failure avoidance, and extrinsic) in Russian art and design education?

RQ<sub>2</sub>: How reliable and valid is the MCQ in assessing the elements of students' creativity (divergent thinking, originality of ideas, persistent attitude, and intellectual risk-taking) in Russian art and design education?

RQ<sub>3</sub>: What is the effect of students' motivation on their creativity in Russian art and design education?

## 3. Method

### 3.1. Instrument

The Motivation for Creativity Questionnaire (MCQ) is a self-designed questionnaire that evaluates the resulting tendency of motivation and creativity. In the questionnaire, participants were asked to express how much they agree or disagree with a particular statement (5-point Likert scale). In the beginning, the MCQ questionnaire consisted of sixty items; 30 items for each dimension of motivation and creativity. The content validity of the instruments used in this study has been previously established in order to ensure their validity. The content validity index (CVI) values for each item were calculated 'by counting the number of experts who rated the item as three or four and dividing that number by the total number of experts' (Rubio et al., 2003, p.97). In the content validation, CVI of all items were greater than 0.80, except for the deleted ten items which were lower than 0.80.

After the previous content validation with six experts from the fields of motivation and art and design education, fifty items were left in total for measuring the construct validity of our instruments in this study: twenty-five items from each dimension of motivation and creativity.

### 3.2. Sample

This study was conducted in Russia (Republic of Tatarstan). The study employed the non-random sampling (stratified sampling), involving 193 students from the field of Russian art and design education in the Kazan Federal (Volga Region) University. Participants were chosen from distinct strata or categories,



specifically from first, second, third, and fourth-year students, with the majority being female (86%). We followed the recommendation of Raykov and Widaman (1995) that the minimum sample should be ten participants per the estimated parameter in SEM.

### 3.3. Procedure

In this exploratory quantitative study, an online survey was designed to non-randomly collect data from students in the field of art and design education. The reason for collecting data was to confirm the validity and reliability of the questionnaire items. The students were informed that their anonymity would be guaranteed, their participation would contribute to the existing research in Russia, and that completing the questionnaire will not take more than 20 minutes to go through. In the MCQ, respondents are also asked to provide their personal and demographic information.

### 3.4. Analysis

To analyze the obtained data, the IBM SPSS V23, and the IBM SPSS AMOS software have been used. To analyze the maximum likelihood estimation by Structural Equation Modelling (SEM), we scrutinized whether there were enough participants in our study. At the beginning, we controlled the reliability of the two dimensions (creativity and motivation) by calculating the values of Cronbach's alphas, we also controlled the reliability of the eight scales formulated based on the theoretical background. After that, based on the exploratory factor analysis (EFA) and various reliability and validity measures, we compared the empirical structure of the variable system with the theoretical structure to indicate the match or the mismatch of the items within the scales based on the phenomenon of creativity and factor of motivation. We considered the modification and deletion of some items and renamed some scales based on the factor analysis to be able to finalize the questionnaire items for the main study. Next, we run structural equation modeling (SEM) to investigate how much of a closed relationship exists between the items and factors in the questionnaire. Finally, we run a correlation analysis in order to know the relations between eight scales of two dimensions.

## 4. Findings

### 4.1. Addressing RQ<sub>1</sub>

To address this research question, we ran the exploratory factor analysis (EFA), and analyzed the construct validity measures of the motivation domain from the MCQ.

#### 4.1.1. EFA for the motivation dimension of the MCQ

EFA aimed to explore what items belong to which factors of the motivation questionnaire (Şeker, 2013). We developed this questionnaire to measure students' motivational factors in their Russian art and design education. After running the EFA with the use of IBM SPSS statistics 23, five items were deleted from the first version of our questionnaire (25 items) failing the minimum factor loading of .40 (Williams et al., 2010). Five deleted items were: item-3. *I would play games that are well known than rare games that require special skill and are known to a few people*; item-7. *I would do something as I see fit, even with a 50% risk of being wrong, then do it the way others advise me*; item-16. *I dream more about my plans for the future than trying to actually implement them*; item-18. *After a successful answer on the exam, I would rather sigh: 'it has gone by!' rather than rejoice at a good grade*; and item-22. *If I need to stay at home, I use the time to relax and unwind rather than to read and work*. Therefore, we found four main factors with a total of 20 items in this questionnaire (Kaiser-Meyer-Olki, KMO = .752, recommended by (Gliner et al., 2017) that >.5 is acceptable, >.7 is good): five items in the factor of intrinsic motivation, seven items in the achievement motivation, four items in the failure avoidance motivation, and four items in the extrinsic motivation (see in Table 1).

**Table 1.** EFA of motivation dimension: factor loadings of items.

No	Items	IM	AM	FM	EM
2	I am inclined towards a business that I am confident will succeed, rather than challenging one that may have unexpected issues.	.592			
4	It is important for me to do my work as best as possible, even if this causes conflicts with my peers.	.600			
14	I am able to work more efficiently on a task when given specific instructions and guidance, as opposed to more general directives.	.718			
17	I prefer competitions where the strengths of all participants are approximately equal.	.694			
24	I am able to work more efficiently on a task when given general guidelines and flexibility, rather than being told precisely what to do and how to do it.	.689			
5	If something did not work out for me, I would do my best to cope with it and then move on to something that can work out well.		.711		
6	During my free time, I master a game (hobby) to develop my skills in order to rest or have entertainment.		.508		
9	My preference is to work in a cautious and deliberate manner, ensuring that I am fully content with the outcome, rather than rushing to complete the task quickly and with minimal stress.		.553		
11	After a failure, I become even more collected and energetic, then lose the desire to continue the work.		.584		
21	In the new unknown situations, interest and curiosity arise in me rather than worry and anxiety.		.615		
23	When I have to compete, I have more interest and excitement than anxiety.		.592		
25	When I make a mistake while working on an important task, I tend to feel disoriented and hopeless rather than focusing on finding a solution to the problem.		.510		
12	I am not willing to take part in any business venture if there is any uncertainty regarding its potential for success.			.613	
15	After successfully completing a task, I would feel confident in taking on a similar one before moving on to a different type of task.			.492	
19	I prefer competitions where I am stronger than those where the strengths of all participants are approximately equal.			.690	
20	Failure poisons my life more than success brings joy.			.515	
1	When faced with a challenging and unfamiliar task, I would prefer to work on it with someone else rather than tackling it alone.				.732
8	I would play in a team than compete one-on-one.				.578
10	If something does not work out for me, I would turn to someone for help than continue to look for a way out myself.				.720
13	I work more efficiently under someone's guidance rather than being solely responsible for a task.				.424

Note. KMO: .752; IM: intrinsic motivation; AM: achievement motivation; FM: failure avoidance motivation; EM: extrinsic motivation.

#### 4.1.2. Reliability and validity for the motivation dimension of the MCQ

The construct validity of the motivation questionnaire was also confirmed by the way of measuring its convergent and discriminant validities. For the convergent validity of the motivation questionnaire, its internal consistency reliability (Cronbach's alpha), composite reliability (CR) and average variance extracted values were investigated. In this motivation questionnaire, the values are consistent with the recommended values by (Fornell & Larcker, 1981) as shown in the asterisk symbol (\*) in Table 2. In AVE analysis, the values from the intrinsic motivation factor (.43) and failure avoidance motivation factor (.42) are lower than the recommended values (\*>.50). However, the CR values of this motivation questionnaire are >.70. Therefore, these low AVE values are acceptable to confirm its convergent validity (Lam, 2012).

For the discriminant validity measures of the motivation questionnaire, we analyzed the HTMT (*heterotrait-monotrait*) ratios of the motivation questionnaire. Values of HTMT ratios from the motivation questionnaire ranged from 0.08 to 0.65 (see Table 3). They were lower than .85 (\*<.85, recommended by Kline (2005). Therefore, we assumed that the motivation questionnaire was valid in its discriminant measures. Based on the above convergent validity and these discriminant validity measures, our motivation questionnaire was reliable and valid for measuring students' motivational factors in art and design education.

Due to the above EFA and construct validity measures, we found that they had acceptable and good values enough for the MCQ to be used in assessing students' motivation (intrinsic, achievement, failure avoidance, and extrinsic) in Russian art and design education.

**Table 2.** Convergent validity measures of the motivation questionnaire.

Factors	No. of items	Cronbach's alpha (>.70) <sup>a</sup>	AVE (>.50) <sup>a</sup>	CR (>.70) <sup>a</sup>
Intrinsic motivation	5	.78	.43	.71
Achievement motivation	7	.77	.54	.78
Failure avoidance motivation	4	.50	.42	.72
Extrinsic motivation	4	.60	.51	.71
Total	20	.71	.52	.87

Note. <sup>a</sup>Shows an acceptable level of reliability or validity.

## 4.2. Addressing RQ<sub>2</sub>

For the reliability and validity of measuring students' creativity in Russian art and design education, we investigated two main analyses such as EFA and construct validity (including convergent and discriminant validity measures).

### 4.2.1. EFA for the creativity dimension of the MCQ

IBM SPSS statistics 23 was used to run the EFA for the reliable use of the creativity questionnaire. In the first version of the creativity questionnaire, there were twenty-five items. Running EFA, it showed a good KMO value of .910 (Gliner et al., 2017) after deleting some items: item-8. *I am nervous if I do not know what will happen next*; item-10. *I like to discuss my ideas with friends*; item-12. *I do not like to stick to rules*; item-14. *If I found an answer to a question once, I will stick with it and not look for other answers*; item-20. *I like when all things are in their places*; and item-25. *I like to pay attention to details or little things that other people usually do not notice*. After EFA, 19 items (nine items for the factor of divergent thinking, three items for the originality of ideas, five items for the persistent attitude, and two items for intellectual risk-taking) were found useful to measure students' creativity in the art and design education (see Table 4).

### 4.2.2. Reliability and validity of the creativity dimension of the MCQ

For the construct validity of this motivation questionnaire, its convergent and discriminant validities were confirmed. Internal consistency reliability (Cronbach alpha,  $\alpha$ ), composite reliability (CR), and average variance extracted (AVE) were also analyzed for the convergent validity of the questionnaire. In this creativity questionnaire, the values are consistent with Fornell and Larcker's (1981) recommended values (\*Table 5). In AVE analysis, the values from the divergent thinking factor (.40) and persistent attitude factor (.40) are lower than the recommended values (\*>.50). However, these low AVE values are also acceptable to confirm its convergent validity (Lam, 2012) because the CR values of this motivation questionnaire are >.70.

For the discriminant validity measures, inter-construct correlations of the factors were compared with the square root of AVE. All square roots of AVE values were greater than the inter-construct correlation values (Fornell & Larcker, 1981). Therefore, discriminant validity was also confirmed for this questionnaire (Table 6).

Based on the above EFA, convergent and discriminant validity measures which were consistent with the recommended values, we responded with the RQ<sub>2</sub> that the MCQ could reliably measure the elements of students' creativity (divergent thinking, originality of ideas, persistent attitude, and intellectual risk-taking) in the Russian art and design education.

## 4.3. Addressing RQ<sub>3</sub>

To answer the third research question with the help of IBM-AMOS software, we analyzed the regression weights of motivational factors on students' creativity in art and design education. The findings showed the non-significant Chi-square ( $\chi^2 = 7.70$ , and degrees of freedom (df = 3) the good model fit measures: SRMR = .79 (\* >.7), CFI = .98 (\* $\geq$ .9) and RMSEA = .67(\*<.08).

Particularly in the investigation of students' motivation on their creative performance in the Russian art and design education, it was found that students' intrinsic motivation had a positive significant impact on their creative performance of divergent thinking reflection ( $\beta = .15$ ,  $p < .05$ ), originality of ideas ( $\beta = .10$ ,  $p < .05$ ), persistent attitude ( $\beta = .21$ ,  $p < .05$ ) and intellectual risk-taking ( $\beta = .50$ ,  $p < .05$ ).

**Table 3.** HTMT ratios of the correlations of the constructs (Discriminant Validity of the Test).

Construct	1	2	3	4
1. Intrinsic motivation	1.00	0.51	0.45	0.65
2. Achievement motivation		1.00	0.47	0.08
3. Failure avoidance motivation			1.00	0.39
4. Extrinsic motivation				1.00

Note: HTMT (heterotrait-monotrait) ratio = Average heterotrait-heteromethod correlations/Square root of (average monotrait-heteromethod correlation of (first construct) × (second construct)).

**Table 4.** EFA of creativity dimension: factor loadings of items.

No	Items	DT	OI	PA	IR
6	Usually, I do not waste time dreaming that someday I will become a famous artist, musician, or poet.	.534			
7	Some of my ideas capture me so much that I forget about everything in the world.	.653			
9	I love what is unusual.	.551			
11	I would like to create or do something that no one else has been able to do before me.	.539			
15	I love to imagine how people will live in the distant future.	.715			
19	I like to invent something new, even if it is impossible to do in reality.	.712			
21	I love to tackle new things to see what comes out of it.	.682			
22	I like to think about something that has never occurred to anyone.	.633			
23	When I see a picture depicting someone unfamiliar to me, I wonder who it is.	.522			
4	I would do everything as usual and then look for new ways.		.696		
16	I would like the world and the people around me not to change.		.713		
24	I think there is one correct answer to most of the questions.		.665		
1	I like to examine the subject carefully in order to discover details that I have not seen before.				.529
2	I do not like to plan work in advance.				.839
3	If I encounter a failure or setback on the first attempt, I will persist and work until I am able to succeed.				.500
5	I like to do something new.				.601
17	I trust my feelings and intuition.				.470
13	I like to solve even a problem that does not have a correct (usual) way of solving it.				.735
18	I am interested in mechanisms; it is curious to see what they have inside and how they work.				.654

Note. KMO: .914; DT: divergent thinking; OI: originality of ideas; PA: persistent attitude; IR: intellectual risk-taking.

**Table 5.** Convergent validity measures of the motivation questionnaire.

Factors	No. of items	Cronbach's alpha (>.70) <sup>a</sup>	AVE (>.50) <sup>a</sup>	CR (>.70) <sup>a</sup>
Divergent thinking	9	.87	.40	.85
Originality of ideas	3	.60	.50	.73
Persistent attitude	5	.83	.40	.73
Intellectual risk-taking	2	.60	.51	.70
Total	19	.82	.50	.92

Note. <sup>a</sup>Shows an acceptable level of reliability or validity.

Furthermore, students' achievement motivation had also significant and positive effects on their creativity: divergent thinking reflection ( $\beta=.54$ ,  $p<.05$ ), originality of ideas ( $\beta=.31$ ,  $p<.05$ ), persistent attitude ( $\beta=.52$ ,  $p<.05$ ) and intellectual risk-taking ( $\beta=.52$ ,  $p<.05$ ). However, it was not found significant in the effectiveness of students' failure avoidance motivation and extrinsic motivation on their creative performance. This can be explained by the fact that an external reward (for example, money or a high grade) for completing a task is often the decisive factor that makes a person overcome the fear of failure and force him to act. The results were shown in Figure 1. After investigating the correlation coefficient, it was found that items of scales: divergent thinking, originality of ideas, persistent attitude, intellectual risk-taking, intrinsic motivation, failure avoidance motivation correlated significantly with each other, except of items of scales achievement motivation and extrinsic motivation (see Table 7). The reason for this can be explained in the theory of motivation, because there is no connection between the personality that shows inner willingness to be successful in any business and personality which does it only by means of the external reward or avoidance of punishment. Results also showed the correlation between students' motivation and their creative performance, pointing out that not only students' motivational factors affect their creative performance but also their creativity affects their motivational factors.

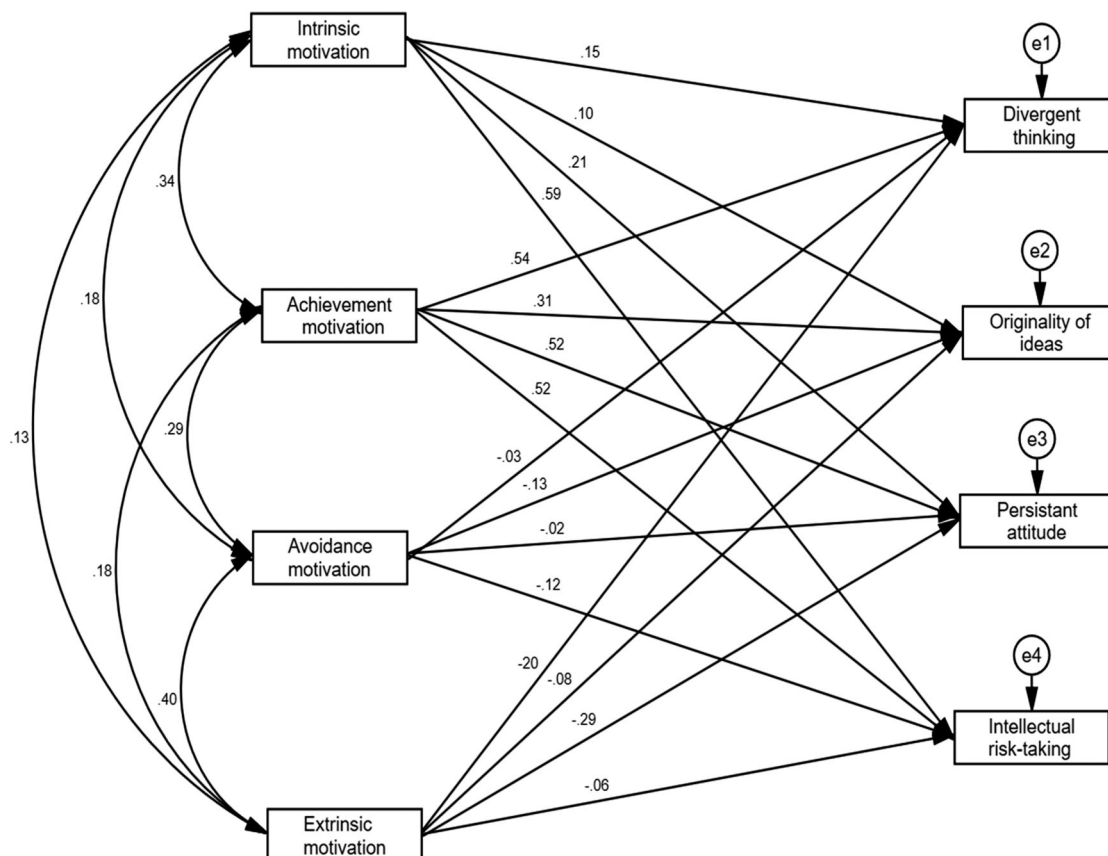
## 5. Discussion

The present results expanded our understanding of the students' motivation that influences their creative potential, using the Motivation for Creativity Questionnaire (MCQ). First, we recognized the

**Table 6.** Discriminant validity of the creativity questionnaire.

Component correlation matrix						
Component	1	2	3	4	AVE	The square root of AVE
1. Divergent thinking	1.00				.40	.62
2. Originality of ideas	.59	1.00			.50	.70
3. Persistent attitude	.46	.35	1.00		.40	.62
4. Intellectual risk-taking	.39	.21	.34	1.00	.51	.71

Note. AVE (average variance extracted).

**Figure 1.** Effects of motivation on students' creativity.

importance of developing a tool to measure motivation factors in undergraduate students in art and design field. Little prior research had been conducted on this particular population in relation to creativity, and we saw a need for empirical work in this area. Second, four types of motivation and four elements of creativity, which are the basis of our questionnaire, were identified. Finally, with the use of the IBM-SPSS v23 and IBM SPSS-AMOS software, the analysis has been done, the results of which we tend to discuss in this section. In this study, three research questions were addressed.

In the RQ<sub>1</sub> which investigated whether the MCQ could measure the factors of students' motivation (intrinsic, achievement, failure-avoidance, and extrinsic) in Russian art and design education, we used the analyses of EFA and construct validity measures. The original questionnaire had twenty-five items; however, there were twenty items left after running EFA. In EFA, to know which items belong to which factors, there were five items in the factor of intrinsic motivation, seven items in the achievement motivation, four items in the failure avoidance motivation, and four items in the extrinsic motivation. Factor loadings that were lower than .4 were suppressed in this study. The reason for the lower factor loadings of these five items may be the lower sample size of this study. However, the number, 193, is a huge amount because, at the current age, there are few students specializing in Russian art and design education at Universities and Colleges. After EFA, it is necessary to confirm the construct validity of MCQ which is in line with Şeker's (2013) suggestion. Therefore, we confirmed its construct validity (based on

convergent and discriminant validities). Different measures of CR, AVE and internal consistency reliability (Cronbach's alpha) proved the convergent validity of the motivation dimension of MCQ. Then, HTMT ratios which were lower than .85 ( $* < .85$ , recommended value) also confirmed its discriminant validity. Therefore, we could say, our motivation dimension of MCQ was reliable for measuring students' motivation in the Russian art and design education.

In the RQ<sub>2</sub> which was the investigation of the reliability and validity of the creativity dimension from the MCQ, we also analyzed its EFA and construct validity based on the convergent and discriminant validity. There were 19 items left out of the original 25 items in this dimension after deleting six items with lower factor loadings ( $< .4$ , Kline, 2005), which occurred due to the lower sample size of this study. We found four different factors; nine items in divergent thinking, three items in the originality of ideas, five items in the persistent attitude, and two items in intellectual risk-taking. For the construct validity, we analyzed its convergent validity (investigating its Cronbach's Alpha, CR, and AVE values) and its discriminant validity based on the comparison of the square root of AVE and factor correlations (Oo et al., 2021). The construct validity of this creativity dimension was also confirmed. Therefore, based on these research questions RQ<sub>1</sub> and RQ<sub>2</sub>, we interpreted that the MCQ questionnaire was reliable and valid for measuring students' motivation and creativity motives in the field of Russian art and design education.

The RQ<sub>3</sub> is to scrutinize the effects of students' motivation factors on their creative performance in Russian art and design education. With the help of structural equation modeling by AMOS, we found out that students' intrinsic motivation had a significant positive impact on students' creative performance such as divergent thinking, originality of ideas, persistent attitude, and intellectual risk-taking in art and design education; however, their extrinsic motivation had no significant impacts on their creativity. This finding is in line with many other studies (Amabile et al., 2002; Amabile & Pillemer, 2012; Zhu et al., 2018). This may be the reason for the nature of Russian art and education and students who pay more intention to their inner urges rather than extrinsic motivation such as rewards or punishments. Achievement motivation, as another important factor of students' motivation, also had a significant impact on students' creative performance. This finding is also the same as the findings of some studies (Miksza, 2011; Strenacikova & Strenacikova, 2020). These positive impacts may stem from Russian students' strong will, deep perspectives, and belief to achieve in their creative works of art and design education.

As for the case of students' failure avoidance motivation, some negative significant impacts were found on their creative performance. It means that if Russian students have more avoidance motivation, they will not succeed in their creative performance in art and design education. Some studies (Heimerdinger & Hinsz, 2008; Icekson et al., 2014; Schüler et al., 2013) also agreed with this finding of our research that students' avoidance motivation can undermine their creativity because of their uncontrollable cognitive factors such as threat appraisals, stress, and anxiety to perform their creative works. Furthermore, extrinsic motivation had also some negative impacts on their creative performance. This finding is also in line with Amabile and other's (1996) finding that students' performance under the extrinsic orientation was significantly low-creative in art and design education. In fact, although some

**Table 7.** Means, standard deviations, pearson correlation matrix for MCQ variables.

	Motivation				Creativity			
	IM	AM	FM	EM	DF	OI	PA	IR
M	3.059	3.244	3.058	2.823	3.385	3.328	3.532	3.269
SD	.459	.775	.784	.831	.963	.942	1.049	1.081
Motivation								
IM	1							
AM	.208*	1						
FM	.175*	.286*	1					
EM	.125	-.080	.171*	1				
Creativity								
DF	.229*	.571*	.082	-.235*	1			
OI	.162*	.227*	.275*	-.041	.447*	1		
PA	.275*	.578*	.111	-.307*	.738*	.405*	1	
IR	.128	.501*	.026	-.118	.444*	.142*	.379*	1

Note. IM: intrinsic motivation; AM: achievement motivation; FM: failure avoidance motivation; EM: extrinsic motivation; DF: divergent thinking; OI: originality of ideas; PA: persistent attitude; IR: intellectual risk-taking. Correlation is significant at the 0.05 level.



studies (Amabile & Pillemer, 2012; Donald et al., 2020; Guay et al., 2010) supported that extrinsic motivation such as rewards, punishments, and different kinds of social supports or incentives can have positive impacts on students' achievement, it was found that low or negative impacts on their creative works in the art and design education (Amabile et al., 1996; Amabile & Pillemer, 2012; Zhu et al., 2018). Therefore, it was seen clearly that Russian students' creative performance does not depend on their extrinsic motivation supported by their surroundings. In fact, our study could show the relationship between students' motivation and creativity factors, highlighting the effects of motivation on students' creativity, and vice versa.

There are practical implications for art and design education as a result of the study's findings. Firstly, the MCQ questionnaire can be used to assess the students' motivation, enabling educators to adapt their approaches accordingly. Furthermore, students' creative potential can be enhanced by understanding motivation factors and creative dimensions. Educators can employ this insight to design curricula and teaching strategies that cater to diverse motivational profiles, thus enhancing students' creative potential. It is also possible for educators to promote intrinsic motivations and achievement motivations while minimizing the negative effects of failure avoidance and extrinsic motivations. Accordingly, educators can promote intrinsic motivation by fostering autonomy, mastery, and purpose while creating a supportive environment that encourages their best performance. Furthermore, integrating quantitative and qualitative data can inform more holistic educational practices by providing a deeper understanding of students' experiences.

## 6. Limitations

This study has some limitations. The distinct limitation of this study is the low sample size. However, it is a huge amount in the art and design education field. Kline (2005) also suggested that the minimum sample number is around 200 to run the SEM. Accordingly, we plan to increase the sample size for further study in order to get more precise results. While quantitative data can provide valuable insights into the motivation and creativity of students in Russian art and design education, we recognize that the lack of qualitative data is a limitation of our study. Qualitative data could have provided a deeper understanding of the subjective experiences of the participants and the contextual factors that may have influenced their motivation and creativity. We acknowledge that without qualitative data, our study may be limited in its ability to fully capture the complexity and richness of the participants' experiences. However, due to methodological and practical constraints, we are unable to collect qualitative data in this study. We encourage future research to explore these aspects of motivation and creativity in Russian art and design education using mixed methods approaches.

## 7. Conclusion

Taking into account the previous discussion, it can be inferred that motivation plays a significant role in determining students' creative performance in art and design education. The questionnaire developed for this study is reliable, and the research conducted is pertinent as it highlights the degree to which the empirical structure of the variable system corresponds to the theoretical framework. This study focused on the motivation on creativity questionnaire, and thus it can provide benefits/contributions to both fields of motivation and creativity measures from art and design education. Since the creativity measure is the fundamental requirement in art and design education, this study is useful to some degree for learners and educators from the field of art and design education.

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## Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Institutional Review Board statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board of University of Szeged, Doctoral School of Education.

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## References

- Alekseeva, L. L., Olesina, E. P., & Shkolyar, L. V. (2011). Art education in the Russian federation: formation of creative potential in the 21st century: Analytical report. Ros. Institute of Cultural Studies., etc.; resp. ed. K.E. Razlogov, 81.
- Amabile, T. M. (1996). *Creativity in context*. Westview Press.
- 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.

- Amabile, T. M., Barsade, S. G., Mueller, J. S., & Staw, B. M. (2005). Affect and creativity at work. *Administrative Science Quarterly*, 50(3), 367–403. <https://doi.org/10.2189/asqu.2005.50.3.367>
- Amabile, T. M., Hadley, C. N., & Kramer, S. J. (2002). Creativity under the gun. *Harvard Business Review*, 80(8), 52–61, 147.
- Amabile, T. M., & Pillemer, J. (2012). Perspectives on the social psychology of creativity. *The Journal of Creative Behavior*, 46(1), 3–15. <https://doi.org/10.1002/jocb.001>
- Atesgoz, N., & Sak, U. (2021). Test of scientific creativity animations for children: development and validity study. *Thinking Skills and Creativity*, 40(December 2020), 100818. <https://doi.org/10.1016/j.tsc.2021.100818>
- Balkin, A. (1990). What is creativity? what is it not? *Music Educators Journal*, 76(9), 29–32. <https://doi.org/10.2307/3401074>
- Bastos, F., & Zimmerman, E. (2017). Creativity in art education: intersecting with design, visual culture, and social justice. *Revista GEARTE*, 4(3), 384–401. <https://doi.org/10.22456/2357-9854.75178>
- Beghetto, R. A., Karwowski, M., & Reiter-Palmon, R. (2021). Intellectual risk-taking: A moderating link between creative confidence and creative behavior? *Psychology of Aesthetics, Creativity, and the Arts. Advance Online Publication*, 15(4), 637–644. <https://doi.org/10.1037/aca0000323>
- Bravo, J. C., Intriago, E. A., Holguin, J. V., Garzon, G. M., & Arcia, L. O. (2017). Motivation and autonomy in learning english as foreign language : a case study of ecuadorian college students. *English Language Teaching*, 10(2), 100–113. <https://doi.org/10.5539/elt.v10n2p100>
- Breva, A., & Galindo, M. P. (2020). Types of motivation and eudemonic well-being as predictors of academic outcomes in first-year students: A self-determination theory approach. *PsyCh Journal*, 9(5), 609–628. <https://doi.org/10.1002/pchj.361>
- Brunstein, J. C., & Heckhausen, H. (2008). Achievement motivation. *Psychology of Classroom Learning*, 1, 9–28. [https://doi.org/10.1007/978-3-319-65094-4\\_6](https://doi.org/10.1007/978-3-319-65094-4_6)
- Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation* (pp. 17–23). Harper Collins Publishers.
- Carlgren, L., Elmquist, M., & Rauth, I. (2016). The challenges of using design thinking in industry—experiences from five large firms. *Creativity and Innovation Management*, 25(3), 344–362. <https://doi.org/10.1111/caim.12176>
- Chamakiotis, P., Dekoninck, E. A., & Panteli, N. (2013). Factors influencing creativity in virtual design teams: an interplay between technology, teams and individuals. *Creativity and Innovation Management*, 22(3), 265–279. <https://doi.org/10.1111/caim.12039>
- Chen, P. Z., Chang, T. C., & Wu, C. L. (2020). Effects of gamified classroom management on the divergent thinking and creative tendency of elementary students. *Thinking Skills and Creativity*, 36(April), 100664. <https://doi.org/10.1016/j.tsc.2020.100664>
- Choi, J. H. J., Payne, A., Hart, P., & Brown, A. (2019). Creative risk-taking: developing strategies for first year university students in the creative industries. *International Journal of Art & Design Education*, 38(1), 73–89. <https://doi.org/10.1111/jade.12169>
- Corazza, G. E. (2016). Potential originality and effectiveness: the dynamic definition of creativity. *Creativity Research Journal*, 28(3), 258–267. <https://doi.org/10.1080/10400419.2016.119>
- Dewett, T. (2006). Exploring the role of risk in employee creativity. *The Journal of Creative Behavior*, 40(1), 27–45. <https://doi.org/10.1002/jocb.2006.40.issue-1>
- Di Domenico, S. I., & Ryan, R. M. (2017). The emerging neuroscience of intrinsic motivation: a new frontier in self-determination research. *Frontiers in Human Neuroscience*, 11(March), 145. <https://doi.org/10.3389/fnhum.2017.00145>
- Donald, J., Bradshaw, N., Ryan, E. L., Basarkod, R. M., Ciarrochi, G., Duineveld, J. J., Guo, J., & Sahdra, B. K. (2020). Mindfulness and its association with varied types of motivation: A systematic review and meta-analysis using self-determination theory. *Personality & Social Psychology Bulletin*, 46(7), 1121–1138. <https://doi.org/10.1177/0146167219896136>
- Eisenberger, R., & Aselage, J. (2009). Incremental effects of reward on experienced performance pressure: positive outcomes for intrinsic interest and creativity. *Journal of Organizational Behavior*, 30(1), 95–117. <https://doi.org/10.1002/job.543>
- Elliot, A. J., Maier, M. A., Binser, M. J., Friedman, R., & Pekrun, R. (2008). The effect of red on avoidance behavior in achievement contexts. *Personality & Social Psychology Bulletin*, 35(3), 365–375. <https://doi.org/10.1177/0146167208328330>
- Fuller, M. A., Valacich, J. S., & George, J. F. (2008). *Information systems project management: A process and team approach*. Pearson Prentice Hall.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, 39–50. <https://doi.org/10.1177/002224378101800104>
- Frederiksen, N., & Ward, W. C. (1978). Measures for the study of creativity in scientific problem-solving. *Applied Psychological Measurement*, 2(1), 1–24. <https://doi.org/10.1177/014662167800200101>
- Friedlander, M. (1983). A natural science creativity test as a prediction of creative thinking in science. *Creative Child & Adult Quarterly*, 8(4), 211–215.
- Friedman, R. S., & Förster, J. (2002). The influence of approach and avoidance motor actions on creative cognition. *Journal of Experimental Social Psychology*, 38(1), 41–55. <https://doi.org/10.1006/jesp.2001.1488>

- Friedman, R. S., & Förster, J. (2005). Effects of motivational cues on perceptual asymmetry: implications for creativity and analytical problem solving. *Journal of Personality and Social Psychology*, 88(2), 263–275. <https://doi.org/10.1037/0022-3514.88.2.263>
- Ghasemi, E., Rastegar, A., Jahromi, R. G., & Marvdashti, R. R. (2011). The relationship between creativity and achievement motivation with high school students' entrepreneurship. *Procedia - Social and Behavioral Sciences*, 30, 1291–1296. <https://doi.org/10.1016/j.sbspro.2011.10.250>
- Gliner, J. A., Morgan, G. A., & Leech, L. N. (2017). *Research methods in applied settings: an integrated approach to design and analysis* (3rd ed., pp. 73–74). Routledge.
- Gralewski, J. (2018). Teachers' beliefs about creative students' characteristics: a qualitative study. *Thinking Skills and Creativity*, 31(2), 138–155. <https://doi.org/10.1016/j.tsc.2018.11.008>
- Guay, F., Chanal, J., Ratelle, C. F., Marsh, H., Larose, S., & Boivin, M. (2010). Intrinsic, identified, and controlled types of motivation for school subjects in young elementary school children. *The British Journal of Educational Psychology*, 80(Pt 4), 711–735. <https://doi.org/10.1348/000709910X499084>
- Hahm, J., Kim, K. K., & Park, S. H. (2019). Cortical correlates of creative thinking assessed by the figural torrance test of creative Thinking. *NeuroReport*, 30(18), 1289–1293. <https://doi.org/10.1097/WNR.0000000000001358>
- Heimerdinger, S. R., & Hinsz, V. B. (2008). Failure avoidance motivation in a goal-setting situation. *Human Performance*, 21(4), 383–395. <https://doi.org/10.1080/08959280802347155>
- Hocking, D. (2016). Motivation in the tertiary art and design studio: a multi-perspectival discourse analysis. *Text & Talk*, 36(2), 155–177. <https://doi.org/10.1515/text-2016-0009>
- Hu, W., & Adey, P. A. (2002). Scientific creativity test for secondary school students. *International Journal of Science Education*, 24(4), 389–403. <https://doi.org/10.1080/09500690110098912>
- Humble, S., Dixon, P., & Mpofo, E. (2018). Factor structure of the Torrance tests of creative thinking figural form a in Kiswahili speaking children: multidimensionality and influences on creative behavior. *Thinking Skills and Creativity*, 27, 33–44. <https://doi.org/10.1016/j.tsc.2017.11.005>
- Icekson, T., Roskes, M., & Moran, S. (2014). Effects of optimism on creativity under approach and avoidance motivation. *Frontiers in Human Neuroscience*, 8(1 FEB), 105. <https://doi.org/10.3389/fnhum.2014.00105>
- Kian, T., Yusoff, W., & Rajah, S. (2014). Motivation for generations' cohorts: an organizational justice perspective. *International Journal of Management Sciences*, 11(2), 536–542.
- Kim, K. H. (2017). The torrance tests of creative thinking - figural or verbal: which one should we use? *Creativity. Theories – Research - Applications*, 4(2), 302–321. <https://doi.org/10.1515/ctra-2017-0015>
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). Guilford Press.
- Kline, R. B. (2011). *Principles and practice of structural equation modelling* (3rd ed.). Guilford Press.
- Kolb, D. A. (1984). Experience as the source of learning and development. In D. A. Kolb (Eds.), *Experiential Learning* (p. 41). Prentice-Hall Inc.
- Kozlovskiy, V., Khokhlova, A., Veits, M. (2010). *The role of Russian educational institutions in the promotion of access for adults to formal education*, Department of Sociology, Saint Petersburg State University. National report for comparative report of Subproject, 5.
- Lichtenfeld, S., Elliot, A. J., Maier, M., & Pekrun, R. (2012). Fertile green: green facilitates creative performance. *Personality & Social Psychology Bulletin*, 38(6), 784–797. <https://doi.org/10.1177/0146167212436611>
- Lam, L. W. (2012). Impact of competitiveness on salespeople's commitment and performance. *Journal of Business Research*, 65(9), 1328–1334. <https://doi.org/10.1016/j.jbusres.2011.10.026>
- Lewis, T. (2019). *Creative networks: toward mapping creativity in a design classroom. lama abdulrahman harkan dissertation prepared for the degree of doctor of philosophy* December 2019 APPROVED : Michael Gibson, Co-Major Professor Laura Evans, Committee Member Denise Bax." University of North Texas.
- Lucas, B. (2022). A field guide to assessing creative thinking in schools. perth. FORM. <https://doi.org/10.13140/RG.2.2.24010.03529>
- Majumdar, S. K. (1975). A systems approach to identification and nurture of scientific creativity. *Journal of Indian Education*, 1(2), 17–23.
- McClelland, D. (2007). *Human motivation*. Peter.
- Mehta, R., & Zhu, R. J. (2009). *Blue or red? Exploring the effect of color on cognitive task performances: Science express report*. Sauder School of Business, University of British Columbia.
- Miksza, P. (2011). Relationships among achievement goal motivation, impulsivity, and the music practice of collegiate brass and woodwind players. *Psychology of Music*, 39(1), 50–67. <https://doi.org/10.1177/0305735610361996>
- Oo, T. Z., Magyar, A., & Habók, A. (2021). Effectiveness of the reflection-based reciprocal teaching approach for reading comprehension achievement in upper secondary school in Myanmar. *Asia Pacific Education Review*, 4(July), 1–24. <https://doi.org/10.1007/s12564-021-09707-8>
- Orhan, Ö. S. (2017). The effect of motivation on student achievement. In *The Factors Effecting Student Achievement: Meta-Analysis of Empirical Studies* (pp.35–55). <https://doi.org/10.1007/978-3-319-56083-0>
- Ostermaier, A., & Uhl, M. (2020). Performance evaluation and creativity: balancing originality and usefulness. *Journal of Behavioral and Experimental Economics*, 86(April), 101552. <https://doi.org/10.1016/j.socec.2020.101552>



- Paek, S. H., Alabbasi, A. M. A., Acar, S., & Runco, M. A. (2021). Is more time better for divergent thinking? A meta-analysis of the time-on-task effect on divergent thinking. *Thinking Skills and Creativity*, 41(May), 100894. <https://doi.org/10.1016/j.tsc.2021.100894>
- Panke, S. (2019). Design thinking in education: perspectives, opportunities and challenges. *Open Education Studies*, 1(1), 281–306. <https://doi.org/10.1515/edu-2019-0022>
- Petty, R. E., Haugtvedt, C. P., & Smith, S. M. (2014). Elaboration as a determinant of attitude strength: Creating attitudes that are persistent, resistant, and predictive of behavior. In *Attitude Strength*, Psychology Press, 93–130.
- Raykov, T., & Widaman, K. F. (1995). Issues in applied structural equation modeling research. *Structural Equation Modeling: A Multidisciplinary Journal*, 2(4), 289–318. <https://doi.org/10.1080/10705519509540017>
- Rieger, K. L., Chernomas, W. M., McMillan, D. E., & Morin, F. L. (2020). Navigating creativity within arts-based pedagogy: implications of a constructivist grounded theory study. *Nurse Education Today*, 91(April), 104465. <https://doi.org/10.1016/j.nedt.2020.104465>
- Roshchin, S. P., & Filippova, L. S. (2020). Artistic literacy in the paradigms of teaching fine arts. *Humanities and Social Sciences Reviews*, 8(52), 136.
- Rubio, D. M. G., Berg-Weger, M., Tebb, S. S., Lee, E. S., & Rauch, S. (2003). Objectifying content validity: Conducting a content validity study in social work research. *Social Work Research*, 27(2), 94–104. <https://doi.org/10.1093/swr/27.2.94>
- Runco, M. A. (2005). Motivation, competence, and creativity. In A. Elliot and C. Dweck (Eds.), *Handbook of Competence and Motivation* (pp. 609–623). Guilford Press.
- Runco, M. A. (2010). Divergent thinking, creativity, and ideation. *The Cambridge Handbook of Creativity*, 5(4), 413–446. <https://doi.org/10.1017/cbo9780511763205.02>
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54–67. <https://doi.org/10.1006/ceps.1999.1020>
- Schumacher, T., & Festing, M. (2023). Developing Cultural Intelligence in a Serious Game-Centered Blended Course - Insights from Experiential Learning Theory and Empirical Evidence. *Journal of International Business Education*, 18, 132–182.
- Schüler, J., Brandstätter, V., & Baumann, N. (2013). Failure cue priming and impaired cognitive performance—analyses of avoidance motivation as a mediator and fear of failure as a moderator. *European Journal of Social Psychology*, 43(5), 335–343. <https://doi.org/10.1002/ejsp.1942>
- Şeker, H. (2013). In/out-of-school learning environment and SEM analysis usage attitude towards school. In M. S. Khine (Ed.), *Application of Structural Equation Modeling in Educational Research and Practice* (pp. 135–167). Sense Publishers.
- Shareef, V. (2018). The meaning of originality in architecture and how can it be measured. *Journal of Process Management. New Technologies*, 6(3), 1–12. <https://doi.org/10.5937/jouproman6-17462>
- Shaun, T. (2001). *Originality and creativity* [Paper presentation]. *Joint National Conference of the Australian Association for the Teaching of English and the Australian Australia* 12-15 July. <https://files.eric.ed.gov/fulltext/ED458582.pdf>
- Shen, W., Hommel, B., Yuan, Y., Chang, L., & Zhang, W. (2018). Risk-taking and creativity: convergent, but not divergent thinking is better in low-risk takers. *Creativity Research Journal*, 30(2), 224–231. <https://doi.org/10.1080/10400419.2018.144>
- Shi, B., Xing, Z., Yang, M., & Tang, C. (2021). How family's support of perseverance in creative efforts influences the originality of children's drawing during the period of covid-19 pandemic? *Frontiers in Psychology*, 12(February), 600810. <https://doi.org/10.3389/fpsyg.2021.600810>
- Shumakova, N. B. (2021). The role of educational motivation in the creativity of intellectually gifted primary school-children. *SHS Web of Conferences*, 117(September), 01004. <https://doi.org/10.1051/shsconf/202111701004>
- Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., Martinez, J. L., & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts*, 2(2), 68–85. <https://doi.org/10.1037/1931-3896.2.2.68>
- Sinha, A. K., & Singh, C. (1987). Measurement of scientific creativity. *Indian Journal of Psychometry & Education*, 18(1), 1–13.
- Sowden, P. T., Clements, L., Redlich, C., & Lewis, C. (2015). Improvisation facilitates divergent thinking and creativity: realizing a benefit of primary school arts education. *Psychology of Aesthetics, Creativity, and the Arts*, 9(2), 128–138. <https://doi.org/10.1037/aca0000018>
- Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal*, 18(1), 87–98. [https://doi.org/10.1207/s15326934crj1801\\_10](https://doi.org/10.1207/s15326934crj1801_10)
- Strenacikova, M., & Strenacikova, M. (2020). Achievement motivation and its impact on music students' performance and practice in tertiary level education. *Music Scholarship*, 0854(2), 143–155. <https://doi.org/10.33779/2587-6341.2020.2.143-155>
- Sun, M., Wang, M., & Wegerif, R. (2019). Using computer-based cognitive mapping to improve students' divergent thinking for creativity development. *British Journal of Educational Technology*, 50(5), 2217–2233. <https://doi.org/10.1111/bjet.12825>
- Takeuchi, H., Taki, Y., Nouchi, R., Yokoyama, R., Kotozaki, Y., Nakagawa, S., Sekiguchi, A., Iizuka, K., Hanawa, S., Araki, T., Miyauchi, C. M., Sakaki, K., Sassa, Y., Nozawa, T., Ikeda, S., Yokota, S., Magistro, D., & Kawashima, R. (2020). Originality of divergent thinking is associated with working memory-related brain activity: Evidence from a large sample study. *NeuroImage*, 216(3), 116825. <https://doi.org/10.1016/j.neuroimage.2020.116825>

- Tehrani-Doost, M., Shahrivar, Z., Torabi, N., Ansari, S., Haji-Esmaeelzadeh, M., & Saeed-Ahmadi, S. (2020). Cross-cultural validation and normative data of the social responsiveness scale in a group of Iranian general child population. *Journal of Autism and Developmental Disorders*, 50(7), 2389–2396. <https://doi.org/10.1007/s10803-018-3773-9>
- Tromp, C., & Baer, J. (2022). Creativity from constraints: theory and applications to education. *Thinking Skills and Creativity*, 46(vember), 101184. <https://doi.org/10.1016/j.tsc.2022.101184>
- Tyagi, V., Hanoch, Y., Hall, S. D., Runco, M., & Denham, S. L. (2017). The risky side of creativity: domain specific risk taking in creative individuals. *Frontiers in Psychology*, 8(2), 145. <https://doi.org/10.3389/fpsyg.2017.00145>
- van de Kamp, M. T., Admiraal, W., Coertjens, L., Goossens, M., & Rijlaarsdam, G. (2022). The relationship of types of exploration activities with originality of visual arts designs. *The Journal of Creative Behavior*, 56(1), 108–124. <https://doi.org/10.1002/jocb.519>
- van de Kamp, M. T., Admiraal, W., Coertjens, L., Goossens, M., & Rijlaarsdam, G. (2015). Enhancing divergent thinking in visual arts education: effects of explicit instruction of meta-cognition. *The British Journal of Educational Psychology*, 85(1), 47–58. <https://doi.org/10.1111/bjep.12061>
- Wang, H., Wang, L., & Zhu, J. (2022). Moderated mediation model of the impact of autonomous motivation on post-graduate students' creativity. *Thinking Skills and Creativity*, 43(27), 100997. <https://doi.org/10.1016/j.tsc.2021.100997>
- Wang, C.-S., Peck, K. L., & Chern, J. Y. (2010). Difference in time influencing creativity performance between design and management majors. *International Journal of Technology and Design Education*, 20(1), 77–93. <https://doi.org/10.1007/s10798-008-9059-3>
- Watters, P., & Jayson, S. (2020). Finding creativity in the extrinsically motivated environment of architecture students. *Innovations in Education and Teaching International*, 57(2), 231–241. <https://doi.org/10.1080/14703297.2019.1572525>
- Williams, B., Onsmann, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8, 1–13. <https://doi.org/10.33151/ajp.8.3.93>
- Williams, S. D. (2004). Personality, attitude, and leader influences on divergent thinking and creativity in organizations. *European Journal of Innovation Management*, 7(3), 187–204. <https://doi.org/10.1108/14601060410549883>
- Yuan, Y. H., Wu, M. H., Hu, M. L., & Lin, I. C. (2019). Teacher's encouragement on creativity, intrinsic motivation, and creativity: the mediating role of creative process engagement. *The Journal of Creative Behavior*, 53(3), 312–324. <https://doi.org/10.1002/jocb.181>
- Zhou, J., & George, J. M. (2001). When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Academy of Management Journal*, 44(4), 682–696. <https://doi.org/10.2307/3069410>
- Zhu, W., Shang, S., Jiang, W., Pei, M., & Su, Y. (2019). Convergent thinking moderates the relationship between divergent thinking and scientific creativity. *Creativity Research Journal*, 31(3), 320–328. <https://doi.org/10.1080/10400419.2019.1641685>
- Zhu, Y. Q., Gardner, D. G., & Chen, H. G. (2018). Relationships between work team climate, individual motivation, and creativity. *Journal of Management*, 44(5), 2094–2115. <https://doi.org/10.1177/0149206316638161>
- Zwirn, G. S., & Zande, R. V. (2017). Differences between art and design education—or differences in conceptions of creativity? *The Journal of Creative Behavior*, 51(3), 193–203. <https://doi.org/10.1002/jocb.98>