# Does technology negatively influence creativity and divergent thinking?

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**Definition of the Problem**

British Columbia education system has recognized that creative and divergent thinking are requirements to success. Our curriculum has been refined to reflect this philosophy. At present, however, it feels as if we are building the plane while it is in the air. Creativity is not always an inherent skill, but it is a skill that can be developed through well thought out and articulated educational practise. Teacher's skill set and pedagogy, school context, leadership, and use of technology play a critical role in the development of creativity and divergent thinking.

The implications and necessity for creativity and divergent thinking are many. No longer are we living in a context where rote memorization and regurgitation of information are pre requisites to success. Research suggests that a culture filled with creativity and divergent thinking is imperative in our globalized world. In order to survive and thrive in a knowledge based and information driven society, it is essential for our schools to integrate the effective and specific technologies in teaching and learning to meet the demands of our global learners.

Technology, however, is a double-edged sword in that it can be harmful, helpful, both and neither. Technology is a complex and multi-faceted aspect to what happens with, for and to our students in our schools. Technology is a pervasive aspect of the social, emotional, and academic aspects of student lives. The question is: how is creativity affected in a technology rich environment? Are they codependent, and can they exists comfortably together?

**Question or Problem of focus**

**Does technology negatively influence creativity and divergent thinking?**

1. How do we define creativity and divergent thinking?

2. What research based instructional practices promote creativity and divergent thinking?

3. What current trends in the use of technology enhance creativity and divergent thinking in the classroom?

4. How can District and School leaders support creativity and divergent thinking in the classroom with technology as the medium?

**Definition of creativity and divergent thinking.**

Maintaining a high-quality first-rate education system that is accessible and engaging for all learners in is a key goal of the BC Ministry of Education.   The importance of ensuring students have creative learning opportunities in the classroom is a primary driver for many lesson plans throughout British Columbia and hopefully worldwide. (Cole, Sugioka&Lynch,1999; Torrance, 1976).  To foster creativity, we need to identify characteristics of the creative personality, clearly articulate the cognitive process, recognize creative production, and ensure the learning environment promotes creative pursuits.

Anecdotally asking colleagues what creativity means to them, some of the many responses included ideas such as "artistically gifted, wonderful at theatre productions, coming up with good or new ideas, great students, engaged and engaging, fun, interesting, and spirited".  Most teachers believed creativity is a skill that could be taught, but that some students just 'come' with a quirky sensibility and those are the ones who are naturally creative.  The phenomenon of creativity is often misunderstood, as research tells us that creative students are often students who exist on the periphery of our schools.

Creativity is difficult to define and measure. The most widely used test for creativity is the Torrance Test of Creative thinking (TTCT). Although seemingly dated (developed in 1966) the TTCT measures such things as creative potential, intellectual curiosity, open-mindedness, verbal expressiveness, and originality. (Gardner and Davis 2013).

## C. Hypothesis:

After ensuring we have a clear and concise definition of creativity and divergent thinking, we will find that there is a correlation between the use of technology and its impact on creativity. Student scores on the TTCT will improve only if the right conditions for expansion in creativity exist in the learning environment. Specifically, students whose scores on the TTCT test improve, will be students who are in a learning environment that focuses on the academic skill, but also specifically on ways to improve creativity scores. Students who excel in the pursuit of creativity will be in environments that focus on specific skills. These will be students whose teachers intentionally foster creativity; their teachers will articulate the cognitive process, recognize creative production and create the environment for creativity and divergent thinking to flourish

A random sampling of teachers and classrooms across the District will be engaged in this study. We will use one specific form of technology is all Grade 3 classrooms across the District in our study to prove our hypothesis. The specific technology or application that we will be using in the classroom is a math program. We expect to find that the use of technology in the classroom may enhance creativity, or it may detract, or it may be indifferent; the key to any of these outcomes will be the skill set of the teacher in each class.

**SECTION 2- Review of the Literature**

**Creativity** is a concept that has a myriad of definitions.  For the purposes of this study, the definition of creativity has two components: an element of originality and an element of effectiveness.  Originality involves creating something new and divergent thinking involves extending this new idea to be something of use.  Both originality and usefulness must exist together for creativity to be present.

The 1963 Torrance study of 650 teachers found that the characteristics of creative students are not aligned with characteristic preferred by teachers in a traditional classroom setting.  For example, behaviours that are common amongst creative students, "playfulness, emotional, open, critical of others, and stubborn" are discouraged and often found to be disruptive.  Teachers often see creative students as non-conforming and easily distracted.  Further, creative students are often more likely to be unpopular with teachers and more problematic in the classroom.  Students who are seen as 'easier'; in a classroom setting have qualities such as cheerful students, easy-going, friendly, and spontaneous.

**Torrance Test of Creative Thinking** was "developed in 1966 and is used worldwide to measure several dimensions of creative potential including intellectual curiosity, open-mindedness, verbal expressiveness, and originality" (Gardner and Davis p.127).

"This test has been found to predict creative achievement better than other standard measures of creative or divergent thinking.  Empirical evidence suggests that high scores on the test successfully predict subsequent creative careers and accomplishments." (Gardner and Davis p.127-128).

**The use of technology** in education is not a new practice; the ubiquity of technology and its impact on all aspects of students' lives, however, is. A myriad of concerns have arisen with respect to development of identity, safety and security, the impact on social relationships, brain development, engagement, brain development and more. For the purpose of this research, we will leave those concerns to the side and focus on the immediacy of this project.

Technology in education is commonplace in many schools throughout the Province. As mentioned, we are currently building the airplane while it is flying high, and as a result, much of our expertise regarding the use of technology to meet educational outcomes is on a trial and error basis.

The online math program that is created to help students improve in math. Each lesson begins with interactive animation with a variety of key characters. Math concepts are modelled in ways that are intended to be both highly entertaining, but also educational. The learner will practice their new skill in a variety of ways. While doing so, the child learns in a setting that has vibrant animation, playful songs and catchy tunes, and are given multiple rewards along their learning journey. The rewards include cute little e-pets that hatch from an acorn. These e-pets are baby animals and they can live in a variety of environments that the learner chooses; for example a farm or a garden. The program is student centered and relatively easy to follow. It aligns to curricular standards and children can see their progress readily. The intention is to create a program that is engaging, fun, lively, easy to follow and one that produces quick results.

At the end of each five lesson 'map', the learner will complete a multiple-choice quiz to show learning.  If successful, they are rewarded with a printable certificate and then move on to the next level.

**SECTION 3-The research methodology is as follows:**

**The question for my study:**

1.  **Does the use of technology in the classroom enhance creativity in students?**
2.  **Is there a correlation between the use of the math program and improved academic scores in Grade 3 math scores?**

To begin, we will uncover the baseline for creativity scores using a random sampling of  students in Grade 3 classrooms across the District.  I will apply the Torrance Test of Creativity to this random sample of students.

- Identify grade 3 classrooms in the District to take part in the study
- Gain consensus regarding which classes will employ the use of Mathseeds in Grade 3 classes and which ones will not.
- Create both summative and formative assessments that show student learning.  All students involved in this research project will participate in the same academic assessments.

- Apply technology in the classes where teachers choose to do so

- Do not apply technology in other classes as teachers choose not to

Yong Zhao's, <u>What works may Hurt</u> asks the educator to be cautious with educational studies.  It may well be  that we glean key insight on educating students, but it is important we do this in a way to is equitable without any harms (intended or not).  The reason that the math progrma lends itself well to this study is that it naturally exists in this District that some teachers use it and some do not.  We are not implementing anything new or taking away a resource that some have found effective.  At present, it is a naturally occurring phenomenon.

After a period of 6 weeks, we will retest a random sampling from the same Grade 3 group of students using the TTCT.  These results should allow us to draw conclusions about the correlation between the use of technology in the classroom and creativity.

**SECTION 4. Expected outcomes**

1. **Does the use of technology in the classroom enhance creativity in students?**

2. **Is there a correlation between the use of technology and improved academic scores in (SPECIFIC COURSE)**

The expected outcome for question one of the study is that it depends.  Depending on the technology, specific teaching skill set, focus on delivery and recognition of exactly what creativity looks like. I would expect that technology could be used to enhance creativity in students.

With regard to question #2, I expect that the use of technology would correlate positively with improved academic scores if the teacher uses ongoing formative assessments to inform their practice. With ongoing regular formative assessments, teachers will continue to inform practice, change style, create opportunities for deeper learning. As a result, academic scores will improve.

The expected outcome is that technology has a negative impact on creativity unless it is delivered hand in hand with a coherent and well planned out approach. The teacher is key to effective development of building creativity and innovation through the use of technology.

Finally, the researcher expects that while experimenting, we will also find a number of best practices that enhance creativity and innovation in our students. Following the premise of Yong Zhao's What Works May Hurt, instead there is an excellent chance we will again recognize that "what works might inform and lead to unexpected yet surprisingly interesting and useful consequences". Practices such as :problem solving**,** providing creative learning experiences employing inquiry with science and technology**,** classroom assessment for learning **,**experiential learning**,** STEM**,** inquiry based learning **,**problem based learning**,** invite risk taking and error making

Unexpected oputcomes:

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