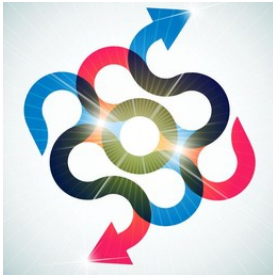


THE EDUCATION AND CREATIVITY



The creativity is very important at the global level. Creative accomplishments help to

build a more interactive world that fortifies human civilization. Humans would have no advancement in art, literature, science or invention if human creativity did not exist. Creativity is as natural and necessary for children as fresh air! But school actually limits children's creativity more than anything else because it is so egregious and is solely focused on how well you can cram and memorize things you will forget right after the fact, which is why we all hate it. *"Every child is an artist, the problem is staying an artist when you grow up"* say Pablo Picasso.

Creativity is found in the obvious subjects such as art and music, but can also be found in science and play. We automatically associate creative thinking with art, music, dance, and drama. However, we must recognize that creative thinking can be found in all aspects of a child's life and can be learned and used daily. Creativity is important at so many levels of our society, including both the individual and the social levels. Educators frequently teach students about creative and eminent people, but ignore teaching methods that foster students' creative thinking in the classroom. The importance of the school's role in the development of students' creativity has been highlighted in many studies regarding creativity. The Importance of Teachers in Fostering Students' Creativity Teacher attitudes, beliefs and classroom practices are deemed to be of crucial influence in the development of students' creativity. However the importance of promoting creativity in schools is a controversial topic. There's no doubt about it.

How could creativity instruction be integrated into scientific teaching [1]? Guidelines for designing specific course units that emphasize HOCS by using strategies of scientific teaching are now available from the current literature. Throughout the 3-wk unit, in accordance with the principles of problem-based instruction [2], course instructors encourage students to seek, interpret, and synthesize their own information to the extent possible. Students have access to a variety of instructional formats, and active-learning

"The task of the modern educator is not to cut down jungles, but to irrigate deserts."

(C. S. Lewis)

experiences are incorporated throughout the unit. These activities are interspersed among minilectures and give the students opportunities to apply new information to their existing base of knowledge.

What would such a class look like with the addition of explicit creativity-promoting approaches? Would the gains in problem-solving abilities have been greater if during the minilectures and other activities, students had been introduced explicitly to elements of creative thinking from the Sternberg and Williams [3] list described above? Would the students have reported greater gains if their instructors had encouraged idea generation with weekly brainstorming sessions; if they had reminded students to cross-fertilize ideas by integrating material across subject areas; built self-efficacy by helping students believe in their own capacity to be creative; helped students question their own assumptions; and encouraged students to imagine other viewpoints and possibilities? Of most relevance, could the authors have been more explicit in assessing the originality of the student plans? In an experiment that required college students to develop plans of a different, but comparable, type, Osborn and Mumford [4] created an originality rubric that could apply equally to assist instructors in judging student plans in any course. With such modifications, would student gains in problem-solving abilities or other HOCS have been greater? Would their plans have been measurably more imaginative?

Recall that in their meta-analysis, Scott et al. [5] found that explicitly informing students about the nature of creativity and offering strategies for creative thinking were the most effective components of instruction. From their careful examination of 70 experimental studies, they concluded that approaches such as social modeling, cooperative learning, and case-based (project-based) techniques that required the application of newly acquired knowledge were positively correlated with high effect sizes. The study was clear in confirming that explicit creativity instruction can be successful in enhancing divergent thinking and problem solving.

Finally, could a weekly brainstorming *"invention session"* included in a course like those described here serve as the site where students are

introduced to concepts and strategies of creative problem solving? As frequently applied in schools of engineering [6], brainstorming provides an opportunity for the instructor to pose a problem and to ask the students to suggest as many solutions as possible in a brief period, thus enhancing ideational fluency. Here, students can be encouraged explicitly to build on the ideas of others and to think flexibly. Would brainstorming enhance students' divergent thinking or creative abilities as measured by TTCT items or an originality rubric? Many studies have demonstrated that group interactions such as brainstorming, under the right conditions, can indeed enhance creativity [6], but there is little information from an undergraduate science classroom setting. Intellectual Ventures, a firm founded by Nathan Myhrvold, the creator of Microsoft's Research Division, has gathered groups of engineers and scientists around a table for day-long sessions to brainstorm about a prearranged topic. Here, the method seems to work. Since it was founded in 2000, Intellectual Ventures has filed hundreds of patent applications in more than 30 technology areas, applying the "*invention session*" strategy [7]. Currently, the company ranks among the top 50 worldwide in number of patent applications filed annually. Whether such a technique could be applied successfully in a college science course will only be revealed by future research.

5 Ways to bring more creativity into the classroom [8]

Introducing more creativity into your classroom and assignments doesn't have to make your job harder. It can actually make it a lot more interesting. Giving assignments that require more creativity will likely result in more engaging work for your students, and a more entertaining grading process for you.

1. Don't limit assignments to one format.

You can provide them the subject to cover, but give them some freedom in how they complete it. Some students will get more out of creating a video or drawing a comic strip than writing a paper. Even better, have them mix and match formats.

2. Set time aside for creativity. Take a cue from the 20% rule practiced by businesses. Work a "*genius hour*" into the school day. The amount of time is really up to you, but deciding to devote time to encouraging your students to explore new ideas and be creative can pay off. You can provide them with some tools to enable their creativity – crayons, clay, notebooks, iPads, or even just access to the library or internet (within reason). They can choose to create, or they can choose to do some digging

into a subject of interest to them. Encourage collaboration in these times, but don't force it. Allowing students the chance to follow their own interests and passions is the whole point and they should be given some leeway in what that looks like.

3. Use tech to broaden your idea of assignments. Tech literacy is almost as important to succeeding in the world today as creativity. And conveniently the two go hand in hand. Just using Google tools alone, we've already covered five creative assignments teachers can give. You can teach students about geography alongside history, literature, or any number of other subjects by having them map out a road trip in Google Maps. You can teach students how to make new contacts, conduct interviews, and turn what they learn from their interviews into a well-researched paper by making use of Google Hangouts or Skype. Students can take more ownership over their work by keeping a blog or making their own educational videos on their smartphones. And they can work more collaboratively with the help of social media. While all of these ideas teach students skills that will benefit them in finding jobs later in life, that's far from all they accomplish. They make them better learners, better thinkers, and give them more incentive to care about the work they do.

4. Introduce unconventional learning materials into class. Have you ever seen a student excited when you assigned a chapter in a textbook? How about if you assigned TED Talks instead? Or educational (and entertaining) podcasts like Radiolab and StarTalk? Many of the people creating a lot of the entertaining pop culture out there have embraced the geekiness that pop culture used to shun. As a result, teachers have a ton of options for bringing more interesting and cool explorations of educational subjects into their classrooms.

5. Encourage discussion. Debates get kids involved and actively engaged with the topics they're discussing. The Socratic seminar method provides a lot of different benefits:

- It gets students thinking more critically about the material;
- It helps them learn to better communicate their ideas and opinions;
- It challenges them to listen to other students' opinions and think critically about their contributions and ideas;
- It gives them the opportunity to challenge each other intelligently and build off of each other's ideas;

The ability to communicate your ideas clearly and respectfully is something that will benefit

students in all areas of their life – and something a lot of people grow up never learning how to do well. Obviously, finding ways to get your students to be more creative requires some creativity on your part too. We've got a lot of resources that can provide you with some starter ideas, but we know educators and students can come up with many more. If you've had some success with activities in your classroom that inspire creativity, please share.

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