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# Using the Steam Education System when Working with Gifted Students

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**Abstract**
For far too long in education, we've been working with the presumption of teaching to ensure our students get a "good job". But what does that look like? We are preparing students for jobs that don't even exist. We are at a point where it is not only possible, but imperative that we facilitate learning environments that are fluid, dynamic, and relevant. None of us go outside and look at a tree and say, "that's a tree, so that's science" or, "the sky is blue, so that's art." Our world is a beautiful, complex, and intricate tapestry of learning all in its own right. Why do we believe that we have the ability or the right to box it in behind brick walls and classroom doors in a place called school? Integrating concepts, topics, standards and assessments is a powerful way to disrupt the typical course of events for our students and to help change the merry-go-round of "school." It takes what we do when we open the doors to the real world and places those same practices in our cycles of teaching and learning. So we can finally remove the brick walls and classroom doors to get at the heart of learning.

**Keywords:** global, regional, analyse, evolve, change

## What the Research Says

Recent research shows that STEAM is a promising approach to positively impacting student achievement and teacher efficacy. In a 2016 study, researchers investigated the impact of STEAM lessons on physical science learning in grades 3 to 5 in high poverty elementary schools in an urban district. Findings indicated that students who received just nine hours of STEAM instruction made improvements in their science achievement *(Brouillette, L., & Graham, N. J.)*.

Another study from 2014 shows the connecting STEAM and literacy can positively impact cognitive development, increase literacy and math skills, and help students reflect meaningfully on their work and that of their peers *(Cunnington, Marisol, Andrea Kantrowitz, Susanne Harnett, and Aline Hill-Ries.)*. This is further supported by a study on the relationship between theater arts and student literacy and mathematics achievement from 2014. *"Results showed that students whose language arts curricula were infused with theater arts often outperformed their control group counterparts, who received no arts integration, in both math and language arts" (Inoa, R., Weltsek, G., & Tabone, C.).*

And in an international study published in the Journal of Educational Change, researchers found that secondary teachers' reflections *"revealed inter-, trans- and cross-disciplinary learning shaped by teacher collaboration, dialogue and classroom organization that fosters critical and creative thinking." (Anne Harris and Leon R. de Bruin).*

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**STEM vs. STEAM**

The STEM to STEAM movement has been taking root over the past several years and is surging forward as a positive mode of action to truly meet the needs of a 21st century economy. STEM alone misses several key components that many employers, educators, and parents have voiced as critical for our children to thrive in the present and rapidly approaching future.

Much has been proclaimed about the need for more STEM "programs" in our schools. The logic is simple: the wave of future economic prosperity lies in a workforce that is well-versed in rising job markets like science, technology, engineering and math. Thus, there has been an increased investment in STEM initiatives in schools. This includes (but is not limited to):

- providing mobile devices for students (sometimes in the forms of computer labs, and other times in the form of 1:1 – a single device for each student)
- after-school STEM clubs or programs
- STEM curriculum, where projects using STEM practices are embedded
- BYOD initiatives (bring your own device)
- STEM days to encourage hands-on exploration within each of these disciplines
- robotics programs

While these initiatives are a wonderful start into the exploration of these four areas of study, the critical process of creativity and innovation is missing. Students in STEM programs may have more experiential learning opportunities, but they are limited to only science, technology, engineering and math. Our economy requires so much more than an understanding of these areas – it requires application, creation and ingenuity. STEM alone does not foster these essential nutrients.

STEAM is a way to take the benefits of STEM and complete the package by integrating these principles in and through the arts. STEAM takes STEM to the next level: it allows students to connect their learning in these critical areas together with arts practices, elements, design principles, and standards to provide the whole pallet of learning at their disposal. STEAM removes limitations and replaces them with wonder, critique, inquiry, and innovation.

The pathway to STEAM is exciting, but can also be dangerous without an understanding of what STEAM truly means in both its intention and its implementation. Like its STEM predecessor, STEAM can stop short of its best manifestation without several core components:

- STEAM is an integrated approach to learning which requires an intentional connection between standards, assessments and lesson design/implementation
- True STEAM experiences involve two or more standards from Science, Technology, Engineering, Math and the Arts to be taught AND assessed in and through each other
- Inquiry, collaboration, and an emphasis on process-based learning are at the heart of the STEAM approach
- Utilizing and leveraging the integrity of the arts themselves is essential to an authentic STEAM initiative
- There are actually 6 steps to creating a STEAM-Centered classroom, no matter what area you teach. In each step, you're working through both the content and the arts standards to address a central problem or essential question.

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- What's great about this process is that you can as easily use it to help plan for a lesson as you can to facilitate the actual learning process in your STEAM classroom. Let's take a look at each step.

***1. Focus***

- In this step, we're selecting an essential question to answer or problem to solve. It's important to have a clear focus on both how this question or problem relates to the STEM and the Arts content areas you've chosen.

***2. Detail***

- During the detail phase, you're looking for the elements that are contributing to the problem or question. When you're observing the correlations to other areas or why the problem exists, you begin to unearth a lot of key background information, skills or processes that students already have to address the question.

***3. Discovery***

- Discovery is all about active research and intentional teaching. In this step, students are researching current solutions, as well as what ISN'T working based on the solutions that already exist. As a teacher, you can use this stage to both analyze the gaps your students may have in a skill or process and to teach those skills or processes explicitly.

***4. Application***

- This is where the fun happens! After students have dived deep into a problem or question and have analyzed current solutions as well as what still needs addressed, they can begin to create their own solution or composition to the problem. This is where they use the skills, processes and knowledge that were taught in the discovery stage and put them to work.

***5. Presentation***

- Once students have created their solution or composition, it's time to share it. It's important that the work is presented for feedback and as a way for expression based on a student's own perspective surrounding the question or problem at hand. This is also an important opportunity to facilitate feedback and help students learn how to give and receive input.

***6. Link***

- This step is what closes the loop. Students have a chance to reflect on the feedback that was shared and on their own process and skills. Based on that reflection, students are able to revise their work as needed and to produce an even better solution.

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