

Toronto District School Board (TDSB) K-12 STEM Strategy

FACT SHEET on TEACHERS

The first year of implementation of the TDSB K-12 STEM Strategy included a study conducted with 80 teachers, 50 administrators, 10 STEM coaches and 439 students in 60 STEM pilot schools in the Toronto District School Board (TDSB). This fact sheet will focus on the findings that are important for teachers.

How do teachers feel about the first year of implementation of the initiative?

Overall, teachers would like to see the STEM initiative continue. 82% of teachers report that they would like to see the STEM initiative continued.

Teachers strongly believed in the importance of STEM education:

- Over 90% of teachers strongly believed in the value of STEM for improving student learning. Teachers believe STEM education can help with preparing students skills and competencies, enhance student learning, solve real-world problems and engage in inquiry or problem-based learning.
- A majority of teachers (87%) believed that STEM education will improve their teaching practice.

On the other hand, some teachers (19%) felt a STEM transdisciplinary approach can diminish the importance of individual content areas. In addition to that, some teachers (38%) feel STEM is a “fad” that is likely to go away.

Wish to see STEM implementation continued at school

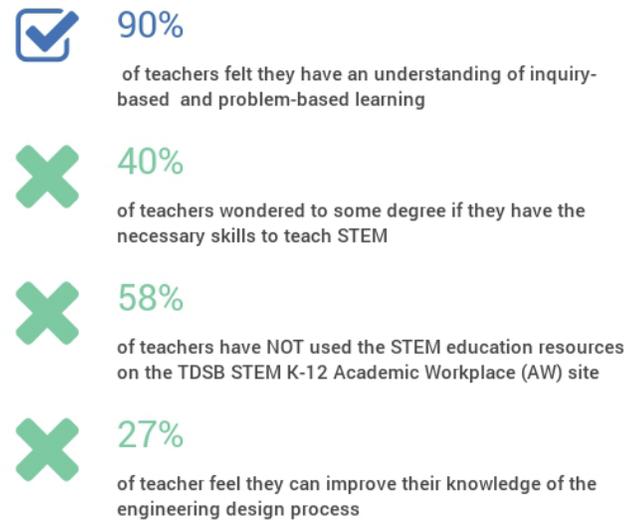


What are teachers' perceptions and knowledge of STEM?

- Teachers feel that they have the necessary understanding STEM pedagogy and resources (inquiry-based learning, problem-based learning, technology...).
 - Over 90 % of teachers felt they have an understanding of inquiry-based and problem-based learning and understood the importance of integrating content from different subjects' areas and disciplines when teaching.

- Teachers feel they could improve in their knowledge of the Engineering design process and awareness of STEM careers.
 - Resources and support in these areas would be beneficial
- Many teachers (58%) have not used the STEM education resources on the TDSB STEM K-12 Academic Workplace (AW) Site.
 - More time needs to be spent to explicitly show and demonstrate the utility of the STEM resources available on the TDSB AW site to teachers.
- Majority of teachers (84%) reported they were confident in their ability to teach STEM effectively but 40 % wondered to some degree of they have the necessary skills to teach STEM. It is important to provide sustained and ongoing STEM professional development to help with teachers feeling unfamiliar with STEM content or pedagogy.

Teacher Perceptions of STEM



What are teacher practices of STEM?

Most TDSB teachers in the study reported that they have tried to a great or moderate extent to develop students' STEM skills, and that the students have in turn learned the STEM skills.

Teachers implemented a variety STEM-related activities into their classrooms. The most popular

Teacher Practices: STEM activities implemented

(% of Teachers)



activities were:

- hands-on activities (90% of teachers)
- experiments (67% of teachers)
- using computer technology for data collection, analysis and presentation (64% of teachers).

On the other hand, the least used STEM-related activities were:

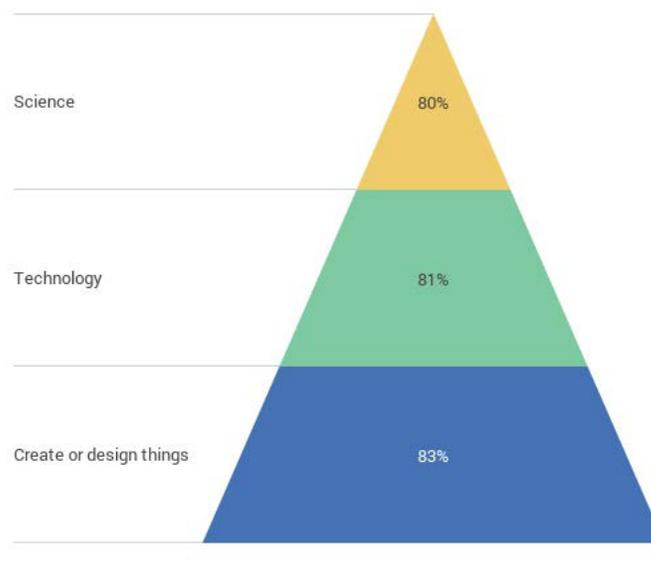
- co-op opportunities with business and community partners (3% of teachers)
- site visits (14% of teachers)
- robotics (23%)

The study findings indicate there are also teaching areas that are not being fostered to the same degree. Only 61% of teachers had students analyze competing arguments, perspectives or solutions to a problem to develop critical thinking skills. About one third of teachers reported they never or rarely discuss issues related to global interdependency. It is important to incorporate teaching examples in professional development that require analysis of competing perspective and facilitating discussion of global connections.

How has their teaching impacted students?

78 % of secondary students strongly agreed, agreed or somewhat agreed that STEM education is relevant and meaningful to their lives. Moreover, the results demonstrate that students are very interested in STEM careers. In fact, the most popular career interests among secondary students included careers: (1) that allow them to create or design things, (2) technology and (3) science. Additionally, students showed very high agreement with STEM skills and competencies, such as collaboration, creativity, critical thinking and citizenship.

Interest in STEM Careers



What do teachers feel was done well with STEM implementation?

77% of teachers felt the coaching they received was excellent, very good or good. Teachers felt the professional development support received from coaches was excellent in the following areas:

- professional learning focused on a variety of hands-on learning experiences
- STEM teaching and learning resources
- how to use various teaching strategies
- supporting teaching using the STEM resource kits and monographs

Rating of overall quality of coaching support received.



What do teachers feel was done NOT as well with STEM implementation?

Teachers felt STEM learning coaches could improve in their support in:

- providing career information
- assisting with STEM start-ups
- developing assessment criteria for STEM

Areas coaches could improve their support



Providing career information



Assisting with STEM start-ups



Developing assessment criteria for STEM

What recommendations do teachers have for moving forward?

Teachers would like to see the STEM initiative continue, but recommend that more time and support should be given for it to develop. 73% of teachers felt the STEM Learning Coach model was a very effective or moderately effective model; and that it should be retained and improved.

Teachers would like to see more funding for more resources such as coaches, ready made lessons plans, and new technology. Teachers felt the largest barriers were a limited availability of professional learning opportunities followed by inadequate facilities.

Below is a list of teacher recommendations:

- Teachers having continued and consistent access to STEM coaches
- More time for planning and collaboration with teachers and coaches
- More resources (ie. Lesson plans, technology, activities)
- More examples of best practices/teaching strategies for STEM
- More professional development (perhaps, in the areas that teachers reported lower knowledge or use such as Engineering design process, assessment, global interactions and analyzing competing arguments)
- Time to observe other teaching STEM
- Clearer directions on how to cover curriculum and include STEM activities

Recommendations for Moving Forward with STEM



Teachers would suggest to allow more time for STEM initiative to develop Teachers would suggest to allow more time for STEM initiative to develop



Teachers would like additional funding for more resources such as coaches, lessons plans, new technology and classroom laptops



More time for planning and collaboration



Teachers would like more professional development on STEM

Source: Sinay, E., & Nahornick, A. (2016). Toronto District School Board (TDSB) (2016). *K-12 STEM Strategy FACT SHEET on TEACHERS*.

Note: This report is not published yet and the final format may differ slightly