A Synopsis of the Final Research Report

Mapping the Impact of the 21st Century Innovation Research Initiative
on Students, Teachers, and Systems

Local Innovation Research Projects in Ontario

Round 5

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The *21st Century Innovation Research Initiative (Round 5),* continues to advance Ontario's renewed vision and core priorities for education while gaining a more in-depth understanding of the impact of technology and resulting changes in Ontario education as a whole that have occurred during this entire initiative (2011-2016).

Projects indicated that sustained improvements to student achievement occur when a number of conditions are met. These conditions include building leadership capacity throughout the system at school and administrative levels, and applying sufficient resources, technology, infrastructure, and professional learning to support change. It is also important to cultivate a collaborative learning culture among staff, a willingness and ability to enhance teaching and learning, and a deepening of pedagogical understanding that reflects technology-enabled practices.

The funding and various support given during the Rounds of the initiative have contributed to refining technology use in schools, to building leadership capacity throughout systems, to promoting changes in pedagogy, and to supporting system-wide conditions for preparing students with the knowledge and skills they need to be successful in a competitive, globally connected, and technologically engaged knowledge society and economy. As one project stated: *"… we want changes for every student, in every classroom, through new pedagogies and understandings for every teacher."*

Building on the previous Rounds of this initiative, Round 5 innovation research was intended to promote and extend local innovation and leadership for 21st Century teaching and learning; to support evidence-based and research-informed decision making, focused on the instructional core; to situate Ontario's innovation efforts within the wider context of international research; and to promote capacity building and knowledge mobilization to scale up pedagogy-driven, technology-enabled practices for optimizing learning.

Through the *Innovation Research Projects (Round 5)*, the Ministry and CODE continued to support effective technology-enabled teaching and learning practices and system changes across Ontario. Curriculum Services Canada (CSC) continued its work with the innovation projects in documenting evidence of impact on student engagement, learning, and achievement, identified within a common research framework. As part of this current study, CSC also focused on changes that have taken place at all levels of the school system, and examined the impacts that occurred during the five Rounds of the innovation research projects.

In this Round 5 study, Curriculum Services Canada organized the same field team members as in the previous Rounds to liaise with project leads and to offer support as they gathered and reported data. Since the field and research team was comprised of the same educators as during the previous Rounds, a community of learners formed that displays many of the attributes of 21st Century competencies. Communication has been ongoing over time as the field researchers interacted on a regular basis with project leads, and project leads followed up on the invitation to contact the team as needed with questions or to dialogue about their project. Field researchers visited project sites and were invited to attend district-organized events related to the project focus. During ongoing dialogue and interaction, collaborative relationships developed between individuals involved in the innovation research and the research team, strengthening the processes and results of the study.

Due to the collaborative efforts of the research field team, project leads and participants have become more skilled in reporting their findings and the impact of the innovation research projects over the Rounds of this initiative. The research team devoted much time and effort into planning for their interactions with the projects, and increasingly, results are shedding new light on the path to technology-enabled teaching and learning, and ultimately to student success. As the research team and project leads networked, they drew from classroom experiences, from whole district perspectives, from experts in the field, and from the cross-fertilization of ideas and perspectives gleaned from students, teachers, and administrators.

In Round 5, all 72 school boards, 4 school authorities, and 1 provincial school participated in the innovation research initiative. Data was collected within a common research structure, using comprehensive self-reporting templates constructed by the research team. Our research team focused its interactions and reporting tools on gathering solid evidence of the impact technology-enabled instruction and learning has on students, on teacher practice, and on the system, making sound and clear connections to student engagement, learning, and achievement, either where the impact can now be evidenced or how it is anticipated in future.

At the outset of Round 5, the research team asked the projects to submit a 'Project Profile' with a description of the innovation research, areas of focus, and anticipated participation numbers. Our field research team used this information in its ongoing conversations with the project leads. To further focus the projects in providing evidence, the research team prepared templates for the final report submission in June and for the artefacts that visually portrayed the impact of the innovation research project in a context that gave meaning to their efforts.

Projects provided descriptions and examples of proof through their artefact submissions. In their accompanying artefact narrative, the projects presented a context for the concrete examples they included to further demonstrate the impact that the innovation research project is making. They described the focus and implementation process used in their innovation research project and supplied further evidence through a myriad of examples and other documentation. As part of the narrative, projects were encouraged to include a brief history of their efforts over all Rounds of study as a comprehensive look at the growth/change over the initiative to date. As well, they included information about how the work connects to their continued efforts in technology-enabled teaching and learning. This information which will be shared broadly once it has been processed, offers valuable insights and promising practices for others in integrating technology-enabled teaching and learning within their systems.

Reported Data

Qualitative and quantitative data provided insights that align with the purpose of the study. Overall, both the *quantity* and the *quality* of the submitted data in Round 5 has substantially exceeded that of previous Rounds. Districts have been much clearer and purposeful in the establishment of baseline data to gauge changes to engagement and learning. The information presented through the narratives and artefacts has provided significant insight into the impact that innovation research projects continue to have on students, teachers, and systems. All projects have demonstrated a stronger understanding of the needed evidence, either quantitative or qualitative, to show impact.

Quantitative Data

Based on the numbers reported by projects, over 265 000 students across the province were reported to be directly engaged in aspects of the Round 5 innovative research initiative. In comparison, approximately 170 000 students were involved in Round 4, and approximately 160 000 students were involved in Round 3.

The number of students in each project varied widely by the nature of the project activities and scope of the investigations with over 1100 students per project being the median level of involvement. In Round 4, the median level of involvement was 680 students per project, and in Round 3, the median level of involvement was 500 students per project. In Round 1 and Round 2 the median levels were 450 and 400 students per project respectively.

All districts identified substantial involvement by classroom teachers in their research. Based on the numbers reported by projects, over 15 000 teachers across the province were directly engaged in aspects of the initiative with 60 teachers per project being the median level of involvement. Round 5 data shows a substantial increase in the level of teacher involvement from all previous Rounds.

In Round 4, approximately 11 400 teachers were involved and the median level of involvement was 58 teachers per project. In Round 3, approximately 6000 teachers were involved and the median level of involvement was 24 teachers per project. In both Rounds 1 and 2, the median level of involvement was less than 20 teachers per project.

As well as classroom teachers, projects reported that in total 2285 school administrators (principals, vice-principals), 360 system administrators, and 850 support staff (e.g., information technology staff, program staff) had direct involvement in the project undertakings. The substantial increase in the direct involvement of school and system leaders in Round 5 supports observations of the field team of the increasing systemic support, alignment, leadership, and commitment given to technology-enabled teaching and learning by school districts across the province.

Qualitative Data

In preparing the comprehensive provincial report for Round 5, the research team analyzed the qualitative data under three areas of impact – students, teachers, and system.

In examining project data over the five Rounds of the *21st Century Innovation Research Initiative*, there have been significant differences and changes in the nature and scope of the project initiatives. Projects are increasingly applying processes that scale their work across the system, and are placing greater emphasis on district-wide implementation strategies rather than on isolated, tactical investigations of specific devices, approaches, or applications. It is clear that provincially, systems are mobilizing knowledge gained over the past Rounds of study to increase capacity, to continue to scale up technology-enabled teaching and learning, and to put in place the conditions necessary for sustaining this approach.

In a foundation document for discussion entitled *Towards Defining 21st Century Competencies for Ontario* (Winter 2016 Edition), the authors note that, *"What's new in the 21st Century is the call for education systems to emphasize and develop these competencies in explicit and intentional ways through deliberate changes in curriculum design and pedagogical practice. The goal of these changes is to prepare students to*

solve messy, complex problems – including problems we don't yet know about – associated with living in a competitive, globally connected, and technologically intensive world" (p. 3).

In the qualitative information provided by the projects, there were substantial indications that systems are taking deliberate and progressive actions to further the impact that technology has in changing teaching practice, in strengthening student engagement, learning, and achievement, and in scaling up and improving systems' structures and policies to meet the increasing demands of living and learning in the 21st Century.

Impact on Students

Learning how to work in collaboration with others, to become effective communicators, to use creativity and imagination, to think critically, and to understand the concept of citizenship and its responsibilities are essential competencies for preparing for life in today's global society. Aspects of character development that highlight self-regulation, self-confidence, self-evaluation, and empathy are also a necessary part of lifestyle learning.

The data clearly points to a consistent focus on the process of learning enabled by technology. For example, a number of projects found that as opportunities for inquiry and problem solving increased, collaboration, communication, and feedback improved and overall interest and engagement was heightened as students worked with individual interests, talents, and learning styles. Teachers reported higher engagement, task completion and increased success through encouraging student inquiry.

There is compelling evidence that increasingly, the relationships between and among students, teachers, and systems as a whole are continually moving to more collaborative, coordinated, and connected ways of impacting on teaching and learning. Systems as a whole reported strengthened efforts to enhance the use of collaborative processes in teaching and learning. There are indications of a new sense of confidence from teachers in supporting student engagement and learning through the inclusion of student voice and choice, and the building of collaborative partnerships among students and others. Projects stated that collaboration has improved between students and that peer-to-peer partnerships are being cultivated as students learn from and support each other.

Round 5 reporting points to a more focused and deliberate move toward collaboration among and between students and teachers as more consideration is given to the process of learning. As opportunities for inquiry and problem solving increased, collaboration, communication, and feedback improved and

overall students' interest and engagement was heightened as their individual interests, talents, and learning styles were reflected in the learning experiences.

A number of projects are adopting frameworks that embody new directions in technology-enabled teaching and learning, e.g., New Pedagogies for Deeper Learning (NPDL), Substitution, Augmentation, Modification and Redefinition (SAMR), Science, Technology, Engineering, Mathematics (STEM).

Projects report that learning for all students, including those with special needs is being greatly enhanced by technology, providing students with better access to the curriculum in that they are able to engage in the same learning experiences as their peers, using appropriate digital supports while working at different levels of engagement. Other projects indicate that self-regulation is a skill impacted by technology use as students become more independent and take more ownership for their learning. Reports indicate that students are more engaged in learning how to learn and less on what to learn. A shift for students toward the processes of learning and a new eagerness to be involved in learning using multiple technologies are evident in project reports.

Some projects reported on achievement measures pertaining to skill development using technology and others reported on gains in the learning attributes central to digital learning. From the reports submitted, there is solid evidence of an increase in achievement due to the focus on 21st Century competencies, utilization of technology, and student inquiry. The descriptions of achievement provide evidence that teachers and system leaders are thinking more critically and deeply about ways to confirm that student achievement can be measured on a scale commensurate with that being used to report student engagement and learning.

Impact on Teachers

Projects are reporting that teachers are engaging differently with technology than in earlier Rounds of study and that is impacting the way they consider student learning and their own thinking about planning, curriculum, instruction, and assessment. There is also a sense of excitement among teachers as they become more comfortable with technology and more knowledgeable about how it supports them in being facilitators in the learning process.

Throughout the project reports, teachers are described as being more motivated to use technology and to explore various ways of incorporating technology into their pedagogical practices. Teachers increasingly are using inquiry-based strategies in the classroom as students have more equitable access to information

provided by an array of technologies. Teachers use these digital tools to engage students in deep thinking and inquiries that require them to use multiple competencies.

The Round 5 projects indicated that teachers are using technology as part of assessing overall student performance as it captures work in progress and the demonstration and application of students' learning so they can be more focused on conversations with students and in observing students' performance while they work. Technology is facilitating assessment practices, especially *assessment as* and *assessment for* learning. Student questions, inquiries, and demonstrations of their learning are captured through technology and provide a reference for teachers when planning instruction and in addressing learner needs. Projects reported that technology allowed for the deepening of assessment practices, and highlighted feedback during the learning as a way of thinking about assessment as part of the learning process. It was reported that the way teachers provide feedback is changing and this is having a direct and timely impact on their teaching practices and the students' learning opportunities.

Considering the previous Rounds of study, the evidence provided from project reports displays the impact on teachers, which is resulting in increasing comfort with technology, in a newfound impetus to build partnerships with students and colleagues, and in teachers participating in ongoing professional learning that can impact their pedagogy and hence, support student learning and achievement.

A principal summed up the impact of changes in pedagogy: *"Now with technologies and with the right learning environment students and teachers are learning together and when they learn together they create knowledge and meaning that is more creative, more powerful, and more motivating than traditional types of learning. This kind of learning, this kind of excitement and motivation takes our students not just from our classroom, not into our community but it takes them across the world."*

Impact on Systems

As evidenced in the previous Rounds, systems are taking a more strategic and comprehensive approach that focuses on partnerships, coordinating school and system planning, ubiquitous access to technology, and job-embedded training and support.

The reports acknowledged that the work of the innovation research projects was seen to be in alignment with system strategic plans and with the belief that technology is an accelerator for learning. System planning suggests that districts are in the process of incorporating technology integration as core to all of their initiatives. There is a compelling sense of the importance of technology as a tool for connections

across the system. System priorities have shifted such that a wider group of stakeholders are involved in the conversation around technology use and decision making. It was further noted having a strong vision that is shared and communicated throughout the system is allowing for advancements in practices and in technology implementation.

Projects reported that there is a growing understanding that leadership is the key to scaling innovative practice. A shift in mindsets within schools is occurring because there is strong leadership and support. For example, principals were reported to be playing a vital role as instructional coaches and that they are developing technical fluency with system tools. There is continued support for administrators and leaders as they recognize the advantages offered by the digital world.

Increasing engagement of parents as part of their children's learning and success was reported by a number of projects. Technology and the system implementation of platforms that provided for home access opened learning beyond the school and afforded opportunities to involve parents. Streamlining communication between home and school, using technology to increase parent engagement, enabling them to support learning at home is stressed in reports, as is the understanding that connecting with the parent community is a way of building a network for student success beyond the walls of the school. Having parents understand the direction that technology-enabled teaching and learning is taking can only help foster understanding of the education process in the larger community.

There was evidence that the desire to build capacity and a culture of growth within districts is continuing to expand. Opportunities to further develop collaborative cultures at all levels was highlighted through participation in cross-board and jurisdictional events, symposia, and shared learning experiences. System learning was often reported around ways of increasing coordination and collaboration among teachers, schools, and administrators as well as interactions with members of multiple stakeholder groups.

Systems reported less on infrastructure needs and challenges than in previous Rounds of study and are focusing more on the human impact of change such as support for teachers and on building bridges between and among different board personnel in order to provide a more coordinated platform for technology use across the district.

Although there remain challenges for systems, Round 5 innovation research projects recognized that there is a positive sense that building a technology-enabled learning environment takes time and must reflect the evolutions in pedagogy and the ongoing changes taking place in the digital world.

At the conclusion of Round 5, it is clear that districts are at an inflection point, where students, teachers, and systems for the most part are both experienced and equipped with the digital milieu to take technology-enabled teaching and learning to the next level.

Recommendations

Given all that has been learned to this point in time from these five Rounds of study about the importance of technology-enabled teaching and learning and the continuing development of global competencies, the research team presents two broad recommendations:

1. Establish a level of funding that would enable districts to continue advancing technology-enabled teaching and learning, specifically in the following domains:

   a) *Professional Growth* – to address many facets of continuous learning and training at all levels of the system, (e.g., teaching practices, leadership, partnerships)

   b) *Infrastructure and Hardware* – to maintain and build on the essential requirements and needs that support technology-rich learning environments (e.g., accessibility, replacement)

   c) *Innovation* – to proactively explore and give ongoing consideration to the impact of the evolving nature of digital tools and resources that promotes data-driven decision making

2. Communicate the enabling role of technology in teaching and learning by making well-defined connections among and between provincial policies, (e.g., competencies, curriculum, assessment) as guidance for embracing effective instructional practices that promote student success.

We believe that with these recommendations in place, districts will continue to build on previous learning and use it going forward as they add to and refine their skills and planning.