Summary of TechYES Research

Project-based Technology Literacy Assessment

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Generation YES, a 501(c)(3) non-profit organization developed the TechYES model of project-based technology literacy assessment based on experience and research that shows that student-centered, project-based models develop higher order thinking skills and support authentic technology learning in schools. Further, the model uses student leadership as a support system for schools implementing TechYES.

Six independent evaluations are summarized in this document.

1. **College YES** – A federally funded Investing in Innovation (i3) grant. Generation YES is a partner with the Alliance for College Ready Public Schools in Los Angeles. The Alliance schools are integrating a new project-based College and Career Readiness curriculum focusing on STEM and technology literacy. (Wexford)
2. **New York State Student Technology Leaders (NYSSTL)** – DLS 2.0 Project, funded through the federal Enhancing Education Through Technology (EETT) grant, part of No Child Left Behind (NCLB). (Measurement Incorporated)
3. **STEM STAR** - STEM Students and Teachers Achieving Reform (STEM STAR) studied the implementation of the TechYES model in five rural high schools in North Carolina and Louisiana to support project-based STEM learning. (Education Northwest)
4. **Verizon California Technology Literacy Project** - The Verizon California Technology Literacy Project provided 10,000 seventh grade students in 47 schools in California's Central Valley with the opportunity to become nationally certified in technology literacy using the TechYES model. Woodside Research Consultants)
5. **Malaysian Student Technology Leaders Catalyst Schools Program**- The Malaysian Student Technology Leaders Catalyst Schools Program (MySTL) was a pilot project of the TechYES program in Malaysia. Incorporating three schools of varying socio-economic status, MySTL saught to show the international validity of the project-based model and Malaysia's capacity to incorporate 21st Century Skill development into the national curriculum. (University Malaya)

In each of these programs, the TechYES model supported larger program goals with several support systems:

- Student and teacher materials and online tools that support project-based learning in specific subject areas.
- Trained Student Technology Leaders (STLs) who help teachers and peers plan, create, and assess student projects.
- Professional development supporting the model.
- Student training, with student tech boot camps or on-site training for potential STLs.

Although this short summary of TechYES research concentrates on four major studies, there are literally thousands of pages of research results and many of these TechYES evaluation reports can be found on the Generation YES website: http://genyes.org/resources/research.

1. College YES

The The Alliance College-Ready Public Schools, a charter management non-profit organization, participated in the CollegeYES Investing in Innovation (i3) Development Project. A total of 20 charter middle and high schools in the Los Angeles area, who receive services from the Alliance

College-Ready Public CMO, participated in the CollegeYES project. CollegeYES served students in grades 6th through 10th with an option for project participation in grades 11th and 12th. Partners in the project include GenYES, an expert in student technology leader programs and Wexford Institute (External Evaluator)

Through the use of Project Based Learning, Student Technology Leadership, Technology Integration, Teacher Professional Development and Alignment to Common Core Standards and ISTE Technology Standards, the CollegeYES project aimed to innovatively implement high quality standards and high quality assessments in students' science courses and Advisory courses.

CollegeYES Project Activity

During the 5-year span of the grant, all students in participating grade levels were required to create 2 technology-based projects each school year; one with a focus on science and one with a focus on College-Career readiness. Students created and submitted projects designed by teachers that were aligned to Buck Institutes for Education Project Based Learning Framework. Students submitted their projects to demonstrate their knowledge of academic content standards and mastery of 21st Century technology standards (ISTE technology).

Upon completion of their projects, students were required to upload their projects to the TechYES website. The TechYES website is an online project management platform that students used to "Plan", "Share", and "Assess" their projects against the ISTE technology standards. Students who submitted projects that demonstrated mastery of 21 of the 24 ISTE technology standards earned TechYES technology certification.

Each year, participating teachers created projects that were presented to students. These projects required students to respond to driving questions or problems and then create a digital project that would publicly shared and assessed for certification.

To support their CollegeYES work, science teachers, advisory teachers, and selected elective teachers, within the LEA, participated in professional development that covered topics such as:

- Designing and integrating PBLs into classroom instruction
- Integrating technology to support the development and creation of student projects
- The International Society for Technology in Education Standards
- Supporting ELLs in Science
- Using the TechYES online platform to manage student projects
- Next Generation Science Standards

Additionally, a selected group of students, known as Student Technology Leaders (STLs), supported their peers; 1) in creating projects, 2) learning new technologies to develop projects, 3) using the online platform (TechYES) for submittal of project, and 4) assessing student projects for technology certification. STLs in grades 6th through 12th provided trainings not only to students but to teachers, and parents on technology tools and resources that supported the completion of student projects. Some of the trainings, led by STLs, were on presentation software and technology tools including, but not limited to, Prezi, iMovie, Google Slides, Google Drive, GoAnimate, and a variety of tech tools and resources that supported the work of the CollegeYES projects. Student technology leaders attended STL summer trainings, facilitated by GenYES and CollegeYES project staff, to learn new technologies, to learn to develop their leaderships skills, and to prepare digital citizenship lessons to be shared with their peers each school year. Over the

5 year grant period the CollegeYES project had close to 500 student technology leaders supporting the CollegeYES project at their individual school sites. STLs grew to become key players in the success of the CollegeYES project as well as key players in supporting their schools transition to 1:1 technology environments.

CollegeYES Project Highlights

Over the the 5 year grant period the CollegeYES project served a total of 9,619 students. Each student served in the CollegeYES project was enrolled in at least 1 science course and one Advisory course that provided the opportunity for the student to access academic content and demonstrate their knowledge of the content through the completion of a student created technology-infused project. Additionally, students served, through the CollegeYES project, had the opportunity to submit at least 1 of their projects to the TechYES platform to be assessed for technology certification.

In total 20, 893 student projects were completed and submitted to the TechYES platform. Student technology leaders, CollegeYES facilitators, and teachers at each individual school site were responsible for assessing projects for technology certification. In order for a project to earn "technology certification" the project needed to demonstrate mastery of 21 of the 24 ISTE technology standards. Additionally, projects could also be recognized as a "highly qualified" project if the project demonstrated mastery of at least 15-20 of the ISTE technology standards.

By year 5, a total of 2,543 projects (12% of projects submitted) earned "technology certification" and 4,683 projects (22% of projects submitted) were identified as "highly qualified" projects. In total, 34% of the projects submitted either earned "technology certification" or were identified as "highly qualified".

CollegeYES enabled:

- 495 students to become Student Technology Leaders in their school and support their Alliance school in integrating technology and project based learning in science courses and College Career Readiness courses.
- 9,619 students to innovatively utilize technology to access science standards and technology standards through the completion and submission of a digital project utilizing an online platform to manage their work.
- 2,477 middle school students to complete and publicly share 1 technology infused project to support their understanding of what it means to be College and Career ready in the 21st century.
- 7,331 high school students to complete and publicly share at least 1 project to support their understanding of what it means to be College and Career Ready in the 21st Century.
- 3,569 middle school students to complete and publicly share at least 1 technology infused project to demonstrate their knowledge of both science and technology concepts.
- 7, 537 high school students to complete and publicly share at least 1 technology infused project to demonstrate their knowledge of both science and technology concepts.
- 20 CollegeYES schools have their Student Technology Leaders participate in 3 STL summer camp trainings.
- 20 CollegeYES schools to have at least one school representative participate in the CollegeYES professional development that focused on Designing projects aligned to the Buck Institute's for Education PBL framework, Technology Integration, College and

Career Readiness Standards as defined by the ISTE Technology standards, and Supporting ELLs in science.

- Each of the 20 CollegeYES schools to develop their STL clubs and provide time for STLs to meet and collaborate on the CollegeYES project.

2. NYSSTL Evaluation

In 2005, Hamilton-Fulton-Montgomery (HFM) BOCES, in cooperation with the Washington-Saratoga-Warren-Hamilton-Essex (WSWHE) BOCES and the Generation YES corporation came together to create the *New York State Student Technology Leaders (NYSSTL) – DLS 2.0 Project,* funded through the federal Enhancing Education Through Technology (EETT) grant initiative. HFM BOCES worked closely with the not-for-profit agency Generation YES to implement two key components of the project: *TechYES* and *GenYES*. TechYES is designed to promote student technology literacy among middle school students using a project-based approach, while GenYES involves students mentoring teachers in the use of technology. Student Technology Leaders (STLs) are students who are trained to work with both teachers (through GenYES) and students (through TechYES) to help promote technology literacy throughout their buildings. The independent evaluation was conducted by Measurement Incorporated.

Summary Findings

Findings from the three-year evaluation consistently point to the potential of the NYSSTL – DLS 2.0 Project to expand the technology skills of both teachers and students, as well as to provide students with valuable leadership opportunities. Teachers gained important new computer skills, and have expanded their use of technology in the classroom. Indeed, the majority of teachers who responded to the teacher surveys each year of the grant are using technology to enhance their teaching of core subject area content.

Student and school-wide benefits are evident as well. Students are more engaged in learning, and their teachers report increased levels of confidence. Furthermore, most teachers surveyed believe the project has led to increased student achievement across the curriculum. For all of these impacts, an analysis of three years of data suggests that the benefits increased over time as the project had time to "take root" in schools. For STLs specifically, benefits include gaining important 21st century skills, including leadership and communication skills, as well as finding a niche and a sense of purpose in their school communities. For some schools, the NYSSTL model was able to "fill the gap" with respect to addressing teachers' day-to-day technology needs.

Promising Practices

Building TechYES into the Curriculum: TechYES was widely implemented throughout the grant with much success—the majority of targeted middle school students completed the program, and were certified as "technology literate". Whether TechYES was built into a computer class or one of the core content area classes, making the two projects a required part of the class scope and sequence was essential.

Promoting Creativity: By allowing flexible project design and completion, the most successful TechYES programs allowed students to explore various forms of technology and complete their projects in a way that was most appropriate for them. Students were able to demonstrate creativity by choosing a project topic, designing the presentation format, and using multiple forms of technology. This flexibility permitted students to gain skills in technology that they were able use across the curriculum and demonstrate success at their own level.

Relying on Peer Mentors: Peer mentoring was described by NYSSTL Advisors as an important component of a successful TechYES program. Peer mentors assisted their fellow students in project design and completion, and also conducted assessments of finished projects using a standardized rubric provided by Generation YES. Some of the most successful sites highlighted the importance of using the peer mentor role to its full capacity to help the program run smoothly. For example, at some schools the entire TechYES class also became peer mentors.

Project Results

Teachers

Participating teachers strengthened their technology skills and increased their use of technology in the classroom.

- Participating teachers have gained greater comfort with technology, and have increased their ability to use technology for instruction. These gains were achieved through both the NYSSTL and DLS models of teacher training and support.
- Teachers are using technology on a regular basis in core subject areas to help students build skills and proficiencies. In the final year of the grant, at least 70% of teachers who responded to the survey are using technology to a "moderate extent" or to a "great extent" for this purpose.
- Teachers have consistently reported *statistically significant* gains in their ability to integrate technology into classroom instruction. Examples include:
  - teachers' ability to connect instructional uses of technology to the NYS Standards,
  - integrating technology to increase students' critical thinking skills, and
  - using technology to assess student learning.

Data suggest that teachers who spent more time involved in NYSSTL and/or DLS training over the course of the grant made the greatest gains (i.e., largest effect sizes).

- Teachers have consistently reported increased use of student-centered instructional activities since their participation in the program, such as having students teach each other, allowing students to evaluate and improve their work, having students work on self-directed projects, and using facilitation and coaching as instructional methods.

Academics

Participating students made academic gains as a result of the project, as reported by both teachers and students.

- As a result of the grant, more than 6,200 middle school students were certified as "technology literate" through the TechYES program.
- The NYSSTL – DLS 2.0 project has had a positive impact on students' level of engagement and attitude toward learning over the course of the grant. Students are more actively engaged in learning, and more excited about learning. Teachers also report that students are producing higher quality work, and are better able to apply what they are learning to the real world.
- The project has also had a positive impact on students' academic performance and achievement over the course of the grant, as reported by participating teachers. Teachers observed greater proficiency in basic skills such as ELA and math, as well as in other core content areas such as science and social studies.
- Student Technology Leaders have also benefitted from participation, including statistically significant gains in technology skills, improved social and leadership skills, and a greater capacity for working collaboratively with their peers and with teachers/other adults.

School Improvement

While overall school improvement was not a specific focus of the local evaluation, there are selected examples of the ways in which the project has had a positive influence on the school-wide environment.

- Teachers believe that the program filled a "major need" in their schools (reported by 95% of teachers in the final year of the grant), and that it fit smoothly into their school program (91%). Ninety percent of teachers *disagreed* with the statement that "we can do just as well in our school without NYSSTL - DLS".

3. STEM STAR

In the 2011–2012 school year, Generation YES implemented a program funded by the Rural School and Community Trust (RSCT) in six rural schools in North Carolina and Louisiana. The TechYES model was used to provide support to schools seeking to improve the quality of STEM learning. The research was conducted by Education Northwest.

Five strategies comprise STEM STAR:

- focus on rural schools
- professional development
- project based inquiry
- professional learning communities
- Student Science Leaders (SSLs)

Inherent in the design and implementation of STEM STAR is the notion that students develop technology skills and expertise to help teachers and peers integrate technology into their teaching and learning. The findings were prepared by the external evaluator, Education Northwest.

Findings

Findings are summarized in the report by key evaluation strategy. Each data source provides input into understanding STEM STAR and represents the perspectives of various stakeholders. All sites infused technology with the support of SSLs, recruiting and retaining them in a variety of ways. Furthermore, all sites engaged students in developing at least two technology-infused science projects. Projects used a remarkable number of technology tools through the year, most of which were all new to teachers and students alike.

Training

All aspects of the initial training workshop were viewed as useful and students and teachers felt prepared to implement STEM STAR at the close of the training. Participants felt particularly well prepared to help students complete their projects, use the iPads (provided by the program), and assess finished projects. None of the comments suggested areas in which insufficient information was provided; rather they suggested areas for follow-up or ongoing implementation support. Final comments offered kudos and appreciation for the workshop training.

Participant Surveys

Teacher and student respondents were positive about STEM STAR and its influence on teaching and learning. Teachers found the SSLs to be useful and reported, in spring, that most students would complete both projects and be certified. Ultimately, only about half of the students accomplished this target. During the second semester, many teachers did not have their original cohort of trained SSLs in their classes. Therefore, they struggled to keep SSLs involved without that regular classroom contact, or to develop ways to integrate new SSLs into the program mid-year.

Teacher Interviews
Interviewees were consistently positive about STEM STAR and its potential. Teachers saw value in all components of the program including the training, use of SSLs, integration of technology-rich science projects, and the website. They unanimously planned to continue in some form during the coming school year. Several teachers commented that the projects fostered student learning of content. All reported that they anticipate STEM STAR students will apply the technology skills they learned in future classes and their own personal interests.

Overall
Across all data sources, STEM STAR appears to have provided a valued program—one that showed positive influence on teachers and students. Considerations for continuing STEM STAR at the sites include developing a solution to mid-year changes in courses which can mean teachers losing daily contact with their SSLs during class time. In addition, teachers would have liked a mid-year "booster shot" in the form of a professional development session to re- acquaint them with the website and share strategies with their colleagues. Some teachers suggested revising the website to facilitate use and simplify project assessment online.

Overall, participants were very enthusiastic about the program and felt fortunate to have been involved.

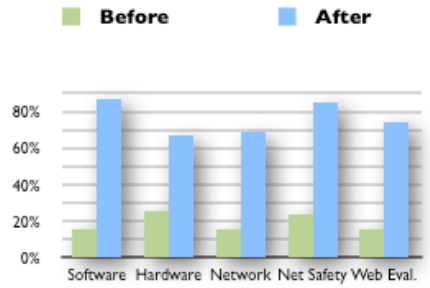
4. Verizon California Technology Literacy Project
In 2006, the Verizon California Technology Literacy Project provided 10,000 seventh grade students in 47 schools in California's Central Valley with the opportunity to become nationally certified in technology literacy using the TechYES model.

Results
An evaluation completed by the Woodside Research Consortium found that "there was a significant positive change in the knowledge and skills of all those involved in TechYES". Teachers/advisors found growth in their own as well as their students' technology skills, and the development of students' leadership skills, particularly among the peer mentors. Overall, "advisors, peer mentors and students in the TechYES program agree that TechYES is a productive way to ensure that middle school students are technology literate and that TechYES is an effective strategy to bridge the digital divide."

Evaluation Highlights
- Advisors agreed (97%) that TechYES helped bridge the digital divide in their primarily Hispanic and Southeast Asian schools.
- 100% of advisors agreed that TechYES is a good way to ensure middle school technology literacy.
- TechYES advisors, peer mentors and students felt that there was significant positive change in the knowledge and skills of all those involved in TechYES.
- Advisors saw growth in their students' technology skills, in peer mentors' skills as effective leaders and tutors, and in their own abilities to teach technology.
- Advisors reported a significant improvement in their own abilities to teach technology and use project-based, collaborative methods.

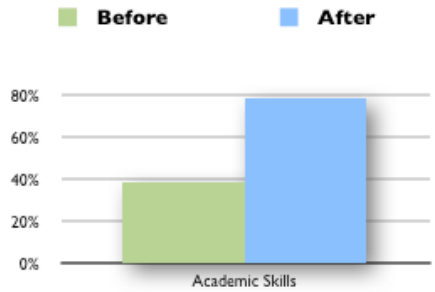
Student Technology Skill Levels

Knows well or expert (according to TechYES Advisors)

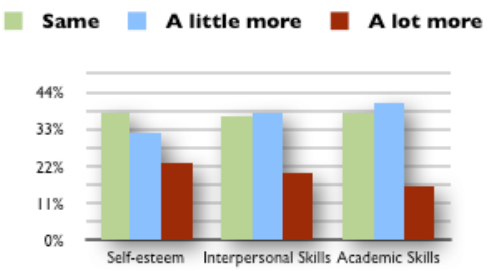


Student Academic Improvement

Knows well or expert (according to TechYES Advisors)

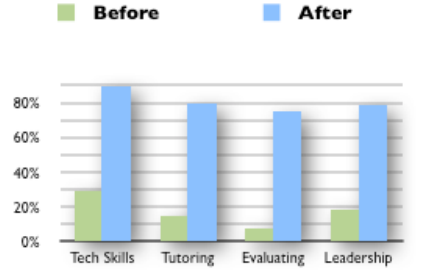


Student's Self-rating of Skills Due to TechYES Participation



Peer Mentor Skills

Knows well or expert (according to TechYES Advisors)



5. Malaysian Student Technology Leaders (MySTL) Catalyst Schools Program

The MySTL program was implemented in two phases. In the first phase the students earn their TechYES certification in relation to four criteria: **gather, organize, construct,** and **share.** Each criterion encompasses one or more of the International Society for Technology in Education standards. In the second phase the students who are now technology proficient drove the ICT from one of limited utilization in the classroom to the whole school. The specific objectives of the MySTL programme included,

(a) Implementation objectives:
   1. To trace systematic challenges associated with implementing the student centric learning programme
   2. To determine the various modes of integration that have been used to embed the programme into existing curriculum and school activities
   3. To explore a new technique of Project Based Learning and Assessment
   4. To investigate the programme's potential to impact other subjects
   5. To compare the schools to one another as to how their differences affect programme outcomes

(b) Participant outcome objectives
   1. To determine the readiness of teachers to manage 21st Century Skills development in the classroom
   2. To raise awareness and to further develop teachers' ICT skills to enhance the integration of ICT throughout the curriculum
   3. To enhance the students' knowledge and interest of using ICT in meaningful ways and developing their ICT life skills
   4. To verify the benefits of adopting the ISTE standards as a benchmark for 21st Century Skills and Technology Literacy
   5. To examine the MySTL system as an effective evaluation tool for 21st Century Skills
   6. To explore the sustainability of the monitoring and evaluation mechanism of the Web based MySTL system

The pilot for the MySTL programme was conducted in three selected schools. Sekolah Seri Puteri (SSP) is a fully residential school in Cyberjaya. Sekolah Menengah Felda Besout (SMKFB) is a rural school in Sungkai and Sekolah Menengah Ampang Pecah (SMKAP) is a semi urban school in Kuala Kubu Baru. The Impact Study was conducted in these three schools.

THE IMPACT STUDY OBJECTIVES

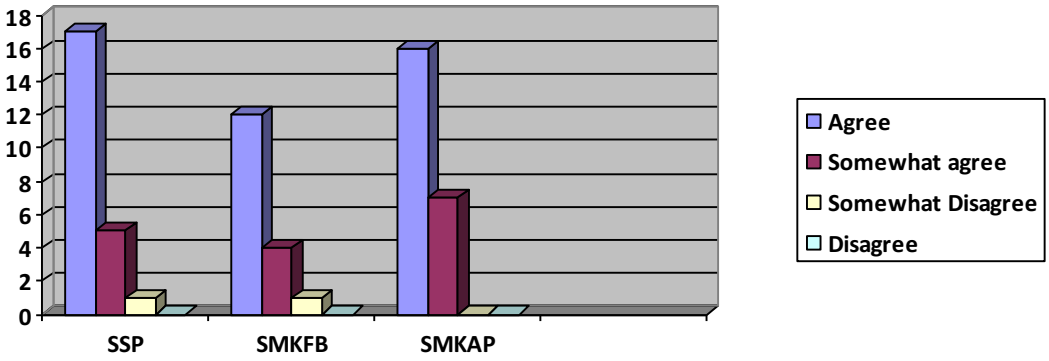
The overall aim of the research was to assess the impact of the implementation of the programin the 3 pilot schools. Specifically the research sought to:

1. To document the experiences and views of the teacher advisors and peer mentors with the MSC Malaysia - MySTL Catalyst Schools Program in the three schools,
2. To determine the technology proficiency and 21st Century skills of teacher advisors and peer mentors through the MSC Malaysia - MySTL Catalyst Schools Program in the three schools,
3. To describe the implementation process of the MSC Malaysia - MySTL Catalyst Schools Program in the three schools,

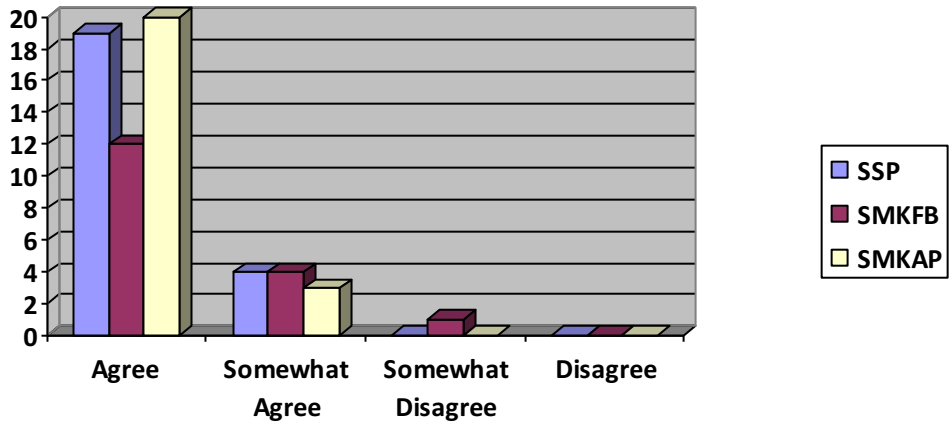
4. To recommend a suitable integration model for the MSC Malaysia - MySTL Catalyst Schools Program

Table 1: The data collection techniques used in the pilot study.

Objective	Data collection techniques
To document the experiences and views of the teacher advisors and peer mentors with the MSC Malaysia - MySTL Catalyst Schools Program in the three schools	Interviews, Surveys and Open Ended Question
To determine the technology proficiency and 21st Century skills of teacher advisors and peer mentors through the MSC Malaysia – MySTL Catalyst Schools Program in the three schools	Observations and Survey
To describe the implementation process of the MSC Malaysia - MySTL Catalyst Schools Program in the three schools	Interviews, Surveys
To recommend a suitable integration model for the MSC Malaysia - MySTL Catalyst Schools Program	Analysis of data



Peer mentors' views as to whether the training has helped them to mentor others successfully



Peer mentors' views as to whether their technology skills have improved due to their involvement in the programme

Domains	SSP	SMKFB	SMKAP
Challenges	The students have a very structured schedule and numerous activities – hence it is difficult to fit in the programme	English – Language problem ; Not so user friendly	English – Language problem; Knowledge of technology
Suggestions	Need to plan schedules to ensure there is sufficient allocation of time for the programme	Bilingual; Enhance User Friendliness	Must teach more details beyond the guide book ; Programme modified for the local context

Challenges and Suggestions by Teacher advisors.