

# Best Practices for Technology High Schools

March 2014



In the following report, Hanover Research explores best practices for technology high schools, including a brief review of the literature and research on technology use in schools, followed by profiles of six programs emphasizing the use of technology in school.

# TABLE OF CONTENTS

<b>Executive Summary and Key Findings .....</b>	<b>3</b>
INTRODUCTION .....	3
KEY FINDINGS.....	3
<b>Section I: Best Practices in Technology Use in Schools.....</b>	<b>5</b>
TECHNOLOGY AS A TRANSFORMATIVE TOOL.....	5
IMPLEMENTING TECHNOLOGY-BASED TRANSFORMATION .....	7
<b>Section II: Program Profiles.....</b>	<b>11</b>
MCVEY INNOVATIVE LEARNING CENTER, HILLIARD CITY SCHOOLS, OHIO .....	11
ACADEMIC ENRICHMENT CENTER, WESTERVILLE CITY SCHOOL DISTRICT, OHIO.....	14
OLENTANGY ACADEMY: SUPPORTING INDIVIDUALIZED SUCCESS (OASIS), OLENTANGY LOCAL SCHOOL DISTRICT, OHIO .....	15
ONE-TO-ONE COMPUTING, KENT TECHNOLOGY ACADEMY, KENT SCHOOL DISTRICT, WASHINGTON.....	17
NEW TECH NETWORK, NEW TECHNOLOGY HIGH SCHOOL, NAPA, CALIFORNIA .....	21
HIGH TECH HIGH, SAN DIEGO, CALIFORNIA .....	25

# EXECUTIVE SUMMARY AND KEY FINDINGS

## INTRODUCTION

The rise of technology in the workspace and educational realm has fundamentally altered the delivery of K-12 education, and the trend seems to be expanding in both scope and influence. For example, in July 2012, Apple Inc. reported that 1.5 million iPads were used in K-12 education.<sup>1</sup> Similarly, degrees in education technology, such as that at the University of Delaware, are emerging, “based on the assumption that new media and the Internet can have a positive effect on teaching and learning.”<sup>2</sup> Despite uncertainty in the educational sector as to the efficacy of technology in the K-12 classroom, this is a phenomenon whose influence is on the rise.

In this report, Hanover Research explores best practices for technology high schools. The first section of the report briefly reviews the literature on best practices for technology use in schools. The second section of the report profiles six different programs that feature the use of technology as a means of improving student outcomes.

## KEY FINDINGS

- **For meaningful reform and impact on student outcomes, schools and districts should use technology in conjunction with curricular changes rather than layered on top of existing curricula.** Technology should be used as more than a mechanism for practice: innovative schools use technology for project-based learning. Project-based learning in smaller communities centers on the students, as individuals and in groups, and facilitates creative problem solving and encourages students to relate their knowledge to the real world.
- **Proper implementation of technology is key to its success.** Many technology schools use technology to transform the school into a workplace-like environment, placing more responsibility on students and shifting the role of teachers from lecturers at the head of the class to facilitators and coaches. Schools are most successful when there is strong leadership and adequate professional development for teachers to understand how to use the technology and apply its use to a new style of instruction.
- **Student outcomes are maximized when the ratio of students per computer is one-to-one.** Research suggests that having ubiquitous access to internet-connected computers is very important. Such access allows students to connect to the world of resources online, collaborate with peers and teachers, work at their own pace, and access schoolwork after school and on weekends with family.

<sup>1</sup> Norris, C. and E. Soloway. “Want Increased Student Achievement Using iPads?” *District Administration*. July 24, 2012. <http://www.districtadministration.com/article/want-increased-student-achievement-using-ipads>

<sup>2</sup> “Master of Education in Educational Technology.” University of Delaware College of Education & Human Development. <http://www.udel.edu/education/edtc/index.html>

- **Many technology schools give consideration to flexibility as well as technology in the design of school facilities.** Teachers and students can use classrooms and other spaces for a variety of purposes, including project work, group or individual work, integrating classes, exhibiting work, and accessing technological resources.
- **Technology can be used to help students who might not be served as well in the traditional classroom.** Technology allows students to work at their own pace in alternative environments or online. Research and case studies suggest that students are more engaged when using technology. Successful completion of projects that require the use of problem-solving skills, or even gaming, can improve student self-esteem.

## SECTION I: BEST PRACTICES IN TECHNOLOGY USE IN SCHOOLS

Research into the use of technology to improve academic achievement faces a number of challenges, making definitive conclusions about its effectiveness difficult. The pace of change in the technology sector means that research that is prolonged enough to reach meaningful conclusions is often limited in its relevance to current technology applications. Furthermore, much of the available research focuses on small sample sizes and short-term pilot projects. Finally, there are concerns regarding the objectivity of the research, much of which continues to be funded by companies or institutions with a stake in the technology itself. Despite these limitations, some broad conclusions about technology

### TECHNOLOGY AS A TRANSFORMATIVE TOOL

As school districts attempt to develop strategies to improve student achievement across all grade levels, experts insist that technology is only part of the solution. Like any tool with great potential, technology can be used effectively or ineffectively, either transcending previous limits of educational delivery or squandering time and financial resources. An October 2012 report by the American Association of School Librarians notes that,

*Schools should beware of the “\$1,000 pencil” approach: Using technology to do the same things with a more expensive tool.*

“when used appropriately, educational technology is a tool to assist with implementation of the Common Core Standards, help raise graduation rates, and prepare students for life beyond K-12 education. Technology employed in isolation, without direct instruction, or highly qualified guidance, fails to address these concerns.”<sup>3</sup>

Schools can use technology with existing instructional practices or use it to transform traditional methods. Traditional technology use involves either treating the technology as the subject matter to be learned or using the technology for tutorial purposes like delivering lectures or providing additional practice. While such uses may not be harmful to learning, they are unlikely to lead to meaningful reform, and can be expensive.<sup>4</sup> Critics of such uses refer to them as “\$1,000 pencil” or “spray and pray” programs because they do little more than use the technology as another way of doing the same thing, while hoping that its use

<sup>3</sup> Cordell, D., et al. “Educational Technology in Schools.” American Association of School Librarians. October 2012, p. 2. [http://www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslissues/positionstatements/AASL\\_Ed\\_Tech\\_WhitePaper.pdf](http://www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslissues/positionstatements/AASL_Ed_Tech_WhitePaper.pdf)

<sup>4</sup> “Overview of Technology and Education Reform.” U.S. Department of Education. <http://www2.ed.gov/pubs/EdReformStudies/EdTech/overview.html>

will somehow transform outcomes.<sup>5</sup> Transformative models, on the other hand, incorporate curricular change along with the introduction of technology. Such programs incorporate technology into student-centered, project-based, and collaborative learning between students and between students and teachers.

Technology and educational change should occur symbiotically and alongside one another, with technology playing a “supportive rather than disruptive role.” The focus should be on supporting curriculum and assessment and not “fitting technology to existing systems.” Furthermore, while many types of technology can help facilitate change, case studies suggest that using technology already familiar to students, such as social networks, games, and discussion forums, is most effective.<sup>6</sup>

### *ACTIVE AND CHALLENGING LEARNING*

General principles of teaching and learning can justify and help specify the most advantageous uses of technology in education. Itiel E. Dror, a senior cognitive neuroscience researcher at University College London, writes that learning is maximized (i.e., it is acquired, remembered, and useable) “when learners are active and motivated, when they are involved, participating, engaged, and interacting with the material.”<sup>7</sup> Technology can do this when it promotes **control of the learning by the learners**, when **learning is challenging**, and when **the learner is committed**. Technology can facilitate learner control, by giving students control over the material they learn and the speed at which they learn it. It can also help learners “know what they know” and “know what they need to know” with more sophisticated and automated feedback.

Technology can also make learning more challenging. This does not necessarily mean it is more difficult, but it is presented in an interesting way that forces the learner to reflect. Gaming technology, for instance, has the capacity to make learning challenging by setting tasks that students need to accomplish by applying their knowledge and problem-solving skills. Gaming has the additional benefit of being able to enhance student commitment levels with built-in rewards for meeting challenges.<sup>8</sup>

<sup>5</sup> November, A. “Why Schools Must Move Beyond One-to-One Computing.” *November Learning*, February 10, 2013. <http://novemberlearning.com/educational-resources-for-educators/teaching-and-learning-articles/why-schools-must-move-beyond-one-to-one-computing/>

<sup>6</sup> “Best Practices in Education Technology.” Cisco, 2010. pp. 4-9. [http://www.cisco.com/web/strategy/docs/education/edu\\_tech\\_best\\_practices\\_wp.pdf](http://www.cisco.com/web/strategy/docs/education/edu_tech_best_practices_wp.pdf)

<sup>7</sup> Dror, I. “Technology enhanced learning: The good, the bad, and the ugly.” *Pragmatics & Cognition*, 16:2, 2008. p. 219. [http://cci-hq.com/Dror\\_CT\\_technology\\_learning\\_good\\_bad\\_ugly.pdf](http://cci-hq.com/Dror_CT_technology_learning_good_bad_ugly.pdf)

<sup>8</sup> *Ibid.*, pp. 219-222.

## IMPLEMENTING TECHNOLOGY-BASED TRANSFORMATION

The International Society for Technology in Education (ISTE) notes that correct implementation of technology is essential, as demonstrated by many different research results. ISTE has identified seven factors for “successful implementation” of educational technology:

- Effective professional development for teachers in the integration of technology into instruction is necessary to support student learning.
- Teachers’ direct application of technology must be aligned to local and/or state curriculum standards.
- Technology must be incorporated into the daily learning schedule (i.e., not as a supplement or after-school tutorial).
- Programs and applications must provide individualized feedback to students and teachers and must have the ability to tailor lessons to individual student needs.
- Student collaboration in the use of technology is more effective in influencing student achievement than strictly individual use.
- Project-based learning and real-world simulations are more effective in changing student motivation and achievement than drill-and-practice applications.
- Effective technology integration requires leadership, support, and modeling from teachers, administrators, and the community/parents.<sup>9</sup>

Specifically, these bulleted points highlight the **importance of implementing project-based learning** alongside new technologies and ensuring that the **professional development** of teachers who deliver these new technological instructional approaches keeps pace with their evolution.

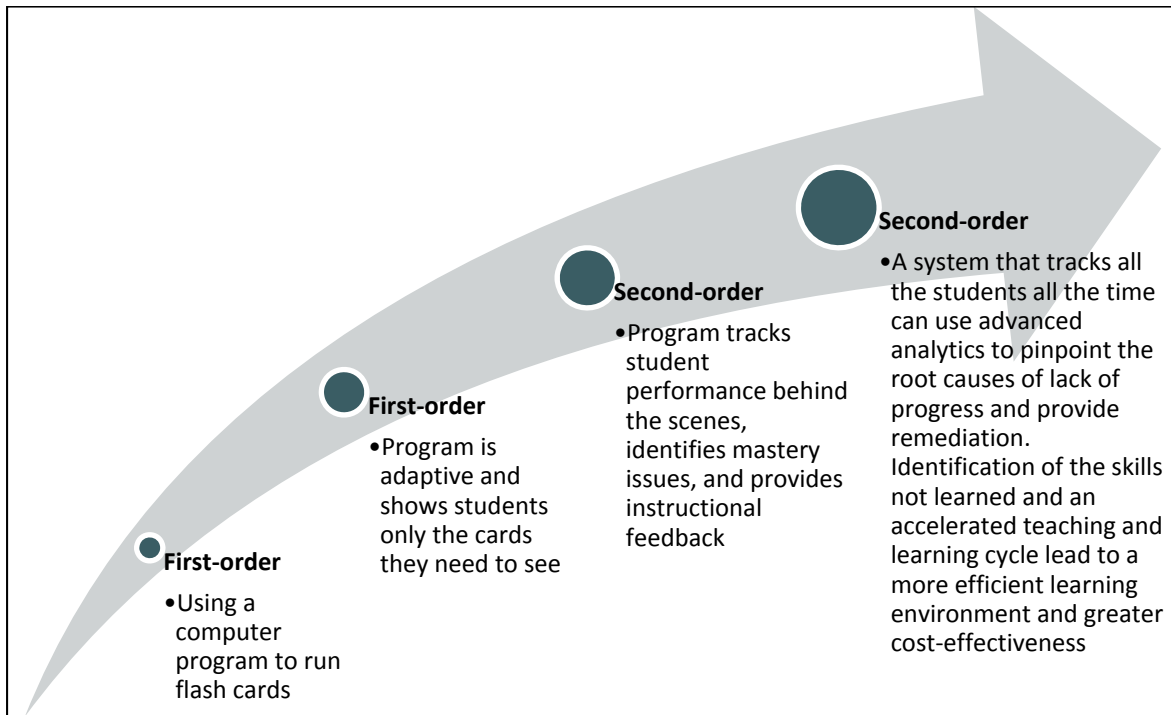
A 2010 report from Project RED was the first large-scale national study designed to “identify and prioritize the factors that make some technology implementations perform dramatically better than others.” The project, a joint endeavor sponsored by Intel, Apple, the Pearson Foundation, among others, was supported by the American Association of School Administrators and the National School Boards Association. The study emphasizes the importance of proper implementation when using technology to improve student achievement. It illustrates this by distinguishing between *first order change*, which leaves intact the basic organizational structure, making incremental improvements by improving the efficiency and effectiveness of that structure, and *second order changes*, which “aim at altering the fundamental ways of achieving organizational goals.”<sup>10</sup> Technology in education can lead to improvements of either kind, but properly implemented, should lead to second-order change. Figures 1.1 and 1.2 illustrate this distinction with examples.

<sup>9</sup> Bulleted points taken verbatim from: “Technology and Student Achievement – The Indelible Link.” ISTE Policy Brief. International Society for Technology in Education. June 2008, p. 3.

[http://www.k12hsn.org/files/research/Technology/ISTE\\_policy\\_brief\\_student\\_achievement.pdf](http://www.k12hsn.org/files/research/Technology/ISTE_policy_brief_student_achievement.pdf)

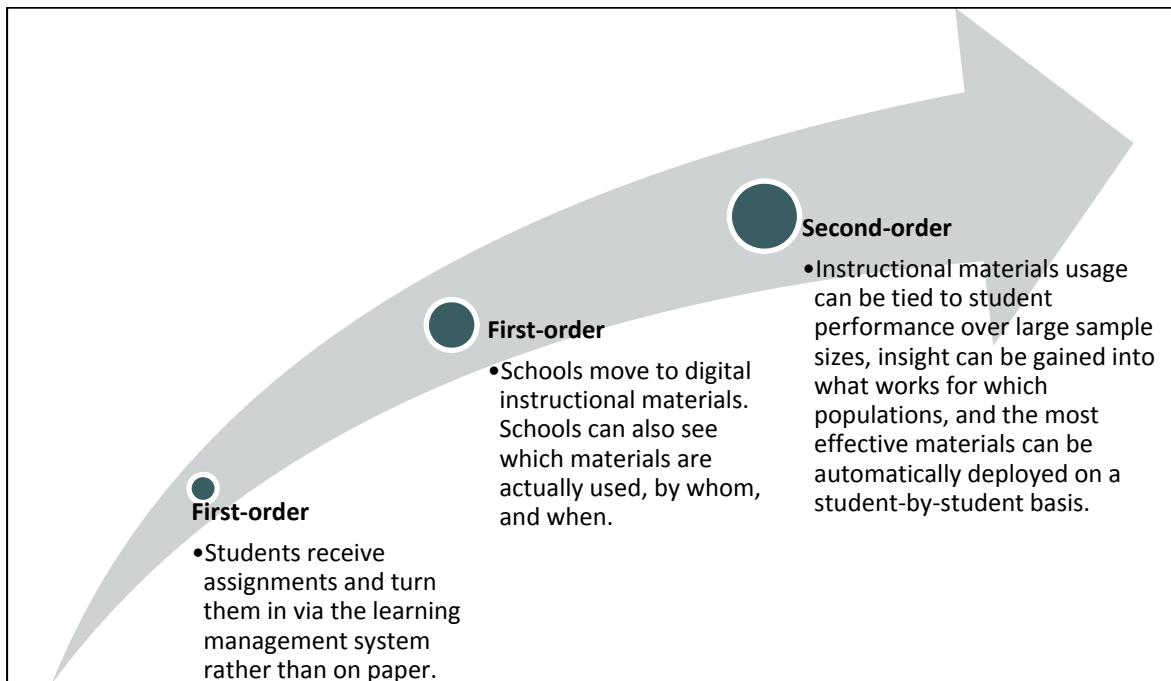
<sup>10</sup> “The Technology Factor: Nine Keys to Student Achievement and Cost-Effectiveness.” Project RED. 2010, p. 7. [http://pearsonfoundation.org/downloads/ProjectRED\\_TheTechnologyFactor.pdf](http://pearsonfoundation.org/downloads/ProjectRED_TheTechnologyFactor.pdf)

**Figure 1.1: More Efficient Learning Environment**



Source: RED Project<sup>11</sup>

**Figure 1.2: Increased Productivity**



Source: RED Project<sup>12</sup>

<sup>11</sup> Example taken from: Ibid., p. 7.



The Project RED report identifies seven major findings from the survey. The key findings fall into two categories. The first is that **technology can have a positive effect on student outcomes**.<sup>13</sup>

- 1:1 schools employing key implementation factors outperform all schools and all other 1:1 schools
- Technology-transformed intervention improves learning
- Online collaboration increases learning productivity and student engagement<sup>14</sup>

The second category of findings demonstrates **the importance of proper implementation**:

- Nine key implementation factors are linked most strongly to education success
- Properly implemented technology saves money
- The principal's ability to lead change is critical
- Daily use of technology delivers the best return on investment

In conclusion, the report found that **"schools employing a 1:1 student-computer ratio and the key implementation factors outperform other schools."**<sup>15</sup> However, most schools fail to implement the technology properly, and do not maximize its effectiveness. Interestingly, schools with a 1:1 student-computer ratio without proper implementation were more similar to schools with higher ratios in terms of success than they were to 1:1 schools properly implemented (schools practicing the top four key implementation factors listed below). Likewise, schools with a 2:1 ratio had outcomes more like schools with a 3:1 ratio than schools with a 1:1 ratio, suggesting that there is a "fundamental difference" between schools where every student has a computer and those where that is not the case. The nine key implementation factors identified by Project RED were the following (in order of predictive strength):<sup>16</sup>

- **Intervention classes:**
  - Technology is integrated into every intervention class period
- **Change management leadership by principal:**
  - Leaders provide time for teacher professional learning and collaboration at least monthly
- **Online collaboration:**
  - Students use technology daily for online collaboration (games/simulations and social media)

<sup>12</sup> Example taken from: Ibid.

<sup>13</sup> The Project RED Study considered various outcomes including the disciplinary action rate, dropout rate, test scores, paper and copying expenses, paperwork reduction, teacher attendance, AP course enrollment, college attendance plans, course completion rates, dual/joint enrollment in college, and graduation rates.

<sup>14</sup> "The Technology Factor: Nine Keys to Student Achievement and Cost-Effectiveness," Op. cit., pp. 12-19.

<sup>15</sup> Ibid., p. 4.

<sup>16</sup> Bullet points taken with slight alteration from: Ibid., p. 12.

- **Core subjects:**
  - Technology is integrated into core curriculum weekly or more frequently
- **Online formative assessments:**
  - Assessments are done at least weekly
- **Student-computer ratio:**
  - Lower ratios improve outcomes
- **Virtual field trips:**
  - With more frequent use, virtual trips are more powerful; the best schools do these at least monthly
- **Search engines:**
  - Students use daily
- **Principal training:**
  - Principals are trained in teacher buy-in, best practices, and technology-transformed learning

**Technology-transformed interventions**, defined as interventions “where technology plays an integral role in the class,” was **the only top-model predictor for more than one education success measure in the study** (high-stakes test scores, dropout rate reduction, course completion, and improved discipline) in ELL, Title I, special education, and reading intervention. These classes were generally student-centered, and students each had a computer and could work at their own pace with individual or group teacher support. Online collaboration, like other forms of collaborative learning, is a predictor of student engagement and reduced disciplinary action and dropout rates.<sup>17</sup>

Many schools implement technology to improve the educational outcomes of all students, including those for whom the traditional classroom setting may not be working. Educators use technology to encourage problem-solving skills in ways that would be more difficult in a traditional classroom. Using technology, students take a more active role in their learning, as the teacher acts more as a facilitator or coach rather than a dispenser of information at the front of the classroom. Educators report that students are more motivated to learn using technology, and that this is particularly important for students of low socio-economic status. Providing access to technology at or through the school can help disadvantaged students who may not have equal access to technology at home, promoting valuable technological skills, increasing collaboration with peers, and enhancing access to and use of outside resources. The combination of being motivated to solve problems and accomplishing goals leads to increased levels of self-esteem, according to educators. In the words of one teacher, “Students gain a sense of empowerment from learning to control the computer and to use it in ways they associate with the real world.”<sup>18</sup>

---

<sup>17</sup> Ibid., pp. 16-17.

<sup>18</sup> “Technology Rationale.” U.S. Department of Education.  
<http://www2.ed.gov/pubs/EdReformStudies/EdTech/techrational.html>

## SECTION II: PROGRAM PROFILES

The following section profiles six programs that use technology as a means of improving student outcomes. The first three profiles represent three programs recently initiated by the Ohio school districts of Hilliard City Schools, Westerville City School District, and Olentangy Local School District. These programs do not establish independent high schools, but they do offer separate spaces with significant technological resources that students and teachers can use for a variety of purposes, including enrichment, after school, and alternative education programs.

The final three profiles represent exemplary models of technology high schools, all of which have been replicated. The Kent Technology Academy at the Kent School District in Washington offers an example of one-to-one computing, with a laptop given to every student. High Tech High of San Diego and New Technology High School of Napa, California are two other innovative models of technology schools, both emphasizing project-based learning.

### **McVEY INNOVATIVE LEARNING CENTER, HILLIARD CITY SCHOOLS, OHIO**

Hilliard City Schools is the ninth largest school district in Ohio. It is a large suburban school district in Franklin County near Columbus, Ohio with 15,726 students and 23 schools, three of which are high schools.<sup>19</sup>

Hilliard City Schools opened the McVey Innovative Learning Center (MILC) in the fall of 2013, with the primary aim of promoting college and career readiness.<sup>20</sup> The space centralizes and expands the district's programs for college and career readiness, providing a space to coordinate online courses, mentorships, enrichment programs, and capstone experiences.<sup>21</sup> The center is designed as an environment to facilitate personalized learning. Students come to the center from their home schools for 90-minute blocks to take classes. Over 700 students have signed up.<sup>22</sup> Hilliard's director of innovation and extended learning, Brent Wise, explains, "Don't think of it as a traditional school." Instead, he adds, "We want it to be an extension of learning."<sup>23</sup>

Students can choose courses from among 24 in-person and more than 50 online courses offered through the center's four "networks," now centralized in one location.<sup>24</sup> These include:

<sup>19</sup> "Facts and Figures." Hilliard City Schools. <http://www.hilliardschools.org/district/factsfigures/>

<sup>20</sup> "Community Invited to Dedication of McVey Innovative Learning Center." Hilliard City Schools. <http://www.hilliardschools.org/community-invited-to-dedication-of-mcvey-innovative-learning-center/>

<sup>21</sup> "Check out the McVey Innovative Learning Center in Hilliard." ITSCO and ETSEO. <http://www.itsco.org/blog/check-out-mcvey-innovative-learning-center-hilliard>

<sup>22</sup> Wainfor, S. "Hilliard Learning Center Designs Personal Education Program." NBC4i.com, November 21, 2013. <http://www.nbc4i.com/story/23288253/hilliard-learning-center-designs-personal-education-program>

<sup>23</sup> Boss, C., and C. Binkley. "Hilliard Schools Explore New Ways to Learn." *The Columbus Dispatch*, February 19, 2013. <http://www.dispatch.com/content/stories/local/2013/02/19/new-ways-to-learn.html>

<sup>24</sup> "Community Invited to Dedication of McVey Innovative Learning Center," Op. cit.

- **The College Jumpstart Network** allows student to earn up to 34 college credits from Columbus State Community College while still enrolled in high school. Students can take courses at the Innovative Learning Center for two years, pursuing classes in English, psychology, sociology, math, and philosophy.
- **The Young Professionals Network** offers professional experiences and mentorships through Career Mentorship courses, in which students earn credit by working with community businesses, or Academy EDU, where students are able to earn credits tutoring younger students.
- **The Personal Success Network** lets students participate in highly personalized instructional programs, which can include any type of alternative education, including online learning and small group instruction, all with flexible scheduling and curricula. Personal Success students work with an ILC Learning Coach throughout the week.
- **The Imagination Network** allows students to “explore learning through the lens of the humanities,” with language classes such as French, German and Spanish, and Academy Vibe, where students can record their own music in the center’s recording studio.<sup>25</sup>

In addition to offering a space for coursework, any students in grades 6-12 can use the MILC after school or on the weekends during extended hours, individually or in groups for study time and to use the available resources. Teachers can also use the space to host review sessions.<sup>26</sup> Students in grade 5 or younger may use the center if accompanied by staff members.<sup>27</sup>

The center has a wide variety of resources, including the following:<sup>28</sup>

- |   |   |
|---|---|
| ■ Pre-engineering computers (8)   | ■ iMac collaborative space  |
| ■ 3D printer  | ■ Booth seating with mounted flatscreens                              |
| ■ 30 desktop computers  | ■ Open space seating and collaborative grouping for up to 50 students |
| ■ Collaborative spaces designed for group work with whiteboards, mounted flatscreens, desktops, and movable furniture | ■ Think Tank Library  |
| ■ A “Fish Tank” with flatscreen and 4 laptop connections for screen sharing   | ■ 50 chromebooks  |
|   | ■ Recording studio  |
|   | ■ Coffee shop run by business students                                |

<sup>25</sup> “2013 2014 High School Program of Studies.” Hilliard City Schools. pp. E-2-E-6.  
<http://hilliardschools.org/pdf/HighSchoolProgramofStudies1314.pdf>

<sup>26</sup> “After Hours at the McVey Innovative Learning Center.” Hilliard City Schools, December 16, 2013.  
<http://www.hilliardschools.org/after-hours-at-the-mcvey-innovative-learning-center/>

<sup>27</sup> “McVey Innovative Learning Center Extended Hours.” Hilliard City Schools, September 13, 2013.  
<http://www.hilliardschools.org/mcvey-innovative-learning-center-extended-hours/>

<sup>28</sup> [1] “After Hours at the McVey Innovative Learning Center,” Op. cit.

[2] Wainfor, S. “Hilliard Learning Center Designs Personal Education Program,” Op. cit.

Figure 2.1 shows screenshots of the center and some of its facilities.

**Figure 2.1: McVey Innovative Learning Center**



Source: ITSCO and ETSEO<sup>29</sup>

Hilliard City Schools designed the Innovative Learning Center to be cost-effective. The district established the center without any new tax revenue, repurposing existing administration offices for space and reassigning teachers to staff the center. The district has sought to use grants and partnerships to pay for technology purchases.<sup>30</sup>

In addition to the MILC, Hilliard City Schools' Technology Team maintains the district-wide eSchool, which is an online platform with links to courses and research and learning resources posted by teachers.<sup>31</sup> The Secondary eSchool has links to resources organized by subject area, as well as links to general learning resources such as Google Apps, reference materials, podcasts, and home school libraries. Students also have access to many classroom pages designed by teachers. In addition, students can access eSchool from home, as can parents whom the district assigns a username and password. Finally, the eSchool also provides teachers with instructional and professional development resources.<sup>32</sup>

<sup>29</sup> "Check out the McVey Innovative Learning Center in Hilliard," Op. cit.

<sup>30</sup> Boss and Binkley, Op. cit.

<sup>31</sup> "About eSchool." Hilliard City Schools. <http://www.hilliardschools.org/sec/abouteschool.cfm>

<sup>32</sup> "Secondary eSchool." Hilliard City Schools. <http://www.hilliardschools.org/sec/index.cfm>

## ACADEMIC ENRICHMENT CENTER, WESTERVILLE CITY SCHOOL DISTRICT, OHIO

Westerville City School District serves around 15,000 students in 23 schools, including three high schools.<sup>33</sup> Westerville’s Academic Enrichment Center occupies the district’s former school board office building, across the street from Westerville South High School.<sup>34</sup> The district opened the center in 2011 as a multi-use site with the mission “to support and engage all learners through an expanding array of educational opportunities.” The center offers programs for at-risk students, summer school, and “alternative options such as flexible credits, dual enrollment and post-secondary options for students who wish to challenge themselves.”<sup>35</sup> Figure 2.2 displays the center’s layout and design, which Learning by Design awarded its 2012 Outstanding Project award.<sup>36</sup>

Figure 2.2: The Academic Enrichment Center



Source: “Moving Forward, New Opportunities,” Westerville City School District

<sup>33</sup> “About Our District.” Westerville City School District.

<http://www.westerville.k12.oh.us/administrativeDepartment.aspx?aid=40>

<sup>34</sup> “Moving Forward, New Opportunities: The Academic Enrichment Center.” Westerville City School District. p. 3.

<http://www.westerville.k12.oh.us/docs/Moving%20Forward%20New%20Opportunities%205%202%202011.pdf>

<sup>35</sup> “Academic Enrichment Center.” Westerville City School District. <http://westervilleschools.org/westerville-schools/academic-enrichment-center/>

<sup>36</sup> “Rep. Gonzales Honors Westerville Schools for Recent Awards.” Ohio House of Representatives Republican Caucus, May 19, 2012. <http://ohiohousegop.blogspot.com/2012/05/rep-gonzales-honors-westerville-schools.html>



The Academic Enrichment Center houses the Educational Options for Success (EOS) program, which serves “students who have been expelled, are overage and under-credited, and/or who have dropped out or are considering dropping out of school.” The program is voluntary, but participants must adhere to a code of conduct and maintain regular attendance and consistent progress toward completion. The staff monitors the weekly progress of students and provides feedback to students and their parents. The program incorporates a technology-based curriculum that allows the student to move at her or his own pace. The EOS also provides students with access to counseling support services and family outreach. Students work towards gaining skills they can use upon completion of the program through evidence-based instructional practices and community service.<sup>37</sup>

### **OLENTANGY ACADEMY: SUPPORTING INDIVIDUALIZED SUCCESS (OASIS), OLENTANGY LOCAL SCHOOL DISTRICT, OHIO**

The Olentangy Local School District is a suburban district near Columbus, Ohio, serving 15,815 students in 23 schools. Olentangy is the fastest growing district in Ohio.<sup>38</sup> Olentangy Local School District initiated the Olentangy Academy: Supporting Individualized Success (OASIS) program in 2010 with the aim of serving students for whom the traditional high school environment was not working and those who were enrolling in schools outside the district, including a number of charter schools. In its first year, OASIS had two students enrolled.<sup>39</sup> By summer 2011, OASIS had 22 students, and by the end of the 2011-12 school year, 108 students enrolled.<sup>40</sup> The stated vision of the program is:

To provide an innovative and personalized delivery model by which to support students’ individualized academic and behavioral development . . . We will promote high expectations for students in all areas: academic, artistic, physical, health, citizenship and service. In a fiscally responsible manner, we will commit the resources necessary to establish and maintain:

- A respectful, caring and safe environment
- Research-based, student-focused instruction
- Information-driven decision making
- Collaboration focused on improving student learning
- An active partnership with parents and community<sup>41</sup>

<sup>37</sup> “Educational Options for Success.” Westerville City School District.

[http://www.westerville.k12.oh.us/content\\_page2.aspx?schoolid=36&cid=992](http://www.westerville.k12.oh.us/content_page2.aspx?schoolid=36&cid=992)

<sup>38</sup> “Using Technology to Keep Up with the Pace of Growth - and Student Demand.” Schoology.

<https://www.schoology.com/olentangy-lms-case-study.php>

<sup>39</sup> Nuckles, B. “Olentangy Program Hopes to Lure Back Charter Schoolers.” *Columbus Local News*, September 14, 2010.

<http://www.olentangy.k12.oh.us/oasis/wp-content/blogs.dir/27/files/2013/10/091510olentangyprogramhopetolurebackchartreschools-2.pdf>

<sup>40</sup> Nuckles, B. “OASIS Booming in Its Third Year.” *ThisWeek Community News*, July 11, 2012.

<http://www.thisweeknews.com/content/stories/olentangy/news/2012/07/10/oasis-booming-in-its-third-year.html>

<sup>41</sup> “Welcome to OASIS.” Olentangy Local School District. <http://www.olentangy.k12.oh.us/oasis/>

One motivation for the program, which began as a “cost-neutral” program that would relocate existing staff and space,<sup>42</sup> was the loss of as much as \$800,000 of funding tied to the 74 students who enrolled in other schools in 2009-10 in pursuit of alternative learning solutions. By 2011-12, the district received \$530,000 in funding for students who attended OASIS who might have otherwise left the district.<sup>43</sup>

**The goal for OASIS was to blend online learning with in-class instruction to provide a personalized and flexible option for students who may need an alternative program for a variety of reasons,** including being overwhelmed by a large high school setting, having jobs or family obligations, or wanting to take Advanced Placement courses not offered in the traditional school.<sup>44</sup> OASIS has a low student-teacher ratio and offers adult mentoring and college and workforce preparation.<sup>45</sup> The site will also be a place for students to receive college and career counseling.<sup>46</sup> OASIS students participate in service learning with bi-weekly community-based activities and are encouraged to spend at least one hour each week in service learning.<sup>47</sup> For example, students can work with local elementary school students for one hour per week.<sup>48</sup>

*Olentangy’s OASIS program combines online learning and in-person instruction for students who need an alternative learning environment.*

The location for OASIS is a separate building behind a district middle school, which has four rooms and enough space for 20 to 30 computers.<sup>49</sup> OASIS hours are 8:00am-12:00pm; however, OASIS students design their own attendance plan.<sup>50</sup> Depending on individual need, students may spend as few as one to two days per week in class or as many as five days. The remainder of class is conducted online. OASIS students can eat lunch at the adjoining middle school.

OASIS students are dual-enrolled at their home school, allowing them to take part in sports or other activities if they so desire.<sup>51</sup> The program seeks a balance between the flexibility of online learning and connectedness to the high school experience.<sup>52</sup>

<sup>42</sup> Manning, A. “Olentangy Launches In-District Alternative.” *The Columbus Dispatch*, October 13, 2010.

<http://www.dispatch.com/content/stories/local/2010/10/13/olentangy-launches-in-district-alternative.html>

<sup>43</sup> Nuckles, B. “OASIS Booming in Its Third Year,” Op. cit.

<sup>44</sup> Manning, Op. cit.

<sup>45</sup> “Welcome to OASIS,” Op. cit.

<sup>46</sup> Budzak, G. “‘Innovative Learning Center’ to Open in 2013.” *ThisWeek Community News*, April 18, 2012.

<http://www.thisweeknews.com/content/stories/hilliard/news/2012/04/17/innovative-learning-center-to-open-in-2013.html>

<sup>47</sup> “The OASIS Vision.” Olentangy Local School District. p. 2.

<http://www.olentangy.k12.oh.us/oasis/files/2012/04/OASISbrochure.pdf>

<sup>48</sup> “Welcome to OASIS,” Op. cit.

<sup>49</sup> Nuckles, B. “Olentangy Program Hopes to Lure Back Charter Schoolers,” Op. cit.

<sup>50</sup> “Welcome to OASIS,” Op. cit.

<sup>51</sup> Nuckles, B. “Olentangy Program Hopes to Lure Back Charter Schoolers,” Op. cit.

<sup>52</sup> Manning, Op. cit.



The district piloted three modes of online courses: Apex Learning, Passkey, and courses built by Olentangy faculty. The district has 200 Apex Learning seats, which rotate as students finish a course, allowing another student to take that seat. Those 200 seats, as well as \$2,200 for professional development, cost the district \$157.50 per seat. The district's 110 seats with Passkey are more affordable at \$40 per seat, but the program "is known to be a lesser quality option." Finally, the district offers a small number of courses developed by Olentangy teachers on the learning management system Schoology.<sup>53</sup>

The Olentangy Online Academy (O2A) offers courses online, providing students with scheduling flexibility. The program, piloted with two technology courses at Olentangy Orange Middle School, has 45 teachers working to develop their own classes for online delivery. One of the major benefits of the program, allowing students to access classes and course resources outside of the classroom, is also one of its challenges: teachers must adjust lesson plans for the online environment, including facilitating interaction at different times. A positive feature of online courses is that teachers can interact with students in other buildings.<sup>54</sup>

Online courses can help maximize the use of space and alleviate the need for a new high school. They can also help implement flipped classrooms by providing students with access to course materials at home.<sup>55</sup> According to a February 2013 district report, the online platform will serve 17,000 students and cost \$2.94 per user, and prices per user are projected to decrease as user numbers increase. The platform is supported by the CampusEAI Consortium, with a MyCampus online portal, a Schoology learning management system, and PowerSchool gradebook.<sup>56</sup>

### **ONE-TO-ONE COMPUTING, KENT TECHNOLOGY ACADEMY, KENT SCHOOL DISTRICT, WASHINGTON**

Kent School District, serving the area around Kent, Washington, had an enrollment of 26,975 students in the 2011-12 school year. The district has 28 elementary schools, six middle schools, four high schools, and three academy schools. Because of its one-to-one program, the district has been recognized as an International Technology Best Practices Visitation Site and placed on the Microsoft Innovative Schools World Tour by Microsoft, as well as being recognized as a Project RED Signature District and a One-to-One Showcase Site by the One-to-One Institute. The Center for Digital Education gave the district its Digital Content and Curriculum Achievement Award.<sup>57</sup> The district holds an annual Kent Technology Expo to present the district's use of technology in education.<sup>58</sup>

<sup>53</sup> "Project 2020 Findings Report." Project 2020 Committee, Olentangy Local School District, February 25, 2013. pp. 5-8. <http://www.olentangy.k12.oh.us/wp-content/uploads/P2020Report.pdf>

<sup>54</sup> Truett, K. "Taking the Classroom Home. *Aptitude*, 1:1, Fall 2011. p. 10. [http://www.escofcentralohio.org/Communications/Documents/Aptitude\\_Issue1.pdf](http://www.escofcentralohio.org/Communications/Documents/Aptitude_Issue1.pdf)

<sup>55</sup> "Using Technology to Keep Up with the Pace of Growth - and Student Demand," Op. cit.

<sup>56</sup> "Project 2020 Findings Report," Op. cit., p. 8.

<sup>57</sup> "Basic District Facts." Kent School District. <http://www.kent.k12.wa.us/domain/37>

<sup>58</sup> "Past, Present, Future." Kent School District. <http://www.kent.k12.wa.us/Page/3556>

Kent School District began its one-to-one program in 2005 with the Kent Technology Academy (KTA), a pilot program with 90 grade 7 students and three teachers housed in a district middle school. In its second year, the KTA doubled in size to 180 students with six teachers. In 2007, the district expanded the program to high school students with the Kent-Meridian Technology Academy (KMTA), located on the Kent-Meridian High School Campus. According to the district's website, the programs at KTA and MKTA currently have 500 students in grades 7-12 with 15 teachers. Additionally, after a positive evaluation of the program by an external company, the district is expanding the one-to-one initiative to all secondary students in the district. In all, around 12,000 students participate in the One-to-One Laptop Initiative.<sup>59</sup>

The district's academies function as laboratories and proving grounds for one-to-one best practices. Students take their core courses in small learning communities in a "technology-rich" environment. Students take electives and PE/Health at the main school. The pilot program at KTA was designed using the following best practice strategies:<sup>60</sup>

- Cooperative approaches to learning
- Project-based instruction
- Individualized and differentiated instruction
- Sustained writing opportunities
- Integration of subject matter
- High expectations for every student

A 2007 report on the effectiveness of the one-to-one program at KTA determined that the program would rank as the first or second highest performing school in the district based on test scores, even though the students in the school were selected via lottery so that they would reflect the district's general population. The evaluation also found that KTA teachers were more likely to act as coaches rather than direct instructors compared with colleagues at the traditional middle school. The study also found that students at KTA were less likely to be unengaged.<sup>61</sup> The Principal of Kent-Meridian High School explains,

Putting great technology in a classroom does not instantly mean that a great education will be provided. But, when fully embraced by the teacher and students, the walls of the classroom disappear and the possibilities are endless. Students are no longer hindered by limited resources because access to anything and everything is at their fingertips 24 hours a day. Technology allows each student to take ownership in his or her education and focus on what they desire to learn.<sup>62</sup>

---

<sup>59</sup> Ibid.

<sup>60</sup> Bullet points taken verbatim from: Banks, K. "Evaluation of the Kent Technology Academy 2005-2007." Data Detectives, December 2007. p. 2.  
<http://www.kent.k12.wa.us/cms/lib/WA01001454/Centricity/Domain/567/KTAKarenBanksReportFinal.pdf>

<sup>61</sup> Ibid., pp. 2-5.

<sup>62</sup> "Cutting Edge Classroom Part I – Teachers and Technology." *Kent Reporter*, March 6, 2012.  
<http://www.kentreporter.com/community/141606993.html>

### *EQUIPMENT PROVIDED*

The district covers the cost of “the laptop, case, extended battery, a 3 year warranty, a one-year extended care package and insurance.” Funding for the program has come from a voter approved technology tax levy.<sup>63</sup> Students receive the laptops during the first two weeks of school and return them in June.<sup>64</sup>

The schools themselves each have an internet connection speed of 500Mbps using a network with built in redundancy to minimize disruption. Schools also have a wireless network designed for classes with as many as 40 students accessing the internet at a time. District devices connect to the network securely using data encryption, firewalls, content filtering, and antivirus software. The district also supplies all teachers and students in grades 3-12 with email accounts. Students are restricted to sending and receiving emails within the district’s address book.<sup>65</sup>

In addition to personal laptops, Kent schools have other classroom technology, including SMART Boards and SMART Response remotes, which allow for student interaction with teacher presentations.<sup>66</sup> Students are not required to take the laptops home, but they may, thus maintaining convenient access to school materials outside of school.<sup>67</sup> For instance, many teachers use an “online virtual classroom,” wherein students have access to lessons presented online that are accessible anytime.

*Kent School District’s program provides 1:1 computing within a framework of professional development and curricular support.*

### *TRAINING FOR STUDENTS AND TEACHERS*

The district trains academy staff in project-based learning, 21<sup>st</sup> century skills, and best practices in integrating technology into the curriculum. Teachers use the learning management system Moodle,<sup>68</sup> which allows teachers to build websites and post materials online, including automatically graded assessments. Teachers can then use Moodle to track student outcome data.<sup>69</sup> Teachers can also use the classroom monitoring and student engagement tool DyKnow, which allows them to monitor and control what appears on students’ laptop screens.<sup>70</sup>

<sup>63</sup> “Frequently Asked Questions.” Kent School District. <http://www.kent.k12.wa.us/Page/3353>

<sup>64</sup> “Distribution and Collection.” Kent School District. <http://www.kent.k12.wa.us/Page/3171>

<sup>65</sup> “Infrastructure and Systems.” Kent School District. <http://www.kent.k12.wa.us/Page/3385>

<sup>66</sup> “Cutting Edge Classroom Part I – Teachers and Technology,” Op. cit.

<sup>67</sup> “Distribution and Collection,” Op. cit.

<sup>68</sup> “Past, Present, Future,” Op. cit.

<sup>69</sup> “Cutting Edge Classroom Part I – Teachers and Technology,” Op. cit.

<sup>70</sup> Ibid.

Kent School District teaches students about internet safety, cyber bullying, digital citizenship, and acceptable use.<sup>71</sup> To increase safety, the district uses filtering software to block objectionable websites, including social networking sites.<sup>72</sup> The district also publishes a One-to-One Student/Parent Handbook specifying appropriate computer and internet use, as well as district policies on laptop damage or loss.<sup>73</sup> Students and families must sign a Student/Parent Agreement regarding laptop use.<sup>74</sup> Additionally, the district maintains an inventory of computers using Computrace, which can be used to locate any district computer.<sup>75</sup>

Kent School District uses a professional development series for its teachers adapted from Common Sense Media. The key professional development practices for the district follow best practice research, including teacher collaboration and learning by doing. Modules and Tech Talks include subjects on technical skills, as well as curriculum and lesson designs and instructional methods.<sup>76</sup> Common Sense Media, an organization providing information about appropriate and common sense media use for children, offers many other professional development resources regarding technology use, including one-to-one computing, in the form of research, workshops, and webinars.<sup>77</sup>

One of the challenges for the district is addressing disruptive behavior and distraction caused by the technology in the classroom. Teachers feel that, “Many of the disruptive behaviors we see that come from technology are similar behaviors to what we might see in an environment with less technology. Students who are bored, unengaged, unmotivated, or disruptive may act inappropriately in any situation, whether they have increased access to technology tools or not.”<sup>78</sup> Another challenge technology brings is the speed of technological advancement, which can quickly make existing technology obsolete and in need of replacement. The district works to predict equipment longevity and include this in its cost-benefit analysis. A related challenge is keeping staff adequately trained on updated technology.

<sup>71</sup> “Distribution and Collection,” Op. cit.

<sup>72</sup> “Frequently Asked Questions,” Op. cit.

<sup>73</sup> “KSD One-to-One Student/Parent Handbook.” Kent School District. <http://www.kent.k12.wa.us/Page/3386>  
[http://www.kent.k12.wa.us/cms/lib/WA01001454/Centricity/Domain/567/Student\\_Parent\\_Handbook\\_with\\_ERP\\_2022.pdf](http://www.kent.k12.wa.us/cms/lib/WA01001454/Centricity/Domain/567/Student_Parent_Handbook_with_ERP_2022.pdf)

<sup>74</sup> “Policies.” Kent School District. <http://www.kent.k12.wa.us/Page/3341>

<sup>75</sup> “Frequently Asked Questions,” Op. cit.

<sup>76</sup> “Staff and Student Training.” Kent School District. <http://www.kent.k12.wa.us/Page/3386>

<sup>77</sup> “Common Sense Media Education.” Common Sense Media. <http://www.common Sense Media.org/educators>

<sup>78</sup> “Cutting Edge Classroom Part I – Teachers and Technology,” Op. cit.

## NEW TECH NETWORK, NEW TECHNOLOGY HIGH SCHOOL, NAPA, CALIFORNIA

The New Tech high school model is one of many innovative strategies recently designed to provide students with ubiquitous technology in hopes of engaging students and producing greater student secondary and postsecondary outcomes. The concept of a New Tech High School (NTHS) originated in Napa, California in 1996 with one high school and an initial class of 100 students. Since then, 134 New Tech high schools have started in 23 states and Australia, all based on a similar model which focuses on project-based learning through the integration of technology in the classroom.<sup>79</sup> The New Tech Network grew out of the Napa New Tech High School. New Tech became a subsidiary of KnowledgeWorks in 2009.<sup>80</sup> In 2012-13, the New Tech Network had over 35,000 students enrolled in participating schools. New Tech Network schools, which are located in various community types, have students who accordingly come from diverse backgrounds.<sup>81</sup>

### *PREPARING STUDENTS FOR 21<sup>ST</sup> CENTURY JOBS*

The original impetus behind the school was **to prepare students for a “technologically advanced marketplace.”** The school implemented this vision with two core elements: the availability of the technology itself and a method of instruction that utilized the technology. Each student had a computer and access to current equipment and software. Instruction was project-based, instead of using tests or book reports. The school also fostered self-sufficiency and time management in its students through “A Community of Trust,” meaning that the school operates more like a workplace than a high school with small class sizes, student-directed learning, and no bell schedule directing students.<sup>82</sup>

At their core, New Tech schools focus on the original mission behind Napa New Tech High School, preparing students with 21<sup>st</sup> century skills for the marketplace. The Assistant Director of school design at Napa New Tech explains, **“It’s much less about control. Our kids are basically treated as much as possible like an employee in a company. With respect and trust.”**<sup>83</sup> The design of New Tech schools, from building design to instruction, focuses on that aim with three key practices: project-based learning, the “smart use” of technology, and “a culture that promotes trust, respect, and responsibility.”<sup>84</sup>

Teachers at New Tech schools trust students to be responsible for their own use of time, without class bells and with time to determine what to work on and how to manage their time wisely.<sup>85</sup> Instead of relying on daily assignments and tests, New Tech schools use project-based learning. Students learn by doing, working on projects with various

<sup>79</sup> “What We Do.” New Tech Network. <http://www.newtechnetwork.org/about/about-us>

<sup>80</sup> “Our Story.” New Tech Network. <http://www.newtechnetwork.org/about/our-story>

<sup>81</sup> “Student Outcomes Report 2013: Re-Imagining Teaching and Learning.” New Tech Network, 2013. pp. 10-11. [http://www.newtechnetwork.org/sites/default/files/news/2013\\_annual\\_data\\_v14-01.pdf](http://www.newtechnetwork.org/sites/default/files/news/2013_annual_data_v14-01.pdf)

<sup>82</sup> “About Us.” New Technology High School. [http://newtechhigh.org/?page\\_id=573](http://newtechhigh.org/?page_id=573)

<sup>83</sup> Barseghian, T. “Napa New Tech High: 5 Reasons this is the School of the Future.” The Huffington Post, January 7, 2011. [http://www.huffingtonpost.com/tina-barseghian/napa-new-tech-high-5-reas\\_b\\_805972.html](http://www.huffingtonpost.com/tina-barseghian/napa-new-tech-high-5-reas_b_805972.html)

<sup>84</sup> “Our Elements.” New Tech Network. <http://www.newtechnetwork.org/about/our-elements>

<sup>85</sup> Barseghian, Op. cit.

components, often collaboratively, thus making the material that they are learning relevant to real world challenges. This form of learning requires the creative ability to use and apply that knowledge to solve problems and work collaboratively.<sup>86</sup> New Tech schools also use course integration and team teaching courses. For instance, a school might have a grade 9 “Problem Solving” course, which integrates Algebra I and Scientific Research I, a grade 10 “Music and Literature Studies” course, “ChemAnalysis” in grade 11 focused on chemistry and statistics/probability, or a “Political Studies” course for grade 12 that integrates Government, Economics, and English 12.<sup>87</sup>

*In the New Tech school model, students work more independently, like employees in a company.*

New Tech schools use technology in the classroom to promote 21<sup>st</sup> century technological skills, as well as to implement the instructional model of project-based learning. Technology access, such as one-to-one ratios of students to internet-connected computers, allows students to be self-directed learners.<sup>88</sup> According to administrators, “Kids are finding the path to knowledge their own way.” Teachers observe that students “become empowered and no

longer have to raise their hand to ask a question unless they're really stuck. This pushes them to become lifelong learners. It happens every time as long as you have access to information and technology.”<sup>89</sup>

New Tech Network’s learning management system, Echo, is used by teachers, students, and parents and is accessible via the internet 24 hours per day. Echo can be used to create groups, post course and project resources, communicate with other students or teachers, access online resources such as Google Apps, and track student activity and data. Echo also provides access to customizable exemplary projects for use in class.<sup>90</sup> Figure 2.3 on the following page illustrates a sample of Echo’s functions with screenshots.

According to a 2013 report on student outcomes, New Tech Network schools have graduation rates that are 6 percent higher than the national average. In addition, New Tech Network graduates enroll in college at a 9 percent higher rate, persist in four-year colleges at a 17 percent higher rate, and at two-year colleges at a 46 percent higher rate.<sup>91</sup>

<sup>86</sup> “Project-Based Learning.” New Tech Network. <http://www.newtechnetwork.org/about/project-based-learning>

<sup>87</sup> “Staffing and Facilities Specifications.” New Tech Network.

<http://www.newtechnetwork.org/sites/default/files/fpfiles/staffingandfacilities specifications0.pdf>

<sup>88</sup> “Our Elements,” Op. cit.

<sup>89</sup> Barseghian, Op. cit.

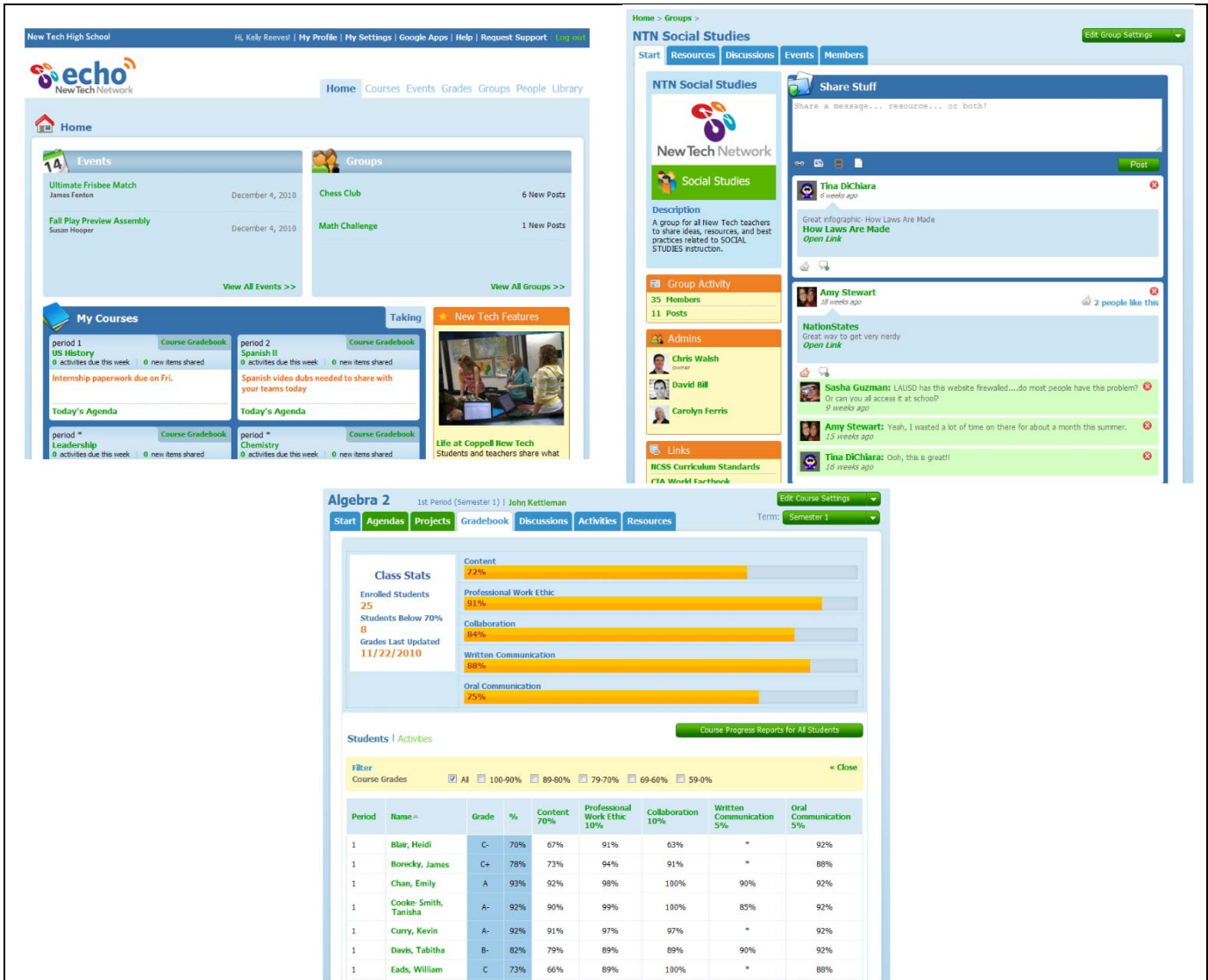
<sup>90</sup> “Our Collaborative Learning Environment.” New Tech Network.

<http://www.newtechnetwork.org/services/learning-management-systems>

<sup>91</sup> “Student Outcomes Report 2013: Re-Imagining Teaching and Learning,” Op. cit., pp. 5-6.



Figure 2.3: Echo Learning Management System



Source: New Tech Network<sup>92</sup>

Figure 2.4 provides a brief overview of the value of the New Tech model to its students. Alumni of a New Tech high school were asked to rate the value of various components of their high school in relation to their success in high school, postsecondary education, and the workplace. The survey used a four-point scale, with a “one” representing “not at all valuable” and a “four” representing “very valuable.” As demonstrated in the table, the average responses for each New Tech component are between three and four, often closer to four. This indicates that New Tech alumni have found substantive value in the majority of the model’s components.

<sup>92</sup> “Our Collaborative Learning Environment,” Op. cit.

**Figure 2.4: Alumni Ratings for the Value of New Tech Program Components**

COMPONENT	HIGH SCHOOL	POSTSECONDARY EDUCATION	CAREER
Using technology as a tool for learning, communicating, and work.	3.78	3.72	3.84
Having a one-to-one computer ratio in the classroom.	3.73	3.48	3.61
Taking college courses while still in high school.	3.70	3.78	3.51
Using real world projects to make classroom learning relevant and interesting.	3.70	3.58	3.69
Experiencing an environment that required high levels of personal responsibility, respect for others, and time management.	3.69	3.72	3.80
Attending a small school where you are well known by peers and teachers.	3.65	3.05	3.35
Regularly presenting information in front of groups.	3.59	3.54	3.64
Working with teams on large projects (collaboration).	3.48	3.29	3.61
Successfully completing an internship.	3.17	3.21	3.31
Reflecting on and describing your abilities in a digital portfolio.	3.03	2.71	2.93

Source: Rockman, et. al.<sup>93</sup>

In a 2010 report, “Alumni Perspectives: Exploring the Impact of New Tech High Schools on College and Work Readiness,” the Network notes that “alumni consistently reported a range of impacted skill areas, including intrapersonal outcomes, such as self-insight and resilience, as well as a range of skills for 21<sup>st</sup> century success, such as critical thinking, communication, collaboration, and technology skills.”<sup>94</sup>

The New Tech network provides services to school districts interested in planning a New Tech school of their own, including school planning, principal training, coaching, and access to the New Tech Learning Platform and other network benefits.<sup>95</sup> The New Tech network has requirements for all new New Tech schools. New schools may begin using a 9<sup>th</sup> Grade Start, with 100-125 students, or a 9<sup>th</sup> and 10<sup>th</sup> Grade Start, with 200-250 students.<sup>96</sup> New schools add a grade level each year after implementation. The New Tech Network requires that school enrollment is no more than 400-600 students. Any New Tech school should have a 1:1 student-to-computer ratio, a school network capacity enabling internet access for all students with 99 percent uptime, Echo, and email accounts.<sup>97</sup> The autonomous school

<sup>93</sup> Rockman, et. al. “New Technology High School Postsecondary Student Success Study.” Center of Excellence in Leadership of Learning. February 6, 2006. p. 9. <http://cell.uindy.edu/docs/NTHS/NTHSSStudentSuccessStudy.pdf>

<sup>94</sup> Lee, P. “Alumni Perspectives: Exploring the Impact of New Tech High Schools on College and Work Readiness.” New Tech Network. November 22, 2010. p. 2. [http://www.newtechnetwork.org/sites/default/files/news/ntn\\_alumni\\_reportv4\\_0.pdf](http://www.newtechnetwork.org/sites/default/files/news/ntn_alumni_reportv4_0.pdf)

<sup>95</sup> “School Development.” New Tech Network. <http://www.newtechnetwork.org/services/school-development>

<sup>96</sup> “Staffing and Facilities Specifications,” Op. cit.

<sup>97</sup> “Commitment Criteria.” New Tech Network, 2012.

<http://www.newtechnetwork.org/sites/default/files/fpfiles/ntncommitmentcriteria-2013.pdf>



should also have a science lab, common spaces for informal learning, a large multipurpose area, and a research center/library. The school should also have or have access to PE facilities, a cafeteria, student storage, and a clinic. A four-year New School should have six to eight “integrated learning studios” that can be used for integrated problem-based learning courses, and six to eight “regular learning studios” for stand-alone courses. New Tech schools should have a full-time director, a full-time IT staff member, and 16-20 teachers.<sup>98</sup> New Technology High School in Napa hosts visitors interested in learning about the New Tech model and has a Center for Excellence which offers project-based learning training.<sup>99</sup>

### **HIGH TECH HIGH, SAN DIEGO, CALIFORNIA**

In 2000, a coalition of business leaders and educators worked to found High Tech High (HTH) as a single charter school in the San Diego Unified School District. The original school began with grades 9 and 10, graduating 50 students in 2003. Currently, a network of 12 schools serves 5,200 students in grades K-12,<sup>100</sup> with no school hosting more than 500 students.

By 2004, HTH ranked in the top 10 percent of California high schools.<sup>101</sup> The mission of the school is “to develop and support innovative public schools where all students develop the academic, workplace, and citizenship skills for postsecondary success.” Each year, High Tech High schools welcome over 2,000 visitors as an “open source” resource center for educators. In 2008, HTH opened its own Graduate School of Education, offering professional development and a Master’s of Education.<sup>102</sup> The school has also recently launched two free MOOCs (Massive Online Open Courses) on New School Creation and Deeper Learning.<sup>103</sup>

High Tech High is ethnically diverse. All students in the district can apply to attend High Tech High. In 2003-04, 400 students applied for 100 spots. Ninety-eight percent of High Tech High graduates have gone on to college, with 75 percent going to four-year colleges.<sup>104</sup> About 35 percent of HTH students are first-generation college students.<sup>105</sup> Attendance rates are high at the school, and HTH students on average scored 85 points higher on the verbal component of the SAT and 54 points higher on the math component than district students as a whole.<sup>106</sup>

The original High Tech High started in a repurposed 38,500-square foot facility at a former naval training center. HTH repurposed other buildings at the site, expanding to three high

<sup>98</sup> “Staffing and Facilities Specifications,” Op. cit.

<sup>99</sup> “Visit Us.” New Technology High School. [http://newtechhigh.org/?page\\_id=29](http://newtechhigh.org/?page_id=29)

<sup>100</sup> “About High Tech High.” High Tech High. <http://www.hightechhigh.org/about/>

<sup>101</sup> “Rethinking High School: Five Profiles of Innovative Models for Student Success.” WestEd, 2004. p. 37. [http://www.wested.org/online\\_pubs/gates.profiles.pdf](http://www.wested.org/online_pubs/gates.profiles.pdf)

<sup>102</sup> “About High Tech High,” Op. cit.

<sup>103</sup> “High Tech High MOOCs.” High Tech High. <http://www.hightechhigh.org/>

<sup>104</sup> “About High Tech High,” Op. cit.

<sup>105</sup> “Results.” High Tech High. <http://www.hightechhigh.org/about/results.php>

<sup>106</sup> “Rethinking High School: Five Profiles of Innovative Models for Student Success,” Op. cit., pp. 38-9.

schools, two middle schools, and an elementary school. Planners designed the school with key program elements in mind, **allowing the flexibility for students to work individually or in different sized groups, for teachers to team-teach, and for students to work on projects, complete internships, and exhibit their work.** For example, teachers who work in interdisciplinary teams share an office and a “seminar” room with moveable walls for teaching a variety of activities.<sup>107</sup> At HTH, “technology is integrated with learning and its management and rather than being something that is added to the life of High Tech High, technology seems part of the fabric and molded to its purpose.”<sup>108</sup>

Figure 2.5 on the following page displays some of High Tech High’s facilities, including the use of open flexible spaces.

**Figure 2.5: High Tech High**



Source: High Tech High<sup>109</sup>

<sup>107</sup> “Facilities.” High Tech High. <http://www.hightechhigh.org/about/facilities.php>

<sup>108</sup> “High Tech High.” Cisco, 2011. p. 3. <http://www.cisco.com/web/strategy/docs/education/HighTechHigh.pdf>

<sup>109</sup> “Facilities,” Op. cit.

As a BBC News technology reporter put it, “The moment you walk into San Diego’s High Tech High you realise this is a school unlike most others. Teenagers are writing video games, filming sketches, using heavy duty power tools to build a boat – and then there are the robots.”<sup>110</sup> The school had 240 computer workstations, an animation lab, and plans for a video editing and production system. Classrooms all had “Smart Boards, an Audio-Visual cabinet, a video projector (1024x768), Computer, Cordless Microphone, and VCR.”<sup>111</sup> While technology is ubiquitous at the school, a case study by Cisco concludes, “In some respects the leading practice of High Tech High is bound up in its implementation of personalization, adult world connection, and common intellectual mission. Those principles, working together with challenge-based learning, and ubiquitous and integrated technology, have led to some spectacular projects and extraordinary results.”<sup>112</sup>

HTH was founded according to four basic principles: **personalization, adult world connection, common intellectual mission, and teacher as designer.** Like other schools following best practice principles, HTH is committed to learner-centered teaching. Teachers develop close relationships with students, getting to know their specific needs. Each student also has a faculty advisor, who visits the homes of the students and meets regularly with them in small advisory groups.<sup>113</sup>

*Beyond technology, High Tech High’s building layout, project-based learning, and individualized advising all contribute to prepare students for the workplace.*

The school focuses on project learning, using a daily schedule divided into two blocks of in-depth work. Students also have access to internet-connected workstations for three hours each day.<sup>114</sup> The integrated projects that students complete are a fundamental part of the HTH curriculum, and the school posts many online. For example, high school students might work on a “Crowded Planet” project in grade 11 mathematics, researching actual census data, learning about exponential growth, making predictions, and investigating the impact of population growth. Another project, Graph-It Design, uses Excel software to create the image of a historical figure by identifying points on an image and reproducing them using linear equations. The class then holds an exhibition night to display those “mathterpieces.”<sup>115</sup>

<sup>110</sup> Webb, A. “Robots and Gaming on the Timetable at Hi-tech School.” BBC News, April 27, 2010. <http://news.bbc.co.uk/2/hi/technology/8631641.stm>

<sup>111</sup> Pearlman, B. “Technology at High Tech High” High Tech High Learning, May 18, 2002. p. 2. [www.bobpearlman.org/BestPractices/TechnologyatHighTechHigh.pdf](http://www.bobpearlman.org/BestPractices/TechnologyatHighTechHigh.pdf)

<sup>112</sup> “High Tech High,” Op. cit., p. 2.

<sup>113</sup> “HTH Design Principles.” High Tech High. <http://www.hightechhigh.org/about/design-principles.php>

<sup>114</sup> “Rethinking High School: Five Profiles of Innovative Models for Student Success,” Op. cit., p. 37.

<sup>115</sup> “Project Based Learning at HTH.” High Tech High. <http://www.hightechhigh.org/projects/>

Students make the connection to the adult world through a number of mechanisms. The school itself has a “workplace” feel with its use of technology in classrooms, laboratories, and laptop access. The high school also requires internships for graduation, and students participate in field studies, community service, and other work in professional settings. Although committed to diverse learners, all HTH schools share a common intellectual mission of teaching 21<sup>st</sup> century skills that will prepare graduates for college at the University of California and in work, using project-based learning and performance-based assessment, including the required internships, senior projects, and a personal digital portfolio.<sup>116</sup>

Teachers participate in program and curriculum design through interdisciplinary teams and team teaching.<sup>117</sup> Teaching teams of two or three teachers guide small learning communities of 40-60 students.<sup>118</sup> HTH strongly emphasizes teacher training with its own training program and an intensive new teacher induction program. HTH offers many opportunities, including teaching residencies, a master’s program in education, and resources for educators such as “guides to project-based learning, curriculum integration, internship program development, teaching to diverse learners, student advisory, college advising, facilities development, technology infrastructure and policies, and management.” The program also offers credentialing in specific subject areas.<sup>119</sup>

New teachers undergo a two-year induction program (there is a one year Early Completion Option for teachers with appropriate prior experience). New teachers develop an Individual Learning Plan guided by an induction mentor teacher, and mentors meet with teachers weekly and make monthly classroom observations. New teachers also become familiar with current technology and participate in “inquiry based classroom research” by observing other teachers.<sup>120</sup>

---

<sup>116</sup> “HTH Design Principles,” Op. cit.

<sup>117</sup> Ibid.

<sup>118</sup> “Rethinking High School: Five Profiles of Innovative Models for Student Success,” Op. cit., p. 37.

<sup>119</sup> “Educator Training.” High Tech High. [http://www.hightechhigh.org/about/educator\\_training.php](http://www.hightechhigh.org/about/educator_training.php)

<sup>120</sup> “Induction Program Overview.” High Tech High. <http://www.hightechhigh.org/about/induction.php>

## PROJECT EVALUATION FORM

Hanover Research is committed to providing a work product that meets or exceeds partner expectations. In keeping with that goal, we would like to hear your opinions regarding our reports. Feedback is critically important and serves as the strongest mechanism by which we tailor our research to your organization. When you have had a chance to evaluate this report, please take a moment to fill out the following questionnaire.

<http://www.hanoverresearch.com/evaluation/index.php>

## CAVEAT

The publisher and authors have used their best efforts in preparing this brief. The publisher and authors make no representations or warranties with respect to the accuracy or completeness of the contents of this brief and specifically disclaim any implied warranties of fitness for a particular purpose. There are no warranties which extend beyond the descriptions contained in this paragraph. No warranty may be created or extended by representatives of Hanover Research or its marketing materials. The accuracy and completeness of the information provided herein and the opinions stated herein are not guaranteed or warranted to produce any particular results, and the advice and strategies contained herein may not be suitable for every partner. Neither the publisher nor the authors shall be liable for any loss of profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages. Moreover, Hanover Research is not engaged in rendering legal, accounting, or other professional services. Partners requiring such services are advised to consult an appropriate professional.



4401 Wilson Blvd, 4th Floor  
Arlington, VA 22203

P 202.756.2971 F 703.248.0022  
[www.hanoverresearch.com](http://www.hanoverresearch.com)