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# Identifying Students With Gifts and Talents in Technology

Susan's science teacher has just purchased five Palm handhelds with temperature probes. He plans to ask his students to develop experiments that test the effectiveness of different types of insulations. Susan can barely contain herself as she waits for him to unpack the new instruments. Later, when he has trouble installing the probe software, Susan volunteers to stay during lunch and help solve the problem. She quickly discovers the error her teacher has been making and remedies it. Susan might be classified as gifted in technology.

Gifts and talents come in a variety of forms. One possible area of talent is technology, and students who are gifted in technology may not be identified as gifted by traditional identification methods. Like any talent, it is important to recognize technologically gifted students in order to develop their talent. As Friedman-Nimz and O'Brien noted, "If computer technology is ignored as an area of talent, one might hypothesize that a noticeable group of high-potential students are not receiving needed services to develop their potential."

Technology expertise often occurs in two types of technology activities. One area of expertise is computer programming and another is expertise as a technology consumer using hardware and software. In addition to demonstrating prowess, some students tend to exhibit passion toward one or both of these activities. Students who excel in either could be considered technologically gifted.

The purpose of this column is to describe the second type of student, the one who demonstrates expertise using technology hardware and software. These students may or may not be able to program computers, but they are certainly able to apply technology in effective and creative ways. Their interests and skills may not be limited to computers. They often focus on other technologies such as audio and video equipment. When a new piece of technology is introduced into the classroom, these are the students who, like Susan, cannot wait to experiment with it. They have a high interest in technology and spend much of their free time developing their technology skills.

## Student Rating Scales

Technologically gifted students can usually be identified by the technology products they produce, the way they assist others with technology, and the technology-related questions they ask. One possible method to identify them is through a rating scale.

There are a variety of teacher rating scales for identifying students with other gifted characteristics on the market (e.g. Pfeiffer & Jarosewich, 2003; Renzulli, Smith, White, Callahan, Hartmen, & Westberg, 1997; Ryser & McConnel, 2004). The Scales for Rating the Behavioral Characteristics of Superior Students (SRBCSS; Renzulli et al.) was one of the earliest sets of teacher rating scales for identify-

ing students for gifted and talented services. It has undergone several revisions and is still one of the most widely used rating scales. A new technology scale is among the four new scales (Renzulli, Reis, Gavin, Siegle, &, Sytsma, 2003) recently added to the SRBCSS (see Figure 1). The technology scale is based on four key student characteristics: expertise using technology, interest and initiative in using technology, mentoring others in technology, and creative integration of technology. The reliability (Cronbach alpha = .96) and confirmatory factor analysis ($X^2[14] = 45.94$, *RMSEA* = .06, *TLI* = .99, *CFI* = .99) evidence for the new technology scale are compelling.

### *Expertise Using Technology*

Technologically gifted students often acquire technology skills more quickly than other students. They may also develop technology skills at an earlier age, even at a time when the age at which students show proficiency of common software programs is earlier and earlier. Five years ago, universities were teaching their teacher candidates how to search the Internet. Today, many undergraduate teacher candidates enter their programs with their own Internet homepages, and many universities are requiring them to create electronic portfolios on the Web. It is not uncommon for 1st graders to use Microsoft Word and PowerPoint—software once reserved for high school students.

Students with technology expertise can also easily transfer what they learned from one technology or software program to another. Part of this transfer skill can be attributed to their outstanding problem-solving abilities. They are able to grapple with the complexities of technology and see common patterns of use among different types of technology or different computer programs.

**SCALES FOR RATING THE BEHAVIORAL CHARACTERISTICS OF SUPERIOR STUDENTS**

**Student's Name (or Assigned Code No.)** _____
*(please fill in)*

**TECHNOLOGY CHARACTERISTICS**
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| **The student…** | Never | Very Rarely | Rarely | Occasionally | Frequently | Always |
|---|---|---|---|---|---|---|
| 1. demonstrates a wide range of technology skills. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. learns new software without formal training. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. spends free time developing technology skills. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. assists others with technology related problems. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. incorporates technology in developing creative products/ assignments/presentations. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. eagerly pursues opportunities to use technology. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. demonstrates more advanced technology skills than other students his or her age. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Add Column Total: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Multiply by Weight: | 1 | 2 | 3 | 4 | 5 | 6 |
| Add Weighted Column Totals: | ☐ + | ☐ + | ☐ + | ☐ + | ☐ + | ☐ |
| Scale Total: | | | | | | ☐ |

**Figure 1. Technology scale for the SRBCSS**

*Note.* Available online and in print from Creative Learning Press (http://www.creativelearningpress.com)

### *Interest and Initiative in Using Technology*

Because technologically gifted students usually experiment and often teach themselves how use new technologies, they show remarkable initiative. Not only are they interested in technology, but they have the initiative to satisfy and extend their interests. This is evident when they learn new software programs without formal training. While many use the "guess and check" problem-solving strategy and simply experiment with what a piece of technology or software program can do, others teach themselves by devouring the instruction manual.

This willingness to try new technologies differs between males and females. A study of young college students found that different personality traits predicted between 20 and 25% of students' willingness to embrace new technologies (Schultz, 1999). Males who rated themselves as adventurous, refined, and less jealous were more willing to embrace technology. Conversely, females who embraced technology rated themselves as composed, frank, responsible,

and less steady. Male students were also much more likely to embrace new technologies. Based on these preliminary findings, males may be more likely than females to show initiative in using new technology and more likely to experiment with unknown technologies. Nugent (2001) proposed that teachers should provide girls with opportunities for play and open-ended exploration on the computer (e.g., girls' computer clubs, girls-only lunch, and after-school periods for computer usage). She suggested that such activities help girls gain confidence and comfort with technology. Additional effort may be needed to find and encourage technologically gifted females.

### *Mentoring Others in Technology*

Technologically gifted students often assist others with technology-related problems because they often have more advanced technology skills than other students their age. While other students often turn to them for assistance, educators should note that not all technologically gifted students are eager to help others. This trait may be used to identify some students, but many technologically gifted students do not fit this pattern. Observing this trait is a form of peer nomination. Gagné (1989) warned educators who use peer nominations that they should also "watch for pupils who do not show their talents to their peers and for those who have not been members of the group long enough to be well known" (p. 53) by their peers.

### *Integration of Technology*

Technologically gifted students incorporate technology in developing creative products, assignments, and presentations. Stettler (1998) proposed four learning modes for using technology: acquirer of information, retriever of information, constructor of information, and presenter of information. The last two modes are more likely to involve technology integration across hardware and software, move students from consumers to producers, and shift learning from teacher-directed to student-directed.

Technology brings to gifted children creative possibilities that are limited only by their imaginations. While a myriad of quality educational software programs exist, some of the best programs are tool programs with which students can apply their creative imagination and talents (Siegle, 2003). These programs transform students from receptacles of knowledge to active producers who make decisions about how to direct their learning. The level of sophistication can range from writing a simple story to producing an electronic novel, from drawing basic shapes to designing a structure with drafting tools, from creating a single melody to composing and arranging multiple instrumental parts for an electronic orchestral performance. Technologically gifted students not only excel at using these programs, but they are able to integrate data and creative products among different programs. The complexity of these interactions increases with the level of student talent.

**Web Page Evaluation**
ID: 66326

| Objectives | Low Performance | At or Below Average | At or Above Average | Exemplary Performance | Earned Points |
|---|---|---|---|---|---|
| Overall Visual Appeal | **1 point** No variation in type and layout. Type may be difficult to read against the background. | **2 points** Type and background work together although there are limited graphics | **3 points** Background and text work together and graphics are incorporated. | **4 points** Type and graphic elements are visually connected toward a thematic theme. | |
| Navigation | **1 point** Site contains broken links where pages cannot be found. | **2 points** All of the links work, although navigation is confusing. | **3 points** All of links work. Navigation is clear althought there are a few links where the user can get lost. | **4 points** Navigation is seamless. It is always clear to users where they are on the site. | |
| Content | **1 point** Site contains inaccurate information. | **2 points** Information is accurate, although it could easily be found elsewhere (e.g., encyclopedia). | **3 points** Content is current and collected from a variety of resources. | **4 points** Content is current, represents a variety of resources, and is correctly referenced. | |
| Graphics | **1 point** No images are used. | **2 points** Images are used but they are not related to the page content | **3 points** Appropriate images are used from a variety of sources (e.g., scans, downloads, digital cameras) | **4 points** Student has used graphic software to create or modify images to improve their usefulness. | |
| Programming Skills | **1 point** Site was created with web authoring software. | **2 points** Some htlm code was created. | **3 points** Java (or other script) was added to the page. | **4 points** Jave (or other script) was added to create an interactive page. | |
| | | | | Score: | |

**Figure 2. Web page evaluation rubric**

## Student Products

Educators can also identify students by the sophistication of the technology they use and the quality of the products they produce. Educators can evaluate the sophistication of students' technology skills in terms of their advanced use of hardware and software, and they also can evaluate the scholarship of the products they create using those technologies.

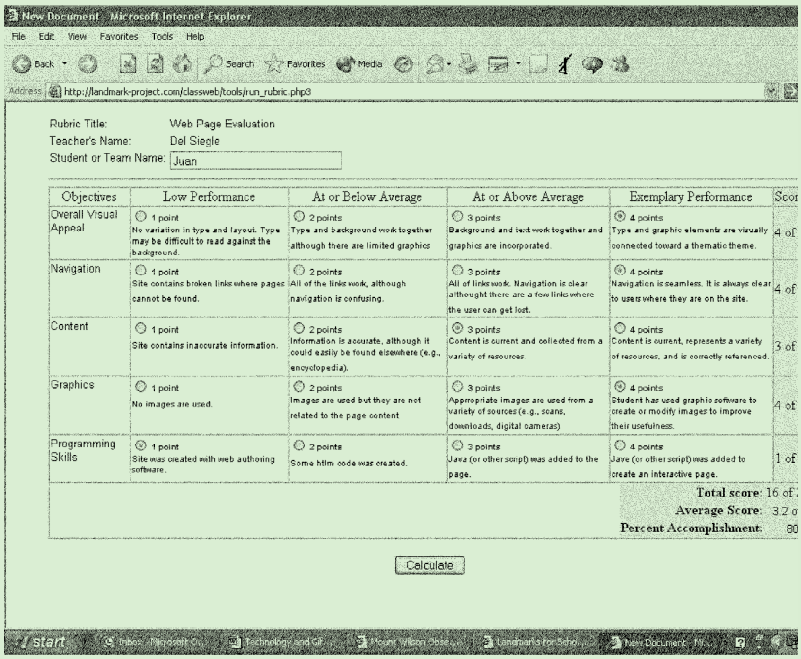


**Figure 3. Sample of a Rubric Builder grid that can be completed online**

***Technology Skills***

Evaluating technology skills requires a comparison of performance to some standard. The International Society for Technology in Education (ISTE) was one of the first organizations to develop technology standards (National Educational Technology Standards [NETS]) for students. Print material on the standards and how to implement them is available from ISTE (http://www.iste.org/bookstore/browse/topic.cfm?id=2). ISTE breaks student use of hardware and software into six areas (National Association of State Boards of Education, 2002):

I. Basic Operations and Concepts (e.g., Students demonstrate a sound understanding of the nature and operations of technology systems). Technologically gifted students would demonstrate a clear understanding of how different technologies work and their productive possibilities.

II. Social, Ethical, and Human Issues (e.g., Students practice responsible use of technology systems, information, and software). Ethical and appropriate use of technology is an area that educators ought to discuss with technologically gifted students. For example, their behaviors can boarder on criminal activity when they test their outstanding skills against security systems.

III. Technology Productivity Tools (e.g., Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works). Gifted technologists create products that often resemble those produced by practicing professions. Using video editing software, a student may produce a video that rivals a Ken Burns documentary.

IV. Technology Communication Tools (e.g., Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences). As stated in Category II, technologically gifted students may be tempted to use their skills in this area to break into computer systems and wreak havoc with networks. Educators should direct students' skills in this area into positive projects.

V. Technology Research Tools (e.g., Students use technology tools to process data and report results). Students skilled at this may or may not be gifted in technology.

VI. Technology Problem-Solving and Decision-Making Tools (e.g., Students employ technology in the development of strategies for solving problems in the real world). Intellectually gifted students who are also technologically gifted excel in this area.

Evaluation rubrics for rating student technology products abound on the Internet. Rubician.com (http://www.rubrician.com/technology.htm) and DiscoverySchool.com (http://school.discovery.com/schrockguide/assess.html) are two comprehensive sites that feature a myriad of prepared rubrics for evaluating technology projects. Readers also can enter the phrase "technology rubric" into any popular search engine to locate a myriad of sample evaluation rubrics. Landmarks for Schools (http://www.landmark-project.com/classweb/tools/rubric_builder.php3) offers an electronic Rubric Builder for educators who wish to create their own rubrics. Users of this Internet site can design attractive rubrics to use with their students. The rubrics can be printed (see Figure 2) or completed online (see Figure 3).

Students who modify a stock image found on the Internet with a photo editing program such as Adobe Photoshop CS or students who write JAVA script to make their Web site more interactive certainly are demonstrating high levels of initiative

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## The Boy and the Rose

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When Isabel opened it at home, David asked her what the letter said.

" Oh, the teachers just want to meet with us after the spring break vacation to talk about your work for next year," she said.

But, as he walked back to his room, David knew better.

Once, when David was smaller and had asked one of his *tias* why his name was Loya and his father's was not, she had told him a story about a rose that smelled just as sweet even though it had a different name, but this hadn't satisfied David. Boys aren't roses, he had thought. And he wanted his father's name. Now he had it, but he had to wish again and hope it came true.

As he slept that night, David had a dream, and in that dream he was sitting at a big table. His mother was there and so were Mrs. Cordero and Mrs. Leal. But where was his father? He was nowhere to be found. David got out of his chair to look for him, when suddenly Tony blew into the room, hugged Isabel, and told her, "All my life I've been the center of attention. Now it's time for me to *pay* attention." Isabel smiled, but not in the shy, quiet way she had, but with a big smile that showed her teeth. And Tony reached over and gathered David in his lap and whispered in his ear, "I always knew it was meant for me to be a good pool player. Maybe it was also meant for me to be a great father."

And then, just as he reached for his father, David woke up. There was a sound in the night. He listened, and at first he thought it was his father calling for him from the next room. He sat up in bed and listened carefully. He was oh so still.

Then the sound came again, and with a sigh, he knew. It wasn't his father calling for him. It was just the wind as it rushed past the little house and moved far away down Oak Street in the darkness. GCT

## Students With Gifts in Technology

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and technological expertise. Students who use sophisticated technology to create products, students who integrate a variety of technologies into their projects, students who use common technologies in unusual ways or at advanced levels, and students who find creative ways to apply technology to solve problems all show potential for technological giftedness.

### Conclusion

Like any student with a gift, technologically gifted students need to have their gifts recognized and nurtured. Doing so may require outside assistance from someone with more technological expertise that the regular classroom teacher or even the gifted education specialist has. Of course, technological talent cannot be developed if technology is not available. Advanced technologies beyond their school may be necessary to develop technologically gifted students' potential to its fullest. This may require providing elementary students with access to high school and college laboratories. It may also require finding mentors in the community with access to the needed skills and equipment to feed these students' inquisitive nature and appetite for new knowledge and skills. With recognition and support, the talents of technologically gifted students can grow and prosper. GCT

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