Computer Technology for the Gifted and Talented Child!

Focused Investigation Paper with Research and Personal Experiences in Educating Students with Computer Technology

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Introduction

Computer technology for the gifted and talented child will become the focus for this focused investigation research paper. In this focused investigation, three areas will highlight the research with computer technology for gifted students. This includes curriculum, instruction, and assessment. Computer technology is changing every minute and day and as educators, we need to continue to develop or find out ways that will allow students to continue to become enriched. Since the early 1970’s school across the nation have been adding instruction in computing to programs for students of all ages and abilities. Gifted and talented students in many schools now have access to computers in their classrooms. As the goals for technology education and the promises of educational change have grown, the hardware and software used in both schools and homes have improved steadily. Educators, business and industry, the government, and the general public believe our most able students must be computer literate for our nation to be competitive in the next generation. Only recently, with the gulf between promises and achievements widening, have voices of concern been raised (Holden, 1989). The disparity between theory and practice is attributed to many causes, ranging from a lack of educational focus to a shortage of funding. Even with those reporting problems have found evidence that students are working smarter, whether they are learning and using more information, understanding key concepts and relationships better, or developing higher level thinking skills. Gifted students are benefiting from increased use of computers because their special needs are being met through informed use of technology (Jones, 1990).

Defining Gifted and Talented

There are several definitions of talented and gifted. The two terms do not have the same meanings, but most people use them interchangeably. World Book Dictionary defines talented
as having natural ability and gifted is defined as having natural talent or special ability, unusually able, or talented. Some people will associate the difference between the two terms as gifted is defined by a score on a general IQ test and talent may be defined by a student’s knowledge, skills, and performance. In 1971, Sidney P. Marland defined gifted and talented children as those identified by professionally qualified persons who are capable of high performance. Gifted children require “differentiated educational programs and/or services beyond those normally provided by the regular school program in order to realize their contribution to self and society” (Moursund, 2006, p. 11). Definitions of gifted students have focused upon the interaction of creativity, task commitment, and above average ability. More recently, however, researchers have been examining differences in the use of metacognition between gifted and grade level students. For example, research has found gifted students possess more declarative knowledge regarding metacognitive strategies, and more complex strategies in general. Hypermedia is a computer based learning environment in which the basic unit of information is represented as nodes. Consisting of a video clip, sound bite, graphic, page of text, or even an entire document, the node is the unit of information storage in hypermedia. The structure of nodes in a hypermedia environment typically creates a dynamic knowledge base where gifted students can access any node in varying sequences, depending on students’ interest and goals. Gifted students can access information of their choosing through the non sequential format of the information, they can pursue personal goals when learning with hypermedia (Greene, 2006).

**Curriculum with the Gifted and Talented Child**

Curriculum is a combination of “aims and objectives, content, experiences, outcome and processes of an educational programme” (PMETB, 2011, p.2). Teachers in today’s society need to find creative ways to stimulate thinking and to create higher order learning environments for
gifted and talented learners. Teachers need to be creative to develop or change programs and curricula for their students (Rejskind, 2000). To effectively teach the gifted and talented learner, teachers need specialized knowledge on best practices from the field. One common strategy used for teaching gifted and talented students is to differentiate instruction, which can be accomplished through several methods, including curriculum compacting and enrichment. Curriculum compacting is an instructional technique used for modifying the regular curriculum to meet the needs of high-ability students by carefully assessing the work they already know and substituting or streamlining it for more challenging content through curriculum enrichment (Reis, Burns, & Renzulli, 1992). Curriculum enrichment is a technique used to deepen students understanding of issues (Wasserman, 2001). Several instructional strategies and curricular enrichment activities that are commonly found in classrooms for the gifted and talented student are conceptual thematic units, questioning strategies, development centers, independent study, and mentorships. Creating a virtual learning environment is a way to differentiate instruction by merging the fields of gifted and talented education and information technology.

Creating a virtual learning environment is a way to differentiate instruction by merging the fields of gifted and talented education and information technology. Children of every ability level are motivated to create technology-enhanced projects using the Internet, online databases, scanned pictures, video clips, and hyperlinks (Bergen, 2002). A Virtual Learning Environment (VLE) refers to computer based environments for delivering learning materials on the Internet (Wilson, 1996). VLEs may be used to develop cultural experiences in the visual, creative, and performing arts; visit all types of museums, industries, governmental agencies, and institutions; expose students to different ideas through prominent and/or controversial persons; and provide advanced study in the content areas that include research activities (Belcastro, 2005). They can
be an exciting learning approach for students because of the unlimited amount of information that is available online. Instant information is as close as a search engine away (Will, 2005).

According to Reis (2003), challenges can be associated with curriculum at all levels. Repetition in the grade level curriculum can happen. A spiraled curriculum can evolve which repeats instruction in many objectives over several school years. This can result in many bright students repeatedly participating in instruction or guided practice of previously learned skills. Poor curricular organization can happen as well. Teachers may not have the skills or tools that will allow them to compact the curriculum in every appropriate content area. The attitudes of co-workers can make curriculum compacting difficult for teachers as well. Insufficient enrichment resources can be another problem. The hopes are that a gifted education specialist is available in the school to provide this assistance. The need for flexible classroom management strategies and the need for staff development to implement compacting can also become challenges as well (Reis, 2003).

**Instruction with the Gifted and Talented Child**

Instruction in education means the activities of educating or instructing or activities that impart knowledge or skill. McClellan (1985) discussed the role of computer-assisted instruction in the education of gifted children to develop decision-making skills and to foster independent learning. In CAI, the computer presents information, asks questions, and verifies responses in much the same way a teacher does. Unlike traditional means of instruction, however, CAI allows students to work at their own level and pace. This mode of instruction can be beneficial to gifted students who often have interest and abilities that go beyond the scope of the regular curriculum. Drill and practice, tutorials, games, and simulations can all be beneficial for gifted and talented students. Various teaching models in education of the gifted can be used for each of
these computer-assisted instructions. This includes, creative problem solving, problem based learning, autonomous learner model, cognitive and affective taxonomies, and the discover curriculum model. Drill and practice programs provide students with practice using material already encountered. These programs cover various levels of many subject areas; they can be used for both remediation and acceleration. Gifted children do not necessarily excel in all areas; they may need help mastering some subjects. Drill and practice programs help to reinforce recently acquired knowledge and skills. For gifted students, the primary role of drill and practice programs is to help students who want to go beyond the lockstep curriculum to acquire new skills (McClellan, 1985).

Tutorials are used to teach new information. Typically, a program presents a body of information and then questions the student on that information. Like drill and practice programs, tutorials can be a form of enrichment for gifted students who want to explore areas of content that may not be in the regular curriculum. Tutorials are also a means of accelerating content. If, for example, a gifted student can and wants to learn Algebra 1 in a shorter period of time than his or her classmates, tutorials provide a means for doing so. Games may be appropriate for gifted children whether they are adventure games and mind teasers. Adventure games put the player in situations in which he or she has to use problem solving skills and creative strategies to overcome obstacles. The player must provide explicit directions to the computer. Adventure games also can help students develop prediction skills. Students learn very quickly to evaluate all possible outcomes before making a move. Mind-teasers are often the computerized version of conventional games such as chess, backgammon, or Master Mind. Among the most powerful learning tools for gifted children, simulations are based on the discovery approach to learning, that is, learning by doing. Simulations provide situations that are analogous to real situations but
control such real limiting factors as danger, expense, time, and space. Since simulations can be repeated, students see the effects of using different strategies in solving the problems presented by the program (McClellan, 1985).

Computers are used to develop thinking skills. One of the major goals of programs for the gifted is to help students develop higher-level cognitive skills, problem-solving skills, and creativity. By using programs designed for these purposes and by learning to write programs, students can develop modes and strategies of thinking that affect the way they think in situations that are not computer-related. Gifted children are believed to be adept at learning to use the cognitive skills of analysis, synthesis, and evaluation. Analysis refers to the ability to break a skill or conceptual structure into its components. Synthesis is the building of complex skills or conceptual structures from simple parts. Evaluation calls for the comparison of skills and structures and the making of judgments about them (Bell 1981). Some games and simulations are aimed at helping students develop these skills. Creativity involves divergent thinking. As is the case with the development of cognitive skills and problem solving skills, students can explore their creative potential by using software that is designed specifically for that purpose or by creating their own unique and interesting programs. Teaching children to write computer programs also helps to develop thinking skills. In programming, there are two kinds of problems to be solved. The first centers on the steps involved in writing the program. The second kind of problem involves debugging the program, that is, solving the problems that are related to the logic and sequencing used in creating the program. Both kinds of problem solving require the use of thinking skills associated with analysis, synthesis, and evaluation (McClellan, 1985).

Assessment with the Gifted and Talented Child
Assessment is not placing a value or judgment on a piece of students work, rather assessment is reporting a student’s profile of achievement. When assessing gifted students, “good assessment is about expanding the assessment repertoire because no single form is sufficient. There are reliability and validity problems with each. Every method has its strengths and weaknesses, and its place” (Associates, 2011, p.1). How can you assess an computer technology gifted project based activity? Many parents might feel worried about teachers assessing cooperative learning projects because they want to know the specifics on student’s performance. Teachers need to find assessments such as presentations by each student or rubrics that allow for understanding of individual learning about each child in a group. From my experiences in instructing computer technology classes, several computer software programs such as Type to Learn or Mavis Beacon Teaches Typing assesses students based on typing speed, typing errors, and rewards students with an activity once they accomplish their task. Technology websites such as learning.com offer computer technology lessons that assess students based on number of items that are correct or incorrect. A reward will follow on some activities if mastery is shown. Other software such as Math or Reading Blaster allow for reinforcement of previously learned task or enrichment as well. Virtual money or other means can be used in the software to reward the students.

An effective assessment program uses many different strategies to show growth and performance, and this should be closely related to goals. Multimedia presentations and web pages, can be assessed differently than traditional written or word processed papers. Some strategies that can be used include performancs tasks, teacher observations, personal communications, standardized testing, and possibly teacher and student developed evaluation rubrics. Rubrics are probably the most common assessment and evaluation tool that can be used
for collaborative learning. Having gifted students develop their own rubric can help them with thinking and clarifies expectations all around. A rubric gives students clear targets of proficiency to aim for full mastery. Students understand the levels that are needed to create a good project. Additionally rubrics can be used to assess projects, student groups, or individual students. Gifted students can use the same rubric for self-assessment as individuals, in groups, or for peer assessment (Foundation, 2007). Teachers can find rubrics online to help assess the learning objectives developed for a unit. When using a rubric, both the student and the teacher should understand and agree how projects will be evaluated (Tuttle, 1996). A good, free online rubric generator is http://rubistar.4teachers.org/, where you will find rubric templates for a variety of subjects.

**Examples of Rubrics used for Assessment**

In assessing gifted students with rubrics, below you will find section A; this is an example of rubric that a teacher should not use to assess an assignment or any other type of assessment. This rubric may be useful for a teacher; it is useless to a student. The actual descriptions provide no information that a student can use to self-assess or to do a peer assessment. The level assigned to a student does not provide useful information about possible revisions to produce a better product, performance, or presentation. Section B is an example of a good rubric that can be used for various activities and projects. Notice how each level a score is shown along with clear descriptions on how students can achieve mastery with each level. This specific rubric is designed for use with gifted students to challenge or enrich them. Section C I have listed two rubrics that I have used from prior lessons when teaching computer technology and can be modified for use with gifted and talented students.

A. Not a good rubric
<table>
<thead>
<tr>
<th>Level</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Emergent</td>
<td>Student displays few, if any, of the rudimentary knowledge and skills that are expected.</td>
</tr>
<tr>
<td>2. Limited</td>
<td>Student displays rudimentary knowledge and skills, but often requires substantial individual help and guidance.</td>
</tr>
<tr>
<td>3. Developing</td>
<td>Student displays a minimally adequate level of the expected knowledge and skills.</td>
</tr>
<tr>
<td>4. Capable</td>
<td>Student displays a functional, adequate level of the expected knowledge and skills.</td>
</tr>
<tr>
<td>5. Strong</td>
<td>Student displays a high level of the expected knowledge and skills.</td>
</tr>
<tr>
<td>6. Exceptional</td>
<td>Student displays an outstanding and creative/innovative level of the expected knowledge and skills.</td>
</tr>
</tbody>
</table>

B. A Good Rubric

A *generalized example* of a scoring scale with performance levels and standards is as follows:

1 = The learning activity / project was attempted, but it was not done correctly or completely.
2 = The learning activity / project was worked on, but it needs redirection, more detail, more information or different strategies and approaches.
3 = For the most part, the learning activity / project was completed. Minor problems remain.
4 = The learning activity / project was fully accomplished and done well.
5 = The learning activity / project was fully achieved and *extended* beyond the requirements or standards.

In this scale, 5 is especially important for gifted and high achieving students who always get A's on assignments without putting forth much effort. This challenges them to think and learn at a level appropriate for them (Coil, 2007).

C. Two rubrics that I have used from my experiences in teaching computer technology.
**Computer Technology Assignment Rubric**

<table>
<thead>
<tr>
<th></th>
<th>Exceeded Expectations</th>
<th>Meets Expectations</th>
<th>Missed Expectations</th>
<th>Did Not Meet Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Following Directions</strong></td>
<td>Followed assignment instructions and where appropriate attempted to enhanced the assignment.</td>
<td>Followed assignment instructions.</td>
<td>Attempted to follow directions.</td>
<td>Did not follow assignment directions.</td>
</tr>
<tr>
<td><strong>Use of Learned Skills</strong></td>
<td>Student demonstrates a thorough understanding of the skills being studied; showed a personal investment in the project which resulted in new knowledge.</td>
<td>Student demonstrates a basic understanding of the skills being studied; showed a personal investment in the project which resulted in new knowledge.</td>
<td>Student has trouble demonstrating the skills being studied; has difficulty demonstrating new knowledge.</td>
<td>Student cannot demonstrate the skills being studied; doesn’t demonstrate any new knowledge.</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Work was completed on time; was free of errors; there were no errors in grammar and spelling.</td>
<td>Work was completed on time; was mostly free of errors; there were minor errors in grammar and spelling.</td>
<td>Work was not completed on time; contained some errors; there were multiple errors in grammar and spelling.</td>
<td>Work was handed in more than 2 days late; contained multiple errors; there were substantial errors in grammar and spelling.</td>
</tr>
<tr>
<td><strong>Work Ethic</strong></td>
<td>Works quietly on assignment and uses class time wisely; when work is finished student goes to alt. assignment without being told. Never uses other student's work.</td>
<td>Works quietly on assignment and uses class time wisely; when work is finished student goes to alt. assignment only when told to. Never uses other student’s work.</td>
<td>May not use class time wisely to work on assignment; when work is finished student goes to alt. assignment only when told to. May use other student’s work.</td>
<td>Does not use class time wisely; when work is finished student goes to alt. assignment only when told to. Uses other student's work.</td>
</tr>
<tr>
<td><strong>Effort</strong></td>
<td>It is obvious through observation that the student wanted to and tried to succeed in completing the assignment.</td>
<td>The student did what was necessary to complete the assignment.</td>
<td>Little effort was put into completing the assignment.</td>
<td>No effort was put into doing or completing the assignment.</td>
</tr>
</tbody>
</table>

THE RUBRIC BELOW WILL BE USED TO EVALUATE YOUR COMPLETED WEBSITES.

<table>
<thead>
<tr>
<th>Item and Points</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Layout</td>
<td>The layout offers little</td>
<td>The layout offers an</td>
<td>The layout is very</td>
</tr>
</tbody>
</table>
Personal Reflection

In the next twenty years, technology will become far greater than it is now. Actually just a few years ago, I predicted classrooms would become laptop based with students reading textbooks online. I actually predicted five years ago, that quarter sized DVD’s will be created that would allow students to carry their textbooks around with them by inserting this quarter-sized DVD into any technology device (I am still waiting on this to be invented). I see autonomous learning evident in online courses where students work independently and working together can be achieved with using web cameras etc. Cell phones are becoming more powerful today and many resemble the workings of computers. Facebook.com and myspace.com allow for social interaction, far greater than the Cleveland Freenet days (developed by Case Western
Reserve University and was text based). Are we going too far with technology? Are we missing the social interaction of talking one on one with students? The point is, children to become productive citizens in today’s society need to learn various forms of social interaction with using new technology devices. Gifted students need to complete projects hands on and learn how to communicate with each other. I am not talking about text messaging one another or responding on each other’s Facebook page but by using the most up to date technology devices. In the next twenty years, curriculum, instruction, and assessment will change and technology will become far greater, but we need to make sure as educators that the one on one learning and social interaction becomes our primary focus in a student’s learning so that they can become productive citizens with any type of job or profession that they choose.

**Conclusion**

In conclusion, in this focused investigation, computer technology for gifted students was researched on in regards to curriculum, instruction, and assessment. When teachers establish rules and procedures that enable inquiry, discussion, and argument, technology provides powerful tools to empower gifted learners to achieve their full potential.
Works Cited


