

EXTENDING INSTRUCTION IN MATHEMATICS

How gifted learners differ from classmates	Relationship to mathematics learning
Pace at which they learn	The sequential nature of math content makes pacing an issue as gifted students do not require the same amount of practice.
Depth of their understanding	Deeper levels of understanding and abstraction are possible for most mathematical topics, so differentiation becomes necessary.
Interests that they hold	If the interest is not nurtured early, the talent may not be developed.

- provide a pre-assessment to determine student's knowledge and skills to reduce repetition and increase meaningful learning
- promote problem solving as much as possible and allow for creative solutions with explanations
- multiple resources, not just one text
- utilize inquiry based, discovery learning approaches that emphasize open-ended problems with multiple solutions or multiple paths to solutions
- allow students to design their own open-ended questions
- ensure that open-ended questions require justification and explanations (communication)
- access technology where appropriate (e.g., geometry sketchpad, power point, etc.)
- math contests, math Olympics



EXTENDING INSTRUCTION IN THE CONTENT AREAS

In many of the content areas, compacting and/or diagnostic assessment may not be appropriate since the materials will be new to the student. However, in many cases gifted students may learn material at a faster rate; therefore, the use of learning contracts, independent study, ability groupings and curriculum compacting will support gifted students' academic growth.

EXTENDING INSTRUCTION USING TECHNOLOGY

The use of technology with gifted students is essential for extending their learning and engagement.

- web sites, CD-ROMs, web quest to support independent research and inquiry
- product ideas - power point, digital cameras and video, MS publisher, etc.
- First Class conferences and chat areas to discuss books, stories, videos, video games with gifted students from other schools or boards
- Progressive stories with student from other schools
- Electronic Literature Circles

SUGGESTED RESOURCES

First Class – HWDSD Conferences, HWDSD Info from Dept. Student Services, Special Education, LRT Hand-Book, Gifted Resources

Free online material for use with gifted students (worksheets, ideas, etc. <http://www.hoagiesgifted.org/materials.htm>)

Free online math problems: <http://www.aimsedu.org/Puzzle/10to20/psmny2.html>

Winebrenner, Susan: Teaching Gifted Kids in the Regular Classroom, Free Spirit Publishing, 2001

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Meeting the Needs of Gifted Students



It may surprise you to find that in a class that has a range of abilities, it is the most able who will learn less new materials than any other group.

Winebrenner

The strategies in this brochure will benefit many students including those identified as gifted.

CHARACTERISTICS

Advanced Cognitive Abilities

- exhibit significantly advanced language reasoning and/or visual spatial reasoning skills
- conceptualize and generalize new concepts easily
- process and retain information quickly and easily
- take interest in critical and creative thinking, abstract thought, and cause-and-effect relationships
- apply concepts in creative ways

Heightened Motivation

- When their interest is sparked, gifted students generally:
- show above-average ability to pay attention, to concentrate, and to retain information
 - are task-committed, goal-oriented, and self-directed
 - become absorbed in certain topics, focusing their attention intensely on those topics to the exclusion of other demands
 - work efficiently and usually independently
 - express frustration with inactivity and absence of progress
 - tend toward perfectionism, which may create significant internal tension or stress
 - need to explore and develop personal management and research skills

Intellectual Curiosity

- take pleasure in intellectual activities
- enjoy the pursuit of open-ended issues and problems
- are curious, questioning, and intuitive (which can lead to conflict with teachers)
- have a wide range of interests
- have the ability to be fluent, flexible, original, and elaborative thinkers
- have keen powers of observation and an eagerness to examine the unusual

Heightened Sensitivity and Creativity

- possess strong creative and imaginative abilities
- have a keen sense of humour that is often off-beat
- see unusual and diverse relationships
- dislike routine and drill
- question, or even reject, the known in order to invent themselves



Emotional Capacities

- require opportunities to interact with their intellectual peers on a regular basis
- are highly motivated by interaction with their intellectual peers, and may become complacent or unmotivated when they have no opportunities for such interaction
- uneven development of their cognitive and emotional abilities (emotional development may lag behind)
- are sensitive to the critical reactions and responses of others
- display heightened sensitivity to criticism and a high level of vulnerability to peer-group rejection or bullying
- become passionate about their beliefs



As with any attempt to describe a group of individuals, it is important to note that all individuals will have their own unique personal profile with their own specific strengths and challenges. Many characteristics specific to your gifted student(s) will be contained in this brochure, while some characteristics will be absent. Some characteristics you observe may appear to be the opposite of what is generally attributed to gifted students as a group.

UNDERACHIEVING GIFTED STUDENTS

Characteristics

- easily bored with routine tasks, refuse to do rote homework, poor study habits
- difficulty moving on to another topic
- very self-critical, impatient with failure, does not take risks
- critical of others including teachers, authority figures often disagree with others
- make jokes or puns at inappropriate times
- frequently appear to be 'just' daydreaming
- emotionally sensitive, vulnerable to criticism, may overreact
- not interested in details; hand in untidy written work
- frequently do not hand-in assignments
- refuse to accept authority, non-conforming, stubborn, rebellious
- poor interpersonal relations with age peers
- find it hard to focus on a new task when absorbed in an area of interest
- withdraw and refuse to contribute in class, not assertive, perceived as 'weird'

Potential Strategies

- Supportive**
- allow students to feel they are part of a "family" versus a "factory"
 - include curriculum activities based on their needs and interests
 - allow students to bypass assignments in subjects in which they have previously shown competency
- Intrinsic**
- the students' self-concepts as learners are tied closely to their desire to achieve academically
 - therefore a classroom that invites a positive attitude encourages attempts not just successes
- Remedial**
- each student has strengths and weaknesses as well as social, emotional and intellectual needs
 - allow students to excel in their areas of strength and improve in other areas



Some underachieving gifted students may present with other challenges such as learning disabilities, behavioural concerns, socio-emotional difficulties and/or attentional issues.

The surest path to high self-esteem is to be successful at something you perceived would be difficult. Each time we steal our students' struggle by insisting they do work that is too easy for them, we steal their opportunity to have an esteem-building experience. Unless kids are consistently engaged in challenging work, they will lose their motivation to work hard.

Dr. Sylvia Rimm

MEETING NEEDS THROUGH DIFFERENTIATED INSTRUCTION (D.I.)

Content

- what students should know, understand, and be able to do
- the 'stuff' we want students to learn

Process

- how students come to understand and "own" the topic
- knowledge, understanding, and skills essential to a topic

Product

- how students demonstrate what they have come to know, understand, and are able to do

Readiness

- the current knowledge, understanding and skill level students have that relates to a particular sequence of learning

Interest

- what students enjoy learning about, thinking about, and doing

Learning Preference

- students' preferred mode of learning, which includes style, intelligence, gender and/or culture

Teachers need to look at all aspects of the learning process to meet the needs of individual gifted students.



Gifted learners should experience consistent opportunities to demonstrate previous mastery before a particular unit of work is taught.

Winebrenner

Do not train children to learn by force and harshness, but direct them to it by what amuses their minds, so that you may be better able to discover with accuracy the peculiar bent of the genius of each.

Plato



D.I. STRATEGIES

Curriculum Compacting

To compact the curriculum teachers need to determine what competencies students have and give them full credit for what they already know. Follow these steps:

- identify the overall or specific expectations of the subject
- provide a diagnostic assessment
- plan and offer curriculum extensions for students who are successful
- eliminate all drill, practice and review for students who have already mastered the content
- keep an accurate record of students' compacting activities



Learning Contracts

These are written agreements between teacher and students regarding a task. They include:

- learning goals
- assessment criteria in learner-friendly language
- organizational details such as timelines and check-in points (students may choose their own activities/research or this may be teacher directed)

Independent Study

Intended for students who may demonstrate a good understanding of the content that will be addressed, prior to beginning a unit of study. Negotiate with students what they may be interested in that is related to the topic of study. Create a learning contract which includes curriculum expectations, assessment and evaluation, personal log of work completed, and a format for process, product, time-lines and check-in points.

BLOOM'S TAXONOMY

Engage and challenge students through higher order questioning.

Level	Process Verbs	Student Activities
Knowledge remember previously learned material	cite, define, identify, label, list, match, name, quote, recite, reproduce, state	read material, listen to lectures, watch videos, take notes
Comprehension grasp the meaning of material	alter, change, convert, describe, discover, explain, give main idea, illustrate, interpret, paraphrase, relate, rephrase, compare, restate	explain ideas in written or oral form, translate information into their own words, make an example, interpret what is said
Application use abstraction in new and concrete situations	apply, classify, compute, demonstrate, direct, discover, employ, evidence, manage, manifest, predict, prepare, present, relate, show, solve	take knowledge learned at above levels and apply it to a new situation, solve problems, recognize problems and develop tools to solve them
Analysis ability to break material into its parts so that its structure is understood	analyze, associate, conclude, designate, determine, diagram, differentiate, discriminate, find, distinguish, divide, examine, infer	analyze and take apart, explain each of the parts, discuss, uncover, list and dissect.
Synthesis put parts together to form a new whole	combine, compile, compose, conceive, create, design, develop, devise, expand, extend,	put parts together into a unified whole, create plans and hypotheses for finding solutions, use original creative thinking
Evaluation ability to judge the value of material for a given purpose	assess, compare, conclude, contrast, criticize, critique, deduce, evaluate, judge, weigh	make a value judgment based on considerations, write editorials, discuss or debate

adapted from Bloom et al., 1956

EXTENDING INSTRUCTION IN LANGUAGE

Reading

The reading program that is most appropriate for gifted students allows them to read, discuss, analyze, and write about literature that challenges them.

- The texts the students read should:
 - include a variety of forms
 - contain rich, challenging, and varied language forms
 - provide opportunities for readers to learn personal problem-solving behaviours
 - be relevant to the readers' lives and experiences

Extension Ideas:

- analyze theme and relationships to other texts
- write a book review for a student/school newsletter
- rewrite events or create a new ending
- write the same story in a different time period
- inferrence, cause and effect
- compare or contrast books by the same author or same genre
- foreshadowing, personification, metaphor or other literary elements
- hypothesize what would happen if different characters had interacted
- use cartoon format to create a graphic story from a novel
- create a screen play/script from a novel

Writing

When extending writing instruction, gifted students will produce higher levels of writing when it is a topic of interest or a form of writing that they prefer. Contracting will allow students to become engaged in an area of interest.

- Examples
- re-write a story based on the perspective of another character's point of view
 - introduce advance level writing skills – simile, alliteration, metaphors, foreshadowing, flashback
 - write opposing viewpoints, argue two different sides of an issue
 - write a variety of poetry
 - write about a piece of music, how it made you feel, what does it make you think about, what images does it create in your mind
 - write lyrics to an existing song or create new lyrics
 - write a user guide or manual for a video game, toy, building a model,...
 - write a letter to an author (novel, game creator, sports celebrity)
 - create a persuasive paragraph on a particular topic of interest
 - write a school/class news letter
 - write a news story on a school event (sports, play, fundraiser)