

K-12 SCIENCE CURRICULUM



***TEACHING SCIENCE IN
INCLUSIVE CLASSROOMS***

This booklet represents a compilation of information and materials accumulated from a variety of resources by Riitta Ballantyne and Dolores Slovarp—Science Curriculum members. Permission was obtained from the authors and a bibliography is included

Preface

Legislation from PL 94-142, SB 504, Americans with Disabilities Act (ADA) and The Individuals with disabilities Education Act (IDEA) 1997 are all initiatives to provide equal opportunities for persons with disabilities to experience the same full and independent life available to the general population. The Helena Public Schools strives to meet the unique and diverse educational needs of all students through a continuum of school and community services and programs.

Science education exists to promote and advance the teaching of science and the development of curricula and instructional materials for students at all levels, with any manner of disability in the learning process. All students should have access to the regular educational curriculum.

This document is the initial attempt to assist teachers in teaching science in an inclusive classroom. Further development of this document is a priority of the Science Curriculum Committee.

When students with special needs are included in general education settings, adaptations often need to be made to meet individual student needs. Science adaptations can pose special challenges due to the nature of experiments and materials used (Stefanich, 2001) Scuggs and Mastropieri (1992) recommend the following adaptations for the inclusive science classroom:

- 1) Vocabulary
 - Simplify language
 - Preteach vocabulary
 - Use mnemonics
 - Use picture clues
 - Implement peer tutoring
 - Evaluate essential vocabulary

- 2) Instructional Delivery
 - Modify rate and how material is presented
 - Include visual organizers
 - Present concrete examples
 - Preteach prerequisite information
 - Use a variety of instructional strategies
 - Provide advanced organizers
 - Use cooperative learning groups
 - Integrate other content areas into science
 - Shorten lessons
 - Provide structure

- 3) Text
 - Provide graphic organizers and framed outlines
 - Highlight important vocabulary
 - Implement partner reading
 - Provide textbook on tape
 - Use trade books at various reading levels.

- 4) Materials
 - Provide multi-textured materials
 - Provide concrete models
 - Provide materials that are easily manipulated
 - Materials that can be taken apart and reassembled
 - Manipulatives for measurement and comparisons
 - Materials that can be felt or heard when solutions are stirred or shaken.

- 5) Assessment
 - Provide authentic and performance-based assessment that can be easily linked to scientific processes.
 - Allow for multiple opportunities to demonstrate acquired skills
 - Implement portfolio assessment
 - Teach test taking and study skills

Stefanich, Greg P. (2001). Science Teaching in Inclusive Classrooms: Theory and Foundations. Reprinted by permission.

Safety: Suggested Teaching Techniques

Science teachers have widespread concern for safety when working with students with disabilities, however, no research evidence has indicated that students with disabilities are a greater risk than other students (Stefanich, 2001). Research into the factors that accompany school accidents indicate problems with adequate work space, overcrowding, poor school discipline, inadequate safety training, teachers who teach more than two preparations at the same time and teachers with poor course work preparation. When a special student is placed in a regular classroom, one needed alteration may be more emphasis on safety.

- 1) Make sure eye protection is worn.
- 2) Review safety rules from time to time, especially after a vacation or prolonged Absence.
- 3) Check medical records to determine if any student with special needs are subject to seizures, fainting spells, etc.
- 4) Make students aware of potential dangers of chemical supplies, glassware, etc.
- 5) Supervise all students and keep them busy to limit the horseplay.
- 6) Remind students to keep work areas clean and free of hazardous objects.
- 7) Isolate a student with special needs when laboratory rules are violated, but no longer than one class period.
- 8) Test a student's abilities using continual teacher observation and student demonstration.
- 9) Make modifications in operations and supplies as needed for student success.
- 10) Consider assistive technology devices to improve communication and participation.
- 11) Plan a lab area that can be free from noise, physical and visual stimuli, which may help students who are easily distracted by them.
- 12) Maximize access barriers to sinks, doorways, laboratory solutions, tools, etc.
- 13) Accept the student as he or she comes to you. Teacher attitude and quality of learning environment are key to student success.
- 14) Employ the aid of special education resource people.
- 15) Students with special needs respond favorably to frequent acknowledgement and positive reinforcement.
- 16) Encourage heterogeneous grouping in the classroom. Placing the student with special needs in a small group of students with various abilities will provide a model for behavior in a laboratory.
- 17) Individualize the program of instruction as much as possible to modify the instructional method to meet the needs of the student.

Stefanich, Greg P. (2001). Science Teaching in Inclusive Classrooms: Theory and Foundations.

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CHARACTERISTICS OF STUDENT AS HAVING:

◆ **Autism: As recognized under the IDEA, diagnosis includes the demonstration of Characteristics include difficulty communicating, forming social relationships, a persistent pattern of isolation which begins before the age of 3 years. exhibiting self-stimulatory behaviors such as rocking the body or repetitive manipulation of objects, and a wide variety of inappropriate behaviors often related to fixations.**

Teacher Implications:

- Provide an area and opportunity for quiet.
- Establish a walking area to allow physical release in a quiet and safe area.
- Provide consistent structure and organization.
- Label areas for specific activities and consider color coding as a means of categorization.
- Establish a seating arrangement in cooperation with the student.
- Establish consistent and clear routines.
- Provide a digital rather than face clocks whenever possible.
- Provide a physical outlet such as a “squeeze ball” to enable a longer seating period for the student.
- Work with guardians to establish consistency between school and home.
- Plan a consistent routine for fire, earthquake, tornado, etc. drills.
- Alert substitute teachers in advance; seek assistance from a paraprofessional familiar with the student.
- Use consistent attentional cues such as signal, music, light, to help the student with transitions.
- Use multi-modality instructional processes whenever possible: physical movement, role-playing, manipulatives, art, puppetry, pictures, tactiles, etc.

◆ Cognitive Delay: The student may be identified as having cognitive delay if the student has a significantly sub-average general intellectual functioning (IQ 70 or lower) and significant deficits in adaptive behavior and educational performance, especially in the area of application of basic academic skills in daily life activities.

- Students who are mildly impaired have an IQ range of 51-70 and are in many ways quite similar to their peers who are not impaired.**
- Students who have moderate impairment have IQ range of 36-50 can learn to take care of their personal needs and perform hands-on vocational tasks.**
- Students who are severely impaired have an IQ range of 21-35 and are more dependent on others for basic needs.**
- Students who are profoundly impaired have an IQ range below 20 and may be largely dependent on others for their care.**

Teacher Implications:

- Meet with student and/or aide to discuss accommodations in private prior to each learning sequence.
- Pre-teach laboratory whenever possible.
- Review directions in advance.
- Provide reader if necessary.
- Examine vocabulary in advance and consider options.
- Provide a variety of learning strategies such as: mnemonics, graphic organizers, computer programs, basic textbooks and supplementary material.
- Eliminate background noises.
- Maximize availability of visual media and/or models.
- Allow for direct manipulation of material when appropriate.
- Get feedback from student.
- Allow more time.
- Modify textbook chapters or passages within chapters, as needed for comprehension..

Laboratory:

- Provide opportunities to practice skills in both normal environments versus contrived experimental situations.
- Consider alternate activities that can be utilized with less difficulty for the student, but has the same or similar learning objectives.
- Link the student to a lab team with non-impaired students.

◆ Deaf-Blindness: The student has both deafness or hearing impairment and vision impairment and severe communication problems that severely restrict the student's ability to communicate and participate in education programs solely for students with deafness or blindness.

Teacher Implications:

- Investigate all possibilities for using adaptive computing.
- Use assistive responding device as needed.
- Review work areas for appropriate height and accessibility of supplies and equipment.
- Examine trafficking needs of the student.
- Review classroom environment to insure student has appropriate access to peers for socialization and cooperative learning groups.
- Provide accessible means of reviewing drawings, charts, graphs, and/or models.
- Provide models, raised-line drawings, or thermo forms.
- Provide Braille text
- Allow for response with computer or tape recorder.
- Review directions with the student.
- Use tactile signals
- Clearly label items or equipment with Braille.
- Get feedback from student.
- Allow more time.

◆ **Deafness:** The student has a hearing impairment so severe that the student is impaired in processing linguistic information, with or without amplification, to the extent that prevents the auditory channel from being the primary mode of learning speech and language.

◆ **Hard of Hearing:** The student may be identified as having a hearing impairment if the student has an organic hearing loss in excess of 20 dB better ear average in the speech range, unaided, or has a history of fluctuating hearing loss which has interrupted the normal acquisition of speech and language and continues to adversely affect educational performance.

Teacher Implications:

- When communicating, always face the student with a hearing impairment.
- Facial expressions, gestures, and other body language will help convey your message.
- Repeat new vocabulary in different contexts. Write new vocabulary on the board before a lesson or laboratory. Vocabulary in science is particularly difficult because hearing impaired students lack the experiences to many science concepts hearing students have had repeated and reinforced.
- Use visual aids and written announcements (due dates, exam dates, etc.)
- Provide an outline in advance of the lesson/activity.
- Make chalk/dry-erase boards legible.
- Do not talk while writing on the board.
- Avoid seating student in heavy traffic areas.
- Provide note taker. It is impossible to simultaneously lip-read and take notes, or to watch/read an interpreter and take notes.
- Assist in student socializations.
- Use captioned films/videos/laser disks, whenever possible.
- Eliminate background noises.
- Model acceptance, provide encouragement, and maintain high expectations.

Laboratory:

- students who are deaf or hard-of-hearing require few specific physical accommodations in the science laboratory, however, adhere to these important laboratory safety considerations: (a) use electrical devices or power strips with visual indicators. (b) install visual or sensory alarms (c) install an accessible telephone with a telecommunication device for the deaf (TDD).
- Plan lessons using cooperative learning strategies. Be sensitive to selecting lab partners who are patient and responsive in communication.
- Avoid seating the student in heavy traffic areas.
- Use frequent demonstrations, check for understanding.
- Write on board or on paper any changes in experimental procedures.
- Label equipment and materials to aid in learning new vocabulary.
- Provide concise, step-by-step directions prior to the laboratory activity and preview it with the student if possible.
- Provide indicator lights for the on/of status of equipment.

- ◆ **Emotional Disturbance: Student characteristics may include; having difficulty maintaining satisfactory relationships, exhibiting psychotic or or bizarre behaviors, depression, schizophrenia, anxiety and fears, all of which affect the student's educational performance over a long period of time. A student may display aggression, bullying, threatening, intimidating behavior. Such students may be physically or verbally abusive of others. Students may destroy property, show little empathy or concern for others, and lack feelings of guilt or remorse. They tend to blame others for their own misdeeds.**

Teacher Implications:

- Provide a cooperatively determined "time out" location.
- Review directions in advance.
- Give undivided attention to the student.
- Listen patiently
- Allow more time.
- Avoid confronting the student in public.
- Be aware of the students' behavioral plan as indicated on the IEP
- Enforce classroom rules consistently.
- Provide a structured environment whenever possible.

Laboratory:

- Maintain consistent routines and expectations.
- Be sensitive to lab team-pairings.
- Activity instructions should be simple but structured.
- Make special effort to involve the student in the lab activity.
- When a student displays a reaction of dislike to the activity, allow a time out option. Avoiding an activity often stems from fear of experience or factors inherent within the situation itself.

Other Health Impairment:

- (1) The student may be identified as having other health impairments if the student has chronic or acute health problems, or disorders of the cardiorespiratory or central nervous systems, or other profound health circumstances, or degenerative health or medical condition which substantially limits the student's strength, vitality or alertness or ability to learn or participate in education programs.**
- (2) Substantially limits means that the student's ability to learn in the regular education setting remains severely affected even when classrooms interventions are applied or accommodations provided. Written documentation shall include specific examples of the adverse affect of the medical condition on the student's educational performance, including school attendance, effect of medications, treatments or other medical interventions, and written documentation of the interventions or accommodations.**

Characteristics:

- Tires more quickly
- Excessive absences
- May be socially delayed due to lack of interaction with other children

Teacher Implications:

- Become familiar with the impairment. If it is degenerative, learn the symptoms and progression.
- Communicate with the student, guardians, and other professional.
- always keep in mind opportunities for socialization and interaction with others
- plan in advance
- review learning priorities in the case of extended absence and organize appropriate make-up lessons
- use electronic communication, email and internet.
- use peer helpers in appropriate ways
- offer assistance but do not insist
- be aware of side effects of medication
- plan for flexible attendance and alternative testing arrangements

Attention Deficit Disorder. inability to attend to tasks for any length of time and distractible. Some students with ADD are quite underactive, and their problem may go unnoticed. Others are hyperactive and fall under the ADHD category (Attention Deficit Hyperactivity Disorder). They are restless and fidgety with excessive movements that appear aimless. One of the most controversial categories due to controversy in definition, diagnosis and treatment.

Classroom Accommodations:

- eliminate distractions

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- review medications and the effect on the student: consider this 'is'..planning student's schedule
- allow for time if a student needs it
- review directions
- allow for signaled response
- eliminate background noises
- maximize availability of visual media and models
- clearly label items or equipment
- allow for direct manipulation of material when appropriate
- get feedback from student
- provide a reader when appropriate
- for students with perceptual problems, avoid computer answer sheets
- allow alternative response modes

Laboratory Modifications

- Establish and maintain consistent routines and expectations
- Gradually reduce the amount of assistance.
- Use a daily assignment notebook as necessary and make sure each student correctly writes down all assignments. If a student is not capable of this, provide assistance.
- When appropriate provide a list of printed instructions in a sequential format. Keep instructions simple.
- Use both verbal and visual directions.
- Start each lab assignment with a few questions or activities you know the student can successfully accomplish
- Provide clear and consistent transitions between activities and notify the student a few minutes before changing activities.
- Make sure all students comprehend the instructions before beginning their tasks.
- Simplify complex directions. Avoid multiple commands.
- Help the students feel comfortable with seeking assistance. (Many students with ADHD will not ask for help.)
- Assign only one task at a time.
- Modify assignments as needed.
- Keep in mind that students with ADHD are easily frustrated.
- Consider alternative activities/ exercises that can be utilized with less difficulty, but have the same or similar learning objectives.

Multi- Categorical Disabilities: The person is affected by two or more separate disabilities. Students with multi-categorical classification are often severely or profoundly disabled and as such require substantial and prolonged care from specialized professionals.

Teacher Implication:

- determine specific impairments and means of communication accessible to the student
- remain in communication with the students, guardians, and other professionals
- keep in mind opportunities for socialization
- use peer helpers in appropriate ways

Student as Having Orthopedic Impairment: The student has an orthopedic impairment as diagnosed by a qualified medical practitioner which substantially limits normal function of muscles and joints due to congenital anomaly, disease or permanent injury and adversely affects the student's ability to learn or participate in education programs. These disabilities include a heterogeneous grouping of conditions. Examples include cerebral palsy, polio, muscular dystrophy, multiple sclerosis, spinal cord injuries, arthritis, scoliosis, These students often require assistive technologies such as mobility devices, augmentative communication systems, sensory devices.

Learning Characteristics

- The students may work more slowly
- Assistive technologies may require thinking time in addition to working time.
- Certain motor tasks may become difficult or impossible
- The student may tire easily.
- Special positioning may be required for certain tasks or activities.

Classroom Accommodations

- provide assistive responding device, if needed
- review work areas for appropriate height and accessibility of supplies and equipment.
- examine traffic needs
- review classroom environment
- provide accessible means of reviewing drawings, chart, graphs, and models
- provide low-force micro-switches for lighting, if appropriate.
- look for adaptive software, keyboards, special switches, and other special equipment

Science Lab Designs and Adaptation

The student with impaired mobility needs to have easy access to equipment including computers, materials, safety devices, and other services such as restroom, ramps, elevators, telephone, and accessible doors and exits. The student also needs enough aisle space for lateral movement and maneuverability.

Adaptations:

- Provide more time to complete activities.
- Provide extra hours outside of the regular school day for the student to work in the laboratory.
- Provide partial outlines or data recording sheets to minimize the time needed for recording data.
- Use peer support.
- Work as a member of a collaborative team.

Lab Designs:

Every teaching laboratory should have at least one adapted workbench. The science lab can be more accessible by making various modifications. Modifications may include:

- Adjust the height of storage units.
- Provide work space for special equipment.
- Lower shelves to lap-board height for holding instruments for students in wheelchairs.
- Assign a lab partner who can help teach or manipulate objects as needed.
- Modify built-in lab tables.
- Provide an easy means for recording data, charts, or graphs.
- Use electric hot plates instead of Bunsen burners as heat sources.
- Use non-manual types of laboratory teaching techniques (electronic probes use pipette bulbs)-for students with arm/ hand impairments.
- Have operating knobs and switches on laboratory hoods in easy access.
- Have accessible water, gas, and electric facilities.
- Increase the size of wheels, dials, handles, and buttons on lab equipment.
- Change the aisle width by relocating desks and/or chairs as needed for wheelchair access.
- Use low-force electric micro-switches for lights and equipment.
- Use wider/ bigger lids on the tops of containers.
- Have a portable eye wash available.
- Explore alternative ways for students who cannot fully use a computer because of physical limitations. Adaptations may include: adaptive access software, altered keyboards, special latching devices, Power Pad-s, eye-controlled input systems, touch-screens with flight talkers, trackballs, and footmice.
- When information gathering involves a physical action that the physically impaired student cannot perform, try a different experience yielding the same information.

Student Having Specific Learning Disability:

(1) The student may be identified as having specific learning disability if, when provided experiences appropriate to the student's age and ability levels:

(a) the student's rate of achievement relative to the student's age and ability levels remains below expectations and the student does not achieve commensurate with his or her age and ability levels in one or more the areas lists in subsection

(b); the student has a severe discrepancy between the student's intellectual ability and academic achievement in one or more of the following areas: oral expression, listening comprehension, written expression, basic reading skill, reading comprehension, mathematics calculation, mathematics reasoning;

(c) the severe discrepancy between ability and achievement is not correctable without special education and related services.

(2) The student may not be identified as having a specific learning disability if the severe discrepancy between ability and achievement is primarily due to visual impairment, hearing impairment, orthopedic impairment, cognitive delay or emotional disturbance, or environmental, cultural or economic factors.

Learning Characteristics Students with learning disabilities display many characteristics that interfere with their behavior, performance and learning abilities. Any combination may be found in any one students

- Academic learning Difficulties
- Communication Disorders
- Perceptual Disorders
- Motor Disorders
- Social-Emotional Problems
- Memory Problems

Classroom Accommodations Accommodations may be needed in learning materials, time, support, strategies and methods.

- eliminate distractions
- review directions in advance
- allow for signaled response
- focus on what is said, not how well it is said listen patiently
- allow more time for assignments and tests review lighting and background for appropriateness
- eliminate background noises
- maximize availability of visual media and / or models clearly label items or equipment
- allow for direct manipulation of material when appropriate
- get feedback from student
- provide a reader when appropriate
- for students with perceptual problems, avoid computer answer sheets allow alternative response modes

Laboratory modifications

- Clearly label equipment, tools, and materials. Color code them for enhanced visual recognition
- Make cue cards or labels that tell the steps of a procedure.
- Plan for extended work time in the laboratory
- In dealing with abstract concepts, use visual tools such as charts and graphs.
- Provide art individual orientation to the laboratory and equipment and give extra practice with tasks and equipment
- allow the use of computers and spell checking programs on assignments

Teacher Presentation

- always ask questions in a clarifying manner, then have the students with learning disabilities describe his or her understanding of the questions.
- Use an overhead projector with an outline of the lesson or unit of the day
- Provide clear photocopies of your notes and overhead transparencies Provide students with chapter outlines or study guides that cue them to key point in their readings.
- Provide a detailed course syllabus before class begins.
- Ask questions in a way that helps the student gain confidence.
- Keep oral instructions logical and concise. Reinforce them with a brief cue words.
- Repeat or re-word complicated directions.
- Frequently verbalize what is being written on the chalkboard.
- Eliminate classroom distraction such as, excessive noise, flickering lights, etc.
- Outline class presentations on the chalkboard or on an overhead transparency.
- Outline material to be covered during each class period unit. (At the end of class, summarize the important segments of each presentation.)
- Establish the clarity of understanding that the student has about class assignments.
- Give assignments both in written and oral form.
- Have more complex lessons recorded and available to the students.
- Have students underline key words or directions on activity sheets (then review the sheets with them).
- Have complex homework assignments due in two or three days rather than on the next day.
- Pace instruction carefully to ensure clarity.
- Present new or technical vocabulary on the chalkboard or overhead.
- Provide and teach memory associations (mnemonic strategies)
- Support one modality of presentation by following it with instruction and then use another modality.
- Talk distinctly and at a rate the student can follow.
- Technical content should be presented in small incremental steps.
- Use plenty of examples, oral or otherwise, in order to make topics more applied.
- Use straight forward instructions with step-by-step terms.
- Write legibly, use large type: do not clutter the blackboard with non-relevant information.
- Assist the student, if necessary , in borrowing classmate's notes.

- Consider cross-age or peer tutoring
- Allow the use of computers and spell checking programs.
- Consider alternate activities /exercises that can be utilized with less difficulty for the student, but have the same or similar learning objectives.
- Review and discuss with the student the steps involved in a research activity.

Reading

- Announce readings as well as assignments well in advance. Have students maintain an assignment notebook.
- Find materials paralleling the textbook, but written at a lower reading level.
- Introduce simulations to make abstract content more concrete.
- Make lists of required readings available early and arrange to obtain texts on tape from Recording for the Blind.
- Offer to read written material aloud, when necessary.
- Read aloud material that is written on the chalkboard and on the overhead transparencies.
- Review relevant material, preview the material to be presented, present the new material then summarize the material just presented.
- Rely less on textbooks. Reading for students with learning disabilities may be slow and deliberate, and comprehension may be impaired for the student.
- Comprehension and speed usually dramatically increase with the addition of auditory input.
- Allow the student to use a tape recorder.
- Highlight key points in text

Testing

- Read the test to the student.
- Avoid overly complicated language in exam questions.
- Clearly separate items when spacing them on the exam sheet.
- Consider other forms of testing (oral, hands-on demonstration, open-book, etc.)
- Some students with learning disabilities find that large print helps their processing ability.
- Consider the use of illustrations as an acceptable form of response to questions in lieu of written responses.
- Allow the student to give oral answers to test questions.
- Eliminate distractions while students are taking exams.
- For students with perceptual problem, for whom transferring answers is especially difficult, avoid answer sheets, especially computer forms. Allow them to write answers (check or circle) on the test (or try to have them dictate their answers on a tape recorder.)
- Gradually increase expectations as the student gains confidence.
- Grant time extensions on exams and written assignments when there are significant demands on reading and writing skills.
- Permit the student to take examinations in a separate quiet room with a proctor.

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- Provide study questions for exams that demonstrate the format along with the content of the exam.
- Provide study guides.
- Review with the student how to proofread assignments and tests.
- Do not test material just presented or outcomes just produced, since additional time is generally required to assimilate new knowledge and concepts.
- Permit the students with learning disabilities the use of a dictionary, thesaurus, or a calculator during tests
- Allow the student to use word banks during the test.

Student Having Speech-Language Impairment: the student may be identified as having a speech- language impairment if the students has a significant deviation in speech such as fluency, articulation or voice, or in ability to decode or encode oral. language which involves phonology, morphology, semantics or pragmatics or a combination thereof. Communication Disorders involve a wide variety of problems in speech, language, and hearing. For example, speech and language disorders include stuttering, aphasia, dysfluency, voice disorders, cleft lip and /or palate, articulation problems, delays in speech and language, autism, and phonological disorders. Speech and language impairments and disorders can be attributed to environmental factors. Communication disorders can also stem from other conditions such as learning disabilities, dyslexia, cerebral palsy and mental retardation.

Teacher Implications

- work with speech language pathologist in cooperation with the student to discuss appropriate strategies
- allow student to meet in private before or after school relating to assignments.
- discuss appropriate teaching interventions with the student in advance
- use computers with visual output
- use electronic mail
- investigate speech synthesis options
- consider internet accessible services/ resources as alternative learning options
- review directions in advance
- allow for signaled response
- don't pretend to understand if you do not
- focus on what is said, not how well it is said
- allow for computer or written response
- listen patiently
- allow more time

Testing

- Allow more time to complete tests in their optimal mode of communication.
- Design tests that are appropriate for the student's disorder (written, drawn, or oral.)
Writer could be provided for test taking
- Check to be sure that test instructions are completely understood and provide any additional assistance that may be needed.

Laboratory Applications

- When possible, allow student to use a technical output device (i.e., laptop computer).
- Pre-plan for accepting laboratory partners.
- Allow more time for the student to complete activities

- Place the student within a reasonable distance from the instructor to meet their needs.
- If appropriate, provide assistance, but also provide support when the student shows the ability to do things unaided.
- Consider alternate activities/ exercises with less difficulty for the student, but with the same or similar learning objectives

Student Having Traumatic Brain Injury. The student may be identified as having traumatic brain injury if the student has damage to the brain that produces impairment of cognitive abilities, speech, behavioral or emotional control, or physical functioning substantially limits the student's functional or psychosocial ability or both and the student's ability to learn or participate in educational programs. These impairments may be either temporary or permanent and may cause partial or total functional disability as well as psychosocial maladjustment. Any or all of these impairments may occur to different degrees.

Characteristics of Students With Head Injury

Cognitive difficulties

- distractibility
- confusion
- shortened attention span
- difficulty remembering recent events
- difficulty with language comprehension and expression
- irritability
- fatigue
- impassivity
- decreased frustration tolerance

Social/ Emotional Problems

- sudden mood changes
- apathy poor motivation
- self-centeredness
- sadness and depression
- loss of inhibition
- may threaten self-destructive acts

The majority of children with IM return to schools, their educational and emotional needs are likely to be very different from before the injury. Careful planning for school re-entry is extremely important in meeting the child's needs.

Student Having Visual Impairment. The student may be identified as having a visual impairment if the student has a: (a) visual acuity of 20/70 or less in the better eye with correction of field of vision which at its widest diameter subtends an angle or no greater than twenty degrees in the better eye with correction; and (b) needs special education and related services. People with visual impairment either have "low vision" or "blindness." If they have low vision, they use whatever visual perception they possess to access information. People with blindness are not able to visually gather information.

Regular classroom teachers need to be aware of vision-aiding devices and their proper operation when working with a student with visual impairment. This will often include consultation with the resource teacher, parents, specialist in orientation and mobility, and others involved in the student's education. Science teachers should help prepare the student's Individualized Education Plan because they know the type of equipment needed for active participation in science classes and labs. The cost of some specialized equipment may be too expensive, however, funds are available from some rehabilitation, state, or local education agencies when a device is mandated on a student's IEP. Devices that may be needed include, optical devices, non-optical devices, devices for enhancing tactile functioning, devices for enhancing auditory functioning and electronic devices.

Teacher Implications; The degree of impairment will effect the usefulness of these strategies and suggestions.

- Work closely with the resource teacher, itinerant teacher, orientation and mobility specialist to design lessons that will enable the student with visual impairment to be active in all activities
- Use peer helpers and lessons using cooperative learning strategies.
- Produce directions and handouts in large print or Braille. Eighteen font size is recommended usually. Tape recorded instructions will allow the student to do activities independently.
- Use small pieces of tape or dabs of glue to mark measurements on equipment, such as rulers, beakers, and graduated cylinders.
- Place objects for each group in identical areas that are marked clearly with Braille or large print.
- Use different grades of sandpaper, textured tape and / or yarn to make raised images of diagrams.
- Record data and observations on a tape recorder for development of graphs.
- Use available technology to develop graphs.
- Verbally spell out new or technical words
- Use an overhead projector to show step-by-step instructions. Mask all the instructions except the one(s) that you want to present.
- Use an opaque projector whenever possible to enlarge a text or manual
- Use a sighted narrator or descriptive video to describe the aspects of videos or laser disks.
- Describe, in detail, all pertinent visual occurrences or chalkboard writing.
- Where needed, have lesson or direction materials Brailled, use an enlarged activity script, for class handouts.

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- Have tactile 3D models, raised line drawings, or thermoforms available to supplement drawings or graphics in tactile format when needed.
- Whenever possible, use actual objects for three dimensional representations.
- Modify instructions for auditory/ tactile presentation.
- Use raised line drawings for temporary tactile presentations.
- Allow student to use a tape recorder for recording classroom presentations or the text
- Provide books on tape.
- Make all handouts available in an appropriate form: e.g., regular print, large print, Braille, or on a cassette, depending on the student's optimal mode of communication.
- Use a monocular or electronic miniature television or similar devices for long range observations of chalkboard presentations.

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BIBLIOGRAPHY

Helena Public Schools: Office of Public Instruction. (Summer 1997). Criteria for Identification of Eligibility: Montana Special Education Reference Manual, 1996. IDEA and you classroom: A Guide for Teachers. Helena, Montana.

Stefanich, Greg P. (2001). Science Teaching in Inclusive Classrooms: Theory and Foundations, pp 109,159-162.

Stefanich, Greg P. (2001). Science Teaching in Inclusive Classrooms: Models and Applications; pp1-57.

Watson, S.M.R. and Houtz, L.E. (Fall 1998). Modifying Science Instruction: One Strategy for Achieving Success and Equity in Inclusive Settings. Journal of Science Education For Students With Disabilities. Pp24-33

Wood, Judy W. (1996). Reaching the Hard To Teach. Midlothian, Virginia: Judy Wood Publishing Company and Consulting Services.

Frame, Kathy. (1999). General considerations for modifying the MicrobeWorld Activities for those who are exceptional. Meet The Microbes: MicrobeWorld Activities. National Association of Biology Teachers.

Keller, Ed. (2001) <http://www.as.wvu.edu/~scidis/add.html>