

Curriculum Adaptations in Science for Students with Intellectual Disability

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Abstract

Access to learning is a crucial quality concern for achieving the right to education for each and every child. For children with disabilities, especially children with intellectual disabilities, this access can be provided by bring about changes in existing curriculum goals, methods, materials and evaluations. Such changes are called 'curricular adaptations'. Further, content loaded subjects such as science demand specific and well planned adaptations to ensure access to learning. This paper presents guidelines and an example of how such curricular adaptations can be made in science curriculum for upper primary classes for children with intellectual disabilities.

Key words: *curricular adaptations, teaching of science, children with intellectual disabilities.*

Introduction

For the last few decades, scholars have been raising doubts and questions about the validity of heavy reliance on a subject-centered approach to curriculum development that is dominated by textbook contents. Furthermore, the convergence of academic disciplines in the form of broad field and problem-orientation to knowledge incorporating a variety of theoretical perspectives requires innovative procedures for the development of curriculum. For this purpose, it is imperative that members of NCERT and State Boards of School Education must be aware of modern trends in the development of curriculum. Standard dictionaries define curriculum as a course of study offered by an academic institution. According to Ronald Doll (1988), curriculum is the formal and informal content and process by which learners gain knowledge and understanding, develop skills, and alter attitudes, appreciations, and values under the auspices of an academic institution. In other words, curriculum can be defined as the total experience. From this view point, curriculum is not only the content selected and delivered, but also the planned and unplanned activities in which individuals' participate as students. Modern education is the combination of two dynamic processes. The one is the process of individual development and the other is the process of socialization, which is commonly known as adjustment with the social environment.

A well-known definition given by Cunningham "Curriculum is a tool in the hands of the artist (teacher) to mold his material (pupils) according to his ideas (aims and objectives) in his studio (school)". Curriculum includes goals, content, teaching materials, teaching methods, assessment and evaluation techniques and changing teaching learning environment. Curriculum in India is set by the NCERT at the central level and by the State Boards of Education at the state levels. Either way, the curriculum follows the guidelines of the National Curriculum Framework, 2005. Education department in each state prepare textbooks based on these curricular guidelines for each subject. Textbooks are prepared by subject experts. Care is taken to make the content age appropriate and with simple language. In regular classroom, this curriculum is transacted by the teachers as per the syllabus set by the state board of education.

In the classroom, teacher and students use the textbook as instructional material for learning the curriculum content. In an inclusive classroom, the classroom has higher diversity of learners. Among them can be children with

intellectual disabilities. Textbooks and classroom practices that are used regularly help students who are typically developing to access information and learn. However, children with intellectual disabilities have certain characteristic challenges in their intellectual and cognitive abilities that ask for making changes in these regularly used instructional materials and practices. These changes are referred to as 'curricular adaptations'. Positive Environments, Networks of Trainers (2005) defines curricular adaptations as "changes permissible in educational environments which allow the student equal opportunity to obtain access, results, benefits, and levels of achievement." Simply put, curricular adaptations allow students with disabilities to participate in inclusive environments by compensating for learners' weaknesses. Such adaptations may very well be useful for other students also although they are made to address the needs of children with intellectual disabilities.

Curriculum adaptations

Curriculum adaptations have two separate kinds which are accommodation and modification. Adaptations, accommodations, and modifications may seem like interchangeable terms, but when it comes to inclusion they carry significantly different meanings. Accommodations are supports and services provided to help a student access the general education curriculum and validly demonstrate learning.

Examples of Accommodations:

Time: Extend the time allotted to take a test, finish an assignment, learn a concept, or complete an activity.

Setting: Students can take tests in a distraction free space – potentially a resource room so it is easier for the child to focus. This accommodation may be as easy as preferential seating (does the student need to be close to the board to see or next to the teacher to hear?)

Level of support: Paraprofessional or peer assistant

Reduce Response effort: The use of a calculator, scribe, or word processor to assist the student when an answer is expected. The student still must understand the concept of what is asked in order to accurately manipulate any of these tools.

Note: If a student knows their basic math facts, a calculator is an accommodation. If the student does not know their facts, it may be considered a modification.

Sensory items: Fidgets to help students focus

Visual schedules: If a child has a visual impairment, would we deny him glasses to help his vision? Glasses or contacts are an accommodation used by many people. It would not be reasonable to say that if a person was denied glasses or contacts, they would just "learn" how to see without that support. Therefore Accommodations will not affect a student's grade or credits. Students can validly demonstrate learning of the general education curriculum. Accommodations are used on the lower end of the continuum for support – least restrictive.

Modifications: Individualized changes made to the content and performance expectations for students

Examples of Modifications:

Quantity: Modify the number of items that the child is expected to learn or complete. (Depending on how it is written in the IEP, this could include entire sections of the curriculum. I.E: Only completing the addition portion of a math assignment that also includes subtraction, multiplication and division)

Output: How a student responds to instruction For Example: Instead of writing an essay, they may be given multiple choice questions. Instead of open-ended questions, they may be given a yes/no strategy option

Alternate Goals: Use the general education curriculum while adapting the goal or outcome expectation. For example: Instead of taking the MEAP test, the student takes the MI-Access. Thus modifications will affect a student's grade. Actual changes are made to the materials passed out by the teachers

Barriers in learning science

Among the subjects in the curriculum, science is a content area subject where information regarding specific aspects of the world. Science endeavours to identify solutions to problems and / or understand a phenomenon. It includes biology, chemistry and physics. Since this field is knowledge oriented, the major portion of learning science is content. These contents can be of various types such as observations, theories, laws, and processes. Most of this content matter is transacted through the textbook. However, learning science can present barriers to learning for children with intellectual disabilities. These barriers are related to the goals, instructional methods, instructional materials and evaluation procedures in science. Since science is a content-loaded subject, it's vocabulary is more technical. Further, understanding and remembering the meanings of technical terms is important for learning successive scientific concepts.

The above listed difficulty-creating characteristics of the content matter oriented subject such as science can cause problems for all students to varying extents. But typically developing students (students without a disability) get over these problems by tackling them by themselves. However, students who are in the borderline of intellectual function and who have intellectual impairments would need specific changes to be made depending on their needs. These changes are called as 'curricular adaptations'. Curricular adaptations can facilitate learning when they are appropriately planned to overcome specific challenges faced by the students in learning science. Challenges to learning can be classified into challenges in the steps of learning.

Barriers in learning for students with intellectual disabilities

Learning involves three major steps – receiving information, processing information and expressing information. In order to be able to make curricular adaptations in science. Children with intellectual disabilities can have a varying range of challenges or impairments in one or more cognitive and/or intellectual functions which create barriers in each step of learning. These are listed in table 1.

Table 1: Barriers to learning science for students with intellectual disabilities

Step in learning	Barrier causing characteristic in students with intellectual disability
Receiving information	<ul style="list-style-type: none"> • Visual and/or auditory perceptions • Language – reading, • Exposure to experiences • Over sensitivity or under-sensitivity to touch, smells or sounds
Processing information	<ul style="list-style-type: none"> • Meta-cognition (thinking about one's own learning) • Transfer of learning • Memory • Information processing (attending to information from different senses) • Building understanding • Attention, concentration and impulsivity • Appropriate physical activity – fine and gross motor • Higher order intellectual skills (reasoning, analysis, synthesis, critiquing)
Expressing information	<ul style="list-style-type: none"> • Eye-hand coordination • Language – writing • Ability to change according to situation • Express ideas, needs and emotions • Social activity and problems of self-regulation • Communication skills

Curricular adaptations for inclusion

Curricular adaptations as outlined above have the potential to enable the teacher to bridge the gap between the barriers caused by the science curriculum and the barrier caused by intellectual disability. These adaptations can be made effective by finding changes that suit the specific cognitive or intellectual challenge faced by a child in each step of learning. These changes can be made by the teacher during planning the lesson. Curricular adaptations are done by creating changes in each aspect of the curriculum – goal, instructional materials, instructional methods and evaluation in such a way that it overcomes the barriers in each step of learning. This is shown in table 2. In this table, the possible curricular adaptation for each step of learning is listed. As an example, the chapter on ‘Diversity of Organisms’, from Class 6, term III, is used.

Table 2: Curricular Adaptations for Science learning at upper primary level

Step in learning	General Instructional strategy	Adaptation	Example of adaptation for the chosen topic
Learning objective / Goal	Learn all content in the given lesson	Tier the objectives from simple to difficult (single to multiple or layered). In case of severe or profound disability, substitute curriculum with functional curriculum.	<u>Level 1:</u> Students recognize differences in organisms in the world. (simplest) <u>Level 2:</u> student understands the characteristics where there are differences in organisms. <u>Level 3:</u> student knows the types of organisms in this diversity. <u>Level 4:</u> student classifies various types of organisms in the surroundings.
Receiving information	Lecture, Demonstration, Observation with TLMs	<ul style="list-style-type: none"> • Show more number of pictures • Show models that can be held in the hand • Use of colors to show similar and different features • Reduce the number of concepts / ideas to be learned by the child at a given time frame. • Give multiple time slots of short duration. • Use of assistive devices such as adapted keyboards and text to speech readers • Use enlarged prints of specific text/concept information. • Use separate cards / pages for separate pieces of information. 	<ul style="list-style-type: none"> • Show multiple numbers of pictures of the same type of organism. • Where possible, show model / live / both of the organisms shown in pictures. • Tell stories / allow students to tell stories or experience with these organism/s. • Use puzzles to direct attention of the students to characteristic features of organisms.
Processing information	Classwork, Activity, Homework	<ul style="list-style-type: none"> • Self-pacing. • Step by step presentation of ideas in the concept after task or concept analysis (chunking) • Multiple repetitions • Use of as many types of activities as possible and relevant (e.g., draw, craft, write, talk, make story, act etc) • Hands-on experiences • Use mnemonics • Use flash cards • Allot peer support • Ensure active participation of student in 	<ul style="list-style-type: none"> • Let student take his or her time with each organism – picture card, model, life (if possible), story. • Have them match and relate the stories themselves for at least three organisms in each type. • Give prototypes / models of the organisms and tell them to separate them, keeping same ones together. • Help the child to recollect

		activity – adjust level of participation where necessary. <ul style="list-style-type: none"> • Giving graphic representations • Giving advanced organizers • Explicit instruction on learning strategies – questioning, visualization 	what he or she has learned by continually reviewing the types of organisms in different ways – for e.g., by showing movie, by taking students out for nature walk.
Expressing information	Write textual information Draw diagrams	<ul style="list-style-type: none"> • Write • Draw • Tell • Make • Perform 	<ul style="list-style-type: none"> • Let students draw or do something by remembering the organism and its characteristics in class.
Evaluation	Tests and exams Continuous comprehensive evaluation	Continuous comprehensive evaluation	<ul style="list-style-type: none"> • Maintain the progress chart with individual organisms / characteristics mentioned on one axis. When student achieves mastery over each type, mark it in the chart.

Conclusion

Thus, curriculum adaptations are a potential way to provide access to information and to learning for children with intellectual disabilities. Clear understanding of the learning ability and needs of the student and an on-going monitoring of learning are crucial in using curriculum adaptations. Further, creating adaptations needs to be a dynamic process based on the requirements of the children.

References

- Doll, R. (1988) *Curriculum and definition*, Retrieved from <http://www.slideshare.net/sqjafery/curriculum-and-its-definition>
- PENT (2005) *Accommodations, Modifications and Differentiated Instruction*. Version presented at the LRP Conference. Retrieved from <http://www.pent.ca.gov/acc/accom.html>.
- Sarva Shiksha Abhiyaan (2016). Confluence. February 2016, Vol. 18. Retrieved from http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/Confluence.pdf
- Tools for teachers (n.d.) *Curriculum Modifications and Adaptations*. Retrieved from http://www.spannj.org/pti/Curriculum_Modifications_and_Adaptations.pdf
- Wright, D. B. (2005). *Nine types of curriculum adaptations*. Teaching and Learning. Retrieved from <http://www.snipsf.org/wp-content/uploads/2011/08/NineTypes.pdf>