UNIT 15   ICT FOR INCLUSIVE CLASSROOM

Structure

15.1   INTRODUCTION

Renu teaches Science in class 8 in Bangalore. She has in her class two children with special needs, Zamir and Koshish, who are hearing impaired. Once while working in her kitchen garden, she could see a pair of earthworms in a pot. Incidentally, she was planning for the next day a lesson on 'Farmers' Friend-Earthworm' and was in a dilemma about how to ensure active involvement of Zamir and Koshish in the lesson. Initially, she thought of carrying the earthworms with her to the class. But she realized that she would be missing these two friends who made her kitchen garden as their home. Just by seeing the earthworms, children cannot understand how earthworms dig the soil to make it good for the plants. By weighing all alternatives, she decided to make a small movie with the help of her mobile phone. Renu finally made a short movie and presented the same over an LCD projector along with her lesson. To her surprise, it was not only Zamir and Koshish benefitted, the whole class was benefitted by the movie. Just think how Renu used 'multimedia' to make her lesson inclusive. She thought it was a small effort; but it was a great work.

For inclusive classroom, you need to use assistive technology. This technology helps individuals with disabilities function more like those without disabilities by helping to bridge the gap between what people can do and what they may need to do. In this Unit, we shall discuss the role of ICT in an inclusive classroom and how various ICTs can be used in teaching learning processes. Besides ICT, we shall address the need of Assistive Technology (AT) in the classroom.

15.2   OBJECTIVES

After going through this Unit, you will be able to:

*   explain the concept of inclusive classroom;

*   appreciate the role of ICTs in promoting inclusion in classroom;

*   discuss the appropriate use of ICTs as per the diverse needs of students;

- relate different assistive technologies (ATs) to various special needs; and

- explain the use of ATs in inclusive classroom.

15.3   INCLUSIVE CLASSROOM

You have already read the Course BES 128, in which we have discussed on how to create an inclusive school and deal with special needs of children. International policy and legislation on the rights of persons with disabilities is strongly in support of children with disabilities receiving their education in an inclusive, rather than segregated, school setting. Children with diverse needs including disabilities are the valued members of the school community. Teachers can facilitate a positive environment in the school that respects inclusiveness and provides equal opportunities to the children with special abilities, from varied social backgrounds and diverse learning needs. Hence, inclusive classroom promotes learning of all children, with special abilities, with various social background and with diverse learning needs. The present system advocates that where possible, children with disabilities are accommodated in inclusive schools. This promotes cost-effectiveness and leads to a more inclusive society. ICT is one of many supports that can enable the realization and implementation of inclusive education. ICT has a major role to play in enabling educational authorities, teachers, students and parents to move towards a more inclusive educational system.

15.4   ROLE OF ICTs IN INCLUSIVE CLASSROOM

When we consider using ICTs for students with special needs, then it is very important to ensure that the technology can be used by them. That means- it has to be accessible. Accessible ICTs are the wide range of assistive and mainstream technologies and formats that can enable students with a disability to enjoy an inclusive education. Accessible ICTs also include assistive technology (AT) which can be defined as a "piece of equipment, product system, hardware, software or any service that is used to increase, maintain or improve functional capabilities of individuals with disabilities." A person's ability to use technology may be impaired due to various physical, sensory, emotional or cognitive disabilities. One common feature of accessibility is the small tactile node, or 'dot', found on the '5' key on most keypads for computers and telephones. By finding the '5' key by touch, anyone can locate the other numeric keys without looking at it. Accessible ICTs hold the potential to enable students with disabilities to receive education and become independent in social and economic life of their communities. Moreover, they provide equitable learning opportunities through enabling communication with teachers and fellow students. They also provide access to learning materials, so that students are able to do the course work, assignments and appear for examinations. In general, accessible ICTs:

- enable greater learner autonomy;

- unleash hidden potential for those with communication difficulties;

- enable students to demonstrate achievement in ways which might not be possible with traditional methods; and

- enable tasks to be tailored to suit individual skills and abilities

Check Your Progress

Notes: a) Write your answers in the space provided.

   b) Compare your answers with the one given at the end of the unit.

1) Why do you need accessible ICT for inclusive classroom?

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The wide variety of accessible ICTs are currently available and can help to overcome reduced functional capacity. Accessible ICTs, therefore, include:

- **Mainstream technologies** - such as computers that contain in-built accessibility features;

- **Accessible formats-** also known as alternate formats - such as accessible HTML (HyperText Markup Language), DAISY (Digital Accessible Information System) books but also include 'low-tech' formats such as Braille.

- **Assistive technologies (AT)** - such as hearing aids, screen readers, adaptive keyboards etc. AT is a "piece of equipment, product, system, hardware, software or a service that is used to increase, maintain or improve functional capabilities of individuals with disabilities.

In its training guide "*ICTs in Education for People with Special Needs*", UNESCOs Institute for IT in Education outlines 3 mains roles for the use of accessible ICTs in education:

- **Compensation uses** – technical assistance that enables the active participation in traditional educational activities such as reading or writing;

- **Didactic uses** – the general process of using ICTs to transform approaches to education. Many ICTs can be used as a didactical tool to enable a more inclusive learning environment;

- **Communication uses** – technologies that enable communication – often referred to as alternative and augmentative communication devices and strategies.

A meta-study carried out by the British Educational Communications and Technology Agency (BECTA, 2003) on the use of accessible ICTs showed the following benefits to all stakeholders involved in education, including students, teachers and parents.

Specific benefits for students:

- Computers can improve students' independent access to education

- Students with special educational needs are able to accomplish tasks working at their own pace.

- Visually impaired students, using the Internet, can access information alongside their sighted peers.

- Students with profound and multiple learning difficulties can communicate more easily.

- Students using voice communication aids gain confidence and social credibility at school and in their communities.

- Increased ICT confidence amongst students motivates them to use the Internet at home for schoolwork and leisure interests.

Benefits for teachers and non-teaching staff:

- Reduces isolation of teachers working for children with special educational needs by enabling them to communicate electronically with colleagues.

- Supports reflection on professional practice via online communication.

- Improves skills for staff and a greater understanding of assistive technology used by students

- Enhances professional development and effectiveness of the use of ICT with students through collaboration with peers

- Materials already in electronic form (for example, from the Internet) are more easily adapted into accessible resources such as large print or Braille.

Benefits for parents:

- Use of voice communication aids encourages parents to have higher expectations of children's sociability and potential level of participation.

15.5   USE OF ICT IN INCLUSIVE CLASSROOM

ICTs offer a great potential to support lifelong learning for all groups of students, including those who have special needs. The application of ICTs enhances independence, integration, and equal opportunities for such people and in this way they facilitate their inclusion in society as valued, respected, and contributing members.Inclusive classroom or school is a very important component of inclusive society.

Why should you use ICT in inclusive classroom? Let us reflect on some examples:

Examples
Example 1: Those with hearing impairment cannot access explanations, instructions and feedback which are provided through the voice. Correspondingly, due to the exclusive use of audio format, they cannot receive feedback on their actions/performances.
Example 2: Those with low vision may also encounter problems if some facilities such as larger fonts/icons and high contrast between foreground and background are not provided by the application. If such features are not built in the program, then that particular ICT is of no use to such students.
Example 3: Those with motor or visual impairments cannot access the program by using the keyboard. If any other alternative input devices are not provided, then their access is restricted and becomes of no use.

ICT, in principle, could be useful to all students but actually it is not entirely accessible for a wide number of those with specific disabilities. In addition, it lacks full compatibility with the available Assistive Technologies. Hence, it leaves most of the encountered problems as unsolved. The use of such educational products (which are not fully accessible) in the classrooms prevents students with special needs from using the same materials as their schoolmates. It also limits their educational opportunities and finally contributes to their 'exclusion'. The choice of suitable educational software and appropriate assistive technologies appears to be vital to avoid discriminations among the roles of students and the teachers. While making this choice, you should, bear in mind that educational resource must meet the needs of all students with no exclusion. Several software, gadgets and web based tools are now available which make teaching learning process easier in inclusive classroom. Some of them are listed in the following Box-1.

Box-1: ICT for Inclusive Classroom: Some Examples

• podcasting	• wikis	• games and gaming
• digital animation	• online reading schemes	• mobile phones
• iPods and iPads	• satnav	• art packages
• dance mat technology	• story boarding	• using sound
• digital storytelling		• visualisers

Technology also addresses the necessity to cover a wide range of content in a short amount of time by minimizing the need to take curriculum at a slower pace. Students with special needs may benefit from technologies that assist them as well as allow them to keep pace with their peers. For example, a student with dyslexia who might normally struggle with a reading passage, could benefit from reading the text while listening to an audio recording through headphones. By providing audio, visual, or concept-mapping supports while introducing new concepts, teachers reduce the need for review and remediation after the initial instruction. There are several technologies that can be used in inclusive classroom. Some are discussed here:

Digital textbooks, eBooks, and Audio-books

Digital textbooks (both online and CD-based) offer options for accessing the same content at different levels of complexity. The digital format offers an advantage over traditional textbooks because digital publications can incorporate time-based and interactive media directly within the text. CD-based digital textbooks provided by textbook publishers, offer a variety of features, including pronunciation guides, text-to-speech, and vocabulary support, as well as features that allow the reader to change the formatting of the text to improve readability. Many digital textbooks allow students to hear the text. This feature supports students with learning disabilities who benefit from the ability to hear and view the text simultaneously.

CAST UDL Book Builder

Some learning situations may require further customization not possible via pre-fabricated content. In these situations, the teacher must seek tools for enhancing text as opposed to already enhanced text. One of the tools is the CAST UDL Book Builder(http://bookbuilder.cast.org/),a free digital book database and book

builder. Developed and hosted by the Center for Applied Special Technology (CAST), Book Builder helps educators "create, share, publish, and read digital books that support diverse learners according to their individual needs, interests, and skills." The database and the tool integrate a number of technologies like 'screen-reading software' to make content accessible to students with learning disabilities, yet at the same time 'integrating functionality', it engages the reader through the use of built-in avatars who pose questions and offer ideas as the students read.

Digital posters

Digital poster displays, like those created using Glogster EDU (http:// edu.glogster.com/) and incorporate media elements like images, videos, audio recordings, and drawings with text. Students, who are gifted or thrive on creative freedom, find engagement and challenge in such a format; whereas students with learning disabilities find support in the options for expression. For a thorough discussion of using digital posters in the classroom, see the article "Digital Posters: Creating with an Online Canvas (http://www.learnnc.org/lp/pages/6542)."

VoiceThread

Voicethread (http://voicethread.com/) is an online platform where students can respond to a topic using text, audio, video, or images. The variety of options makes it possible for students with learning disabilities to contribute to the presentation using the method that works best for them. The option to record an oral response, rather than delivering it 'live' in class, benefits students who need time to compose their thoughts, as well as students who have speech disorders like stuttering. In an example of a picture book of poetry for class III, students have commented with both text and audio(https://voicethread.com/myvoice/thread/119840). You may refer to the article 'Using VoiceThread to Communicate and Collaborate' for a thorough explanation on how to use 'VoiceThread' with students(visit: http://www.learnnc.org/lp/pages/6538).

Digital storytelling

Digital storytelling projects, in which students tell fictional or true stories, are another example of differentiating product by student interest: Each learner draws on his or her background or interest to provide the content for the product. Digital stories can be created in a range of formats, including pure audio, image slideshows with static text, image slideshows with voiceovers, and pure video. The options that prioritize audio over text benefit students who have difficulty with writing. (The University of Houston offers a useful introduction to using digital storytelling in the classroom, visit: http://digitalstorytelling.coe.uh.edu/)

Support for Evaluation: Rubistar

In order to succeed on any class project, all students need the support in terms of clear guidelines. But students with special needs may need additional support to stay on task and complete each step in completing a project. Creating separate rubrics for students who have different skill sets, can provide the appropriate level of support for such students. For example, an oral presentation rubric might include a criterion like, "Share multiple drafts with teacher," to remind students with organizational/procedural issues of importance of viewing the final presentation as a series of tasks. Web-based tools like Rubistar (http:// rubistar.4teachers.org/index.php), a free rubric generator, can help teachers easily create a master rubric and then adapt it for students with special needs.

Check Your Progress

Notes: a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

2) Select any topic of your choice for an inclusive classroom and find out what technology would be most suitable? And Why?

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15.6 UNDERSTANDING ASSISTIVE TECHNOLOGY

On a daily basis, most of us independently engage in a wide range of important and fulfilling activities. Most of the time we accomplish these activities with ease without thinking about the steps involved in accomplishing them. For an individual with a disability, these activities can be difficult, time consuming, and sometimes even not possible without personal assistance or 'assistive technology'. In such cases, assistive technology has a great role to play. What do you understand by 'assistive technology'? Read carefully the following four statements:

* a student with a disability,

* who wants to perform an activity,

* using a technology or device,

* within a context or an environment.

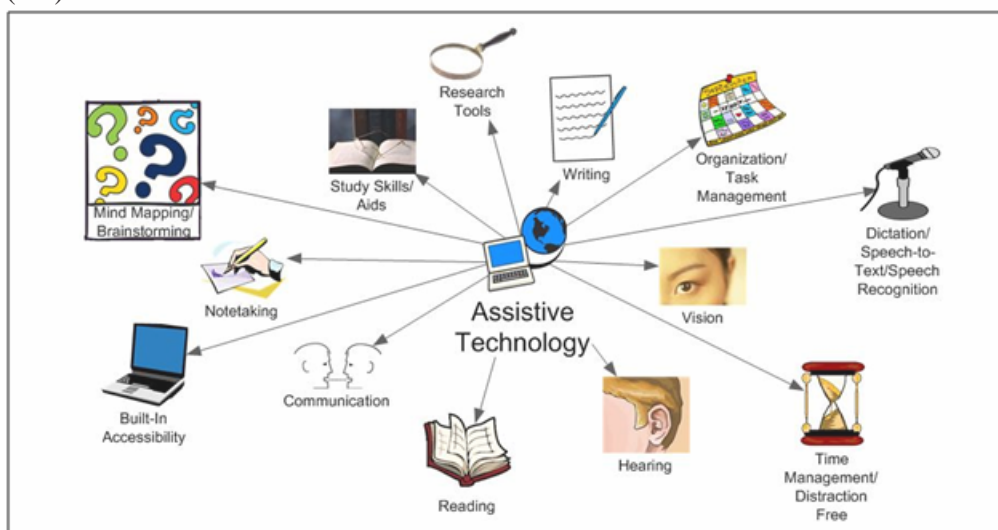A technology or device with these four components is called 'assistive technology (AT)'.

Figure 15.1: Areas of Assistive Technology Solution
Source: http://www.augsburg.edu/class/groves/assistive-technology/everyone/

Many students with disabilities require 'assistive technology' to participate in and benefit from their educational programs. A range of assistive technology solutions is available to support student performance, achievement, and independence in the following areas:

- academics and learning aids,
- aids to daily living,
- assistive listening and environmental aids for the hearing impaired and deaf,
- augmentative communication,
- computer access,
- leisure and recreation,
- seating,
- positioning,
- mobility, and
- vision.

15.7 CATEGORIES OF ASSISTIVE TECHNOLOGY

Students who have access to appropriate assistive technology solutions, that they need, are more likely to be successful in their educational programs. Common assistive technologies which may be required in your inclusive classroom are listed here.

Academic Learning Aids: Many students with disabilities use assistive technology to enhance their participation and achievement in their educational programs. There are a range of assistive technology solutions to address student needs in all academic areas including reading, writing and spelling, math, and study and organization.

Figure 15.2: Academic Learning Aids
(**Source:** https://www.teachingvisuallyimpaired.com/overview-of-assistive-technology.html)

Aids to Daily Living: An array of low technology to high technology aids are available for students who have difficulty in completing activities of daily living

independently. Daily living aids include aids for tooth brushing, eating, drinking, dressing, toileting, and home maintenance. These are typically used by students with physical disabilities.

Fig.15. 3: Aids to Daily Living

Source: http://www.aid2ability.com/index.php/our-products/aids-to-daily-living.html

Assistive Listening Devices and Environmental Aids: Students who are hard of hearing or deaf, often need assistive technology to access information that is typically presented verbally and accessed through the auditory modality. A variety of technology aids or devices that are available to-day amplify speech and other auditory signals or that provide an alternative to the auditory modality are available today. These include assistive listening devices that amplify sound and speech both in the classroom and home environment, text telephone (TT), closed captioning devices, real time captioning, and environmental aids that support independent living skills.

Fig.15. 4: Assistive Listening Devices

Source: https://arizonahearing.com/find-hearing-aids/hearing-aid-accessories/

Augmentative Communication: Students with severe expressive communication impairments have difficulty communicating with peers and adults within their environments. Many of these students need a means of supplementing their communication skills. What these students should actually use are augmentative communication technology devices ranging from low technology to high technology. Today, these are available and include: object-based communication displays, picture communication boards and books, talking switches, voice output communication devices and computer-based communication devices.

Fig.15. 5: Augmentative Communication

Source: http://nmcleod51732013.blogspot.in/2013/02/tango-augmentative-and-alternative.html

Computer Access and Instruction: A variety of technology solutions are available to adapt the classroom computer for students with disabilities. Some computer access technologies offer a method of input other than the standard computer keyboard and mouse. Other computer adaptations include software and hardware that modify the visual and sound output from the computer. There are a variety of such devices. Some of them are adaptive pointing devices, keyboard adaptations, alternative keyboards, touchscreens, onscreen keyboards, mouse alternatives, voice input devices, and environmental aids.

Fig.15. 6: Computer Access and Instruction

Source: A. https://www.pinterest.com/amyandpals/mouse-alternatives/,

B. http://www.eaccessibilitywales.org.uk/easyread/i-cant-see-the-computer-very-well/hardware/

Environmental Control: There are high technology environmental aids that assist students with physical disabilities in controlling electronic appliances within the school and home. These devices allow the student to use an alternate input device such as a switch to control one or more electronic appliances such as lights, televisions, and electronically controlled doors.
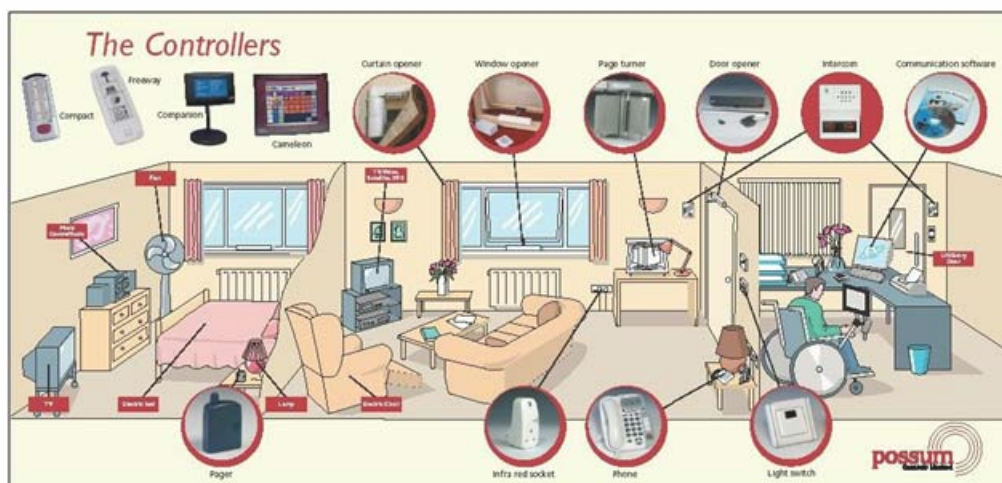

Fig.15. 7: Environmental Control

Source: http://possum.co.uk/product-category/assistive-technology/

Mobility Aids: Students with physical disabilities often need access to mobility aids to provide them with a means of moving about their environments. Mobility aids include: canes, crutches, walkers, scooters, and wheelchairs. Generally, assistive technology devices such as the mobility aids referenced above are recommended by physical and occupational therapists and are based on the student's individual needs.

Fig.15. 8: Mobility Aids

Source: https://www.elder-care-india.com/mobility-aids-for-the-elderly.html

Pre-Vocational and Vocational Aids: Students with physical and cognitive disabilities and enrolled in educational programs that address pre-vocational and vocational skills, may benefit from the use of prevocational and vocational aids. These types of technology solutions include modifications of the tools and manipulative used in the completion of work related tasks. Low technology solutions include 'grips' for handling materials and 'stabilization devices' for

supporting work materials. For students using electronic appliances such as staplers and paper shredders, an environmental control unit such as the model available from AbleNet can be used to allow for switch control of the appliance. Many of the adaptations required for participation in work activities may be teacher constructed. For example, a picture-based task schedule can be created to represent all of the steps in a particular activity for students with intellectual disabilities.

Fig. 15. 9: Pre Vocational and Vocational Aids

Source: http://www.fredshead.info/2011/02/oldies-but-goodies-established-aph.html

Recreation and Leisure: Students with physical, sensory, and intellectual disabilities require assistive technology in order to participate more fully in appropriate recreation and leisure activities. A range of low technology to high technology solutions are available for them and include game adaptations, book adaptations, switch adapted toys, and environmental control access for televisions, videos, tape players, CD players and MP3 players.

Fig. 15. 10: Recreation and Leisure Aids

Source: http://www.maddak.com/leisurerecreation-aids-c-1711.html

Seating and Positioning: Students with physical disabilities often require adaptive seating and positioning systems as an alternative to the standard classroom seating systems. Adaptive seating and positioning systems include seat inserts for wheelchairs, side liers, prone standers, and adaptive chairs. These seating and positioning systems are generally determined by the physical and occupational therapist in consultation with the classroom staff. Several different seating and positioning devices for the classroom are available in national and international market these days.

Fig. 15. 11: Seating and Positioning Aids

Source: https://www.especialneeds.com/shop/special-needs-seating-positioning.html

Visual Aids: Students with visual impairments can benefit from 'assistive technology' in a variety of areas. A critical need for 'assistive technology' is often in the area of accessing printed information and to providing a means of producing written communication. There are many visual aids including talking dictionaries, adapted tape player/recorders, large print and talking calculators, Braille writers, closed circuit televisions (CCTV), and software such as screen reading and text enlargement programs.

Fig. 15. 12: Visual Aids

Source: http://www.freedomscientific.com/Products/LowVision

15.8 USING ASSISTIVE TECHNOLOGY IN INCLUSIVE CLASSROOM

Assistive technology has the capacity for increasing student independence, increasing participation in classroom activities and simultaneously facilitating

academic improvement of students with special needs, providing them the ability to have equal access to their school environment. Assistive technology is often discussed by technology levels as being high, middle, or low-tech. A low-tech assistive technology option is usually easy to use, has low cost and typically does not require a power source. Mid-tech assistive devices are also easy to operate but typically require a power source. The high-tech device is usually complex and programmable, and usually includes items that require computers, electronics or microchips to perform a function. An example of the application of technology could range from having a voice input word processor (high-tech) to a student using an adapted pencil grip (low-tech) to assist during writing. Another view of assistive technology focuses on the levels in applying the assistive technology personally, developmentally, or instructionally necessary. Of these three, the most important to a teacher is instructionally necessary level. The personally necessary level is concerned with assistive technology devices that are for the use of an individual student, and the suggestion and evaluation of such devices are left to experts. Developmentally necessary assistive devices can be shared among individuals. These devices help meet an educational need based on a developmental delay, which ideally would be improved, thereby eliminating the need for the item in an individual's future. The instructionally necessary devices are the devices that assist in the instructional process at a course or grade level, and this level has important implications for the classroom teacher. This modification or technology applications would not need to accompany the student as he/she progresses to the next course or academic level, and instead the assistive technology device could remain at the teacher level.

Check Your Progress

Notes: a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

3) Based on level of technology, how would you classify AT?

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4) Differentiate between personally and instructionally necessary AT?

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15.9   LET US SUM UP

In this Unit, we have discussed the role of ICT in an inclusive classroom and how various ICTs can be used in teaching learning. In general, accessible ICTs (a) enable greater learner autonomy, (b) unleash hidden potential for those with communication difficulties, (c) enable students to demonstrate achievement in ways which might not be possible with traditional methods, (d) enable tasks to be tailored to suit individual skills and abilities. Technology also addresses the necessity to cover a wide range of content in a short amount of time by minimizing the need to take curriculum at a slower pace. Students with special needs may benefit from technologies that assist them as well as allow them to keep pace with their peers. There are several technologies which can be used in inclusive classrooms.

Many students with disabilities require 'assistive technology' to participate in and benefit from educational programs. A range of technology solutions are available to support student performance, achievement, and independence in the following areas: academics and learning aids, aids to daily living, assistive listening and environmental aids for the hearing impaired and deaf, augmentative communication, computer access, leisure and recreation, seating, positioning, mobility, and vision. Assistive technologies are more personal to special children and help to bridge the gap between normal and special children.

15.10 SUGGESTED READINGS AND REFERENCES

ABLEDATA: *AbleData - Your source for assistive technology information* from http://www.abledata.com/

BECTA ICT Research (2003) *What the research says about ICT supporting special educational needs (SEN) and inclusion.* Available at http://research.becta. org.uk/upload-dir/downloads/page_documents/research/wtrs_motivation.pdf

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UNESCO Institute for Information Technologies in Education, 2006. *ICTs in Education for People with Special Needs*, available at http://www.iite.ru/pics/ publications/files/3214644.pdf

15.11 ANSWERS TO CHECK YOUR PROGRESS

1) A person's ability to use technology may be impaired due to various physical, sensory, emotional or cognitive disabilities. Accessible ICTs are the wide range of assistive and mainstream technologies and formats that can enable students with a disability to enjoy an inclusive education.

2) Do on your own.

3) Low Tech, Mid Tech and High Tech

4) The personally necessary level is concerned with assistive technology devices that are for the use of an individual student, and the suggestion and evaluation of such devices are left to experts; whereas the instructionally necessary devices are the devices that assist in the instructional process at a course or grade level, and this level has important implications for the classroom teacher.