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Teaching Children with Special Needs

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Unit I: Designing Instruction for Inclusive Classes

1.1 Concept of Inclusive Class and Instruction

In 1975, Congress passed a law that would change the face of public education in the United States. This law, the Education for All Handicapped Children Act (now known as the Individuals with Disabilities Education Act, or IDEA) specified that all children including those with disabilities formerly excluded from school were entitled to a free, appropriate public education. This law went far beyond any previous legislation in specifying that, to the greatest extent possible, this “special" education was to be provided in the least restrictive environment. In other words, students with disabilities were to be educated the greatest extent possible in the general education classroom.

The passage of IDEA, and its subsequent amendments, has largely achieved its purpose. More than ever, students with disabilities now receive free, appropriate public education. Furthermore, this education is being provided more often in the general education classroom. Before the passage of IDEA, students with disabilities were often denied access to public education (Knowlton, 2004, as cited in Mastropieri & Scruggs, 2010). In some cases, they were placed in institutions. In other cases, the parents were forced to pay for private schools, often in inappropriate settings. Today, all students with disabilities are legally entitled to a free, appropriate education suited to their needs. Because of IDEA and related legislation, society has an increased understanding of individuals with disabilities and is much better able to accommodate individual differences in schools in workplaces, and in social settings.

Many schools have inclusion classrooms. In part, that’s because the Individuals with Disabilities in Education Act (IDEA, 204) says that children who receive special education services should learn in the “least restrictive environment” (LRE). That means they should spend as much time as possible with students who don’t receive special education services. Inclusive classes are set up in several ways. Some use a collaborative team teaching (or co-teaching) model. With co-teaching, there’s a special education teacher in the room all day. Other inclusive classes have special education teachers “push in” at specific times during the day to teach (instead of pulling kids out of class to a separate room). In either

case, both teachers are available to help all students. Studies show that inclusion is beneficial for all students not just those who receive special education services.

Inclusive education is when all students, regardless of any challenges they may have, are placed in age-appropriate general education classes that are in their own neighborhood schools to receive high quality instruction, interventions, and supports that enable them to meet success in the core curriculum (Alquraini & Gut, 2012). The school and classroom operate on the premise that students with disabilities are as fundamentally competent as students without disabilities. Therefore, all students can be full participants in their classrooms and in the local school community. Much of the movement is related to legislation that students receive their education in the least restrictive environment (LRE). This means they are with their peers without disabilities to the maximum degree possible, with general education the placement of first choice for all students (Alquraini & Gut, 2012, as cited in Mastropieri & Scruggs, 2010).

Successful inclusive education happens primarily through accepting, understanding, and attending to student differences and diversity, which can include the physical, cognitive, academic, social, and emotional. This is not to say that students *never* need to spend time out of regular education classes, because sometimes they do for a very particular purpose—for instance, for speech or occupational therapy. But the goal is this should be the exception. The driving principle is to make all students feel welcomed, appropriately challenged, and supported in their efforts. It's also critically important the adults are supported, too. This includes the regular education teacher and the special education teacher as well as all other staff and faculty who are key stakeholders; and that *also* includes parents.

There is a definite need for teachers to be supported in implementing an inclusive classroom. A rigorous literature review of studies found most teachers had either neutral of negative attitudes about inclusive education. It turns out that much of this is because they do not feel they are very knowledgeable, competent, or confident about how to educate students with disabilities. However, similar to parents, teachers with more experience and in the case of teachers more training with inclusive education were significantly more positive about it. Evidence supports that to be effective, teachers need an understanding of best practices in teaching and of adapted instruction for students with disabilities; but positive attitudes toward inclusion are also among the most important for creating an inclusive classroom that works.

The Common Benefit of the Inclusive Classroom

- In an inclusive classroom, general education teachers and special education teachers work together to meet the needs of students.
- This type of classroom gives special education students the support they need and allows them to stay in the least restrictive environment.
- All students can benefit from the additional resources and supportive techniques used in an inclusion classroom.
- Studies show that all students benefit from the resources available in an inclusion classroom.
- The special education teacher can help all kids in an inclusion classroom, not just special education students.
- A key teaching strategy in an inclusion classroom is to break students into small groups and teach kids according to their specific learning needs.

Special education is different today in many dramatic ways than it was in the not-too-distant past. Today, standards-based education drives what schools do how teachers function, and how students respond. One of the dominant themes in special education is inclusion. The desire to create a system where students with special needs receive their education in the general education classroom and for these students to have access to the general education curriculum is clearly evident from recent federal initiatives.

Special educators need new knowledge bases and skill sets to function effectively in the multitiered system that now exists to address the needs of students with learning-related needs or who are placed at risk for other reasons (e.g., homeless). The role of the special education professional has changed in recent years, for example, as a prominent special educator notes, "we have developed instructional programs that fit also in regular classes such as class wide peer tutoring, cognitive strategies, and direct instruction. A large handful of models have been researched and developed and are working with large numbers of children" (Polloway, 2002, as cited in Polloway, Patton, & Serna, 2008). A similar is as follows: "The field has developed advanced methods for the prevention of problems for students general [e.g., self-regulation, curriculum-based measures, peer tutoring, memory strategies). Their development has led to their use in general education. The tools are there, even if they are not being used. Thus, they do not have as great an impact as a consequence" (Polloway, 2002, as cites in Polloway et. al., 2008).

Teachers are encouraged to carefully consider their role in facilitating the inclusion of students with disabilities in general education and in evaluating the efficacy of these efforts. We encourage the use of the term supported education for inclusion to emphasize that successfully inclusion hinges on the provision of appropriate supports in the general education classroom as a basis for establishing a successful learning environment for students.

1.2 Key Elements of Special Education in Today's Schools

Although public education has experienced a long history of criticism, professionals, business leaders, politicians, parents, and other laypersons increasingly have called for literate graduates, offering varying directions for change. The common factor is that these requests have been consistent in their demand for accountability and system reform. Surprisingly absent from the early calls for reform in the 1980s and 1990s was direct attention to students with disabilities and to the role of special education (Thurlow, 2000, as cites in Polloway et. al., 2008). This lack of attention was particularly inopportune because this time period corresponded chronologically with increasingly urgent calls for the inclusion of students with disabilities in general education classrooms.

With the advent of the No Child Left Behind Act (2001), students with disabilities are now recognized as an important component of the school population and thus subject to the opportunities and accountability inherent in this act. These are further reflected in the work of the President's Commission on Excellence in special Education (2002). The Commission stressed results rather than process, prevention and early intervention, and the importance of general and special education sharing responsibility for students with disabilities. Key recommendations as adapted from the summary provided by the President's Commission (2002) include:

1. Reduce the regulatory burden and increase flexibility (i.e., reduce paperwork and simplify regulations so that they are easily understood).
2. Simplify the process used to identify children with disabilities and implement identification practices that are based on a student's response to interventions.
3. Implement research-based early identification and intervention programs for young children with learning and behavioral difficulties.
4. set high expectations for special education and hold local school districts accountable for results.

5. Increase parental empowerment and school choice.
6. Prevent disputes and improve dispute resolution.
7. Simplify IDEAs federal student transition requirements.
8. Invite all children and youth with disabilities to attend every IEP meeting.
9. Recruit and train highly qualified general and special education teachers.
10. Require rigorous training in the teaching of reading.

The following sections focus on a number of key elements of special education as implemented in schools today: standards-based education, inclusion, multitiered education system, access to the general education curriculum, universal design, differentiated instruction, evidenced-based practice, diversity considerations, and empowerment.

1.2.1 Standard-Based Education

Standards-based education means that what is taught must be tied to the state-derived content and performance standards that now exist in almost all states in the core subject areas of language arts/English, mathematics, social studies, and science. The intent of developing standards is to have a common set of goals and mileposts. As Hogan (2000) suggests, standards have been developed with the purpose of ensuring that all students can demonstrate the knowledge and skills necessary to read, write, compute, problem solve think critically, apply technology, and communicate across subject areas. In addition to these core subject areas, many states have also developed standards for other subject areas (as cites in Polloway et. al., 2008).

Key Features of Standard-Based Education

In standard-based education, there are two features of standards warrant some discussion: types of standard and critical elements of standards. Turnbull and colleagues (2004) offer clear explanation of the components of both of these features. Although several ways exist for classifying standards, the most common distinction ins between content and performance standards (as cites in Polloway et. al., 2008):

- ***Content Standards:*** knowledge, skills, and understanding that students should attain in academic subjects.

- ***Performance Standards:*** levels of achievement that students must meet to demonstrate their proficiency in the subjects.

The other dimension of standards in the distinction among the terms Standards, Benchmarks, and Indicators. A short description of each term is as follows:

- ***Standards:*** a general statement of what student should know and be able to do in academic subjects.
- ***Benchmarks:*** a specific statement of what student should be able to do.
- ***Indicator:*** a statement of knowledge or skills that a student has demonstrate in order to meet a benchmark.

1.2.2 Multitiered System of Addressing the Needs of Special Learners

With the passage of the No Child Left Behind Act, multitiered instructional models have emerged for at-risk and special learners in most schools throughout the country. Other terms such as multilevel, tri-level, three-tiered, and even four- tiered instructional models may be used to describe this system. In general, tiered instruction provides layers of intervention to meet student needs, increasing in intensity as a student progresses through different tiers over time. Figure 1.1 highlights the three major levels of multitiered intervention.

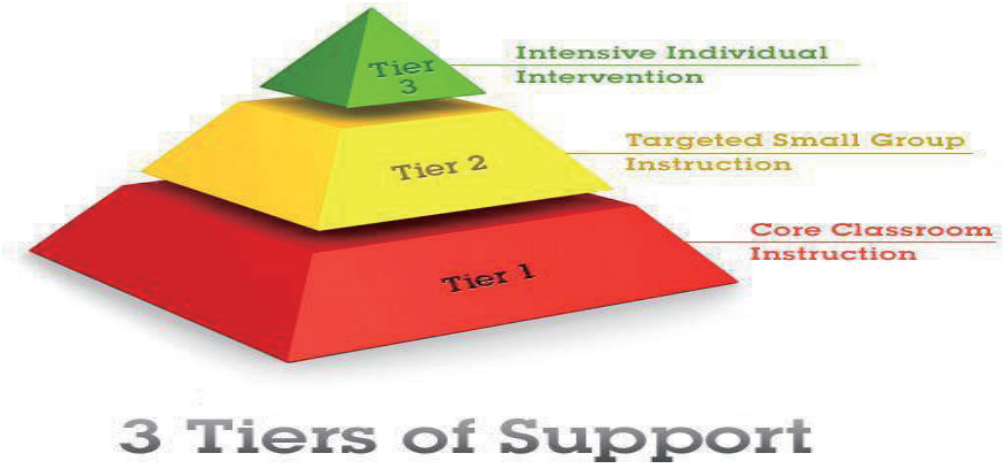


Figure 1.1 Three Tier model for addressing the needs of special learners

- **Tier I:** High-Quality Core Instruction: High-quality, research-based, and systematic instruction in a challenging curriculum in general education. Within Tier 1, all students receive high-quality, scientifically based instruction provided by qualified personnel to ensure that their difficulties are not due to inadequate instruction. All students are screened on a periodic basis to establish an academic and behavioral baseline and to identify struggling learners who need additional support. Students identified as being "at risk" through universal screenings and/or results on state- or districtwide tests receive supplemental instruction during the school day in the regular classroom. The length of time for this step can vary, but it generally should not exceed 8 weeks. During that time, student progress is closely monitored using a validated screening system such as curriculum-based measurement. At the end of this period, students showing significant progress are generally returned to the regular classroom program. Students not showing adequate progress are moved to Tier 2.

  Outcome: Students initially receive quality instruction and achieve expected academic and behavioral goals in the general education setting.

- **Tier II:** High Quality Targeted Supplemental Instruction: Targeted and focused interventions to supplement core instruction. Students not making adequate progress in the regular classroom in Tier 1 are provided with increasingly intensive instruction matched to their needs on the basis of levels of performance and rates of progress. Intensity varies across group size, frequency and duration of intervention, and level of training of the professionals providing instruction or intervention. These services and interventions are provided in small-group settings in addition to instruction in the general curriculum. In the early grades (kindergarten through 3rd grade), interventions are usually in the areas of reading and math. A longer period of time may be required for this tier, but it should generally not exceed a grading period. Students who continue to show too little progress at this level of intervention are then considered for more intensive interventions as part of Tier 3.

  Outcome: Students who do not meet general class expectations and exhibit need for supplemental support receive more targeted instruction. Learners may receive targeted, tier II instruction in the general education classroom or in other settings in the school such as a pull-out situation: however, students receive various types of assistance in terms of differentiations, modifications, more specialized equipment and technology in order to target

instructional related needs. Critical within tier II is the documentation of student's responses to the interventions used, which serves as important prereferral data should more formal special education assessment be determined necessary. Students who make insufficient progress in Tier II are considered for formal special education assessment.

- **Tier III:** High-Quality Intensive Intervention: Specialized interventions to meet significant disabilities. Tier 3 includes specialized and intensive interventions that are usually specifically tailored to the students 'needs. At Tier 3, interventions are often provided one-on-one or in very small, homogeneous groups by a special education or reading teacher or therapist who has expertise in implementing interventions. The intensity, frequency, and duration of interventions is greater than in Tier 2, and it is not unusual for a student to receive specialized assistance for up to 90 minutes daily, at times in place of the regular classroom instruction. Progress monitoring occurs more frequently as well, usually weekly. Students in Tier 3 have not responded adequately to general education instruction or to the small group support they received in Tier 2, and they need individualized and prolonged interventions that are tailored to their unique learning difficulties.

  Outcome: If found eligible for special education services, tier III provides students with more significant disabilities and more intensive, evidence-based interventions within a range of possible special educations settings.

Within three-tiered instructional programming, students initially are provided high-quality core instruction in the general education setting. As reasonable and targeted differentiated instruction is implemented within the core instruction, some students emerge as requiring additional high quality targeted supplemental instruction. This supplemental instruction incudes:

- May occur in the general education setting or other settings within the school,
- Is targeted to specific areas of need, and
- Directly complements the core instruction.

Evidence-based intervention should be provided to the student along with systematic documentation and evaluation of the targeted supplemental instruction. For those students who continue to experience significant academic and/or socioemotional problems, high- quality intensive

intervention will then be considered. In the three-tiered model, formal referral for special education consideration is a latter-stage, tier II event and would only be initiated if supplemental support has been demonstrated to be unsuccessful at meeting student needs, but prior to formal placement in tier III.

1.2.3 Universal Design for Learning

The concept of universal design starts from the field of architecture. In the 1970s, an architect named Ronald Mace, who was a wheelchair user, recommended that physical environments be designed inclusively to allow diverse users to assess them. Mace argued in favor of proactively designing physical environments and products so that they would be functional for a wide range of users. Retroactive accommodations are generally more cumbersome and costly in items of both time and money. Universal design gained acceptance and has since become the norm in the design community, reinforced by the passage of the Americans with Disabilities Act (ADA,1990) and more recently by the 2004 reauthorization of IDEA.

Universal Design for Learning is a set of principles for curriculum development that give all individuals equal opportunities to learn. UDL provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone--not a single, one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs. Nowadays, Universal design is widely used design in the public spaces and appears in the use of curb cuts on sidewalks, handlebars in toilet stalls, lower sinks, ramps in entranceways, and other features. These features are beneficial not only to individual with disabilities but also to elderly individuals, persons with baby strollers, skateboarders, and to others (McGuire, Scott & Shaw, 2006, as cites in Polloway et. al., 2008).

Universal Design for Learning (UDL) is a more recent application of universal design principles in the field of education, specifically curriculum development, in of instructional and assessment of learners. Orkwis and McLane (1998) defined UDL as “the design of instructional materials and activities that allows the learning goals to be achievable by individuals with wide difference in their abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember”. According to the Center for Applied Special Education Technology (2010), UDL has three basic premises:

1. Curriculum that provides ***multiple means of representation*** *of content,* presenting information through various means (e. g., printed text, electronic text, closed captions, audiotapes, Braille, ASL).
2. Curriculum that provides ***multiple means of expression*** of what the learner knows (e. g., through written response, typed response, drawings, photos, multimedia presentations).
3. Curriculum that provides ***multiple means of engagement*** through cognitive supports (e. g., summaries of information presented, questions to stimulate background information, use of strategy instruction, use of engaging instructional materials such as digital or graphic materials that capitalize on the learner's interests and increase motivation).

Basic Principles of Universal Design of Instruction

Instruction that is universally designed meets seven basic principles that are presented by the North Carolina University's Center for Universal Design (2008):

1. ***Equitable use*** – In this process, Instruction is designed to maximize use by learners with a range of learning styles and preferences. Instruction is equally accessible to all students, regardless of their learning modalities and preferences (e. g., a teacher's presentation could be made using visuals to complement the lecture so to be comprehensible to students with hearing disabilities, English learners, and other students).
2. ***Flexibility in use*** – In this principle, there is a choice in methods of use that can be adapted to individual preference (for example, students can demonstrate their knowledge of a unit of study by developing a project on the topic in various forms such as a slideshow, a diorama, drawings, an essay, etc.).
3. ***Simple and intuitive*** – It includes, instruction is easy to understands and accessible by learners regardless of their language skills, prior experiences, or knowledge (e. g., simple, 1-step directions are accompanied by written prompts directing students how to completes a task).
4. ***Perceptible information*** – In this process, essential information is effectively communicated to the student (through, e. g., use of large font, few words, gestures, symbols, minimal text in a slideshow).

5. *Tolerance for error*- It includes, instruction anticipates variability in learner responses (e. g., setting computer preferences so that a student cannot accidentally delete important documents or applications).
6. *Low physical effort*- In this principle, instruction maximizes student learning and minimizes fatigue (e. g., text-to-speech software to assist a student who has reading disabilities to decode large volumes of text, automatic sensors that open doors for people entering a building).
7. *Size and space for approach and use*- It includes, instruction is designed to maximize physical access to required materials and activities regardless of the learner's body size or motor skills (e. g., classroom furniture that is wheelchair accessible, student materials on shelves that are within easy reach of students using wheelchairs).

1.2.4 Evidence-based Practice

Evidence-based practices (also called scientifically-based practices) are teaching strategies or methods that have been tried and tested. Through a series of experiments, these practices have been proven effective in multiple settings with a large number of subjects. Such experiments have usually been published in peer-reviewed journals, which indicates that a team of experts in a particular topic have questioned and critiqued the research until it's proven to be scientifically effective. Federal law now requires the use of evidence-based practice in public education, as these methods and strategies are proven to yield positive results.

An evidence-based practice can be defined as an instructional strategy, intervention, or teaching program that has resulted in consistent positive results when experimentally tested (Mesibov & Shea, 2011; Simpson, 2005, as cites in Polloway et. al., 2008). The implementation of high quality research is needed in order for intervention strategies to be considered an evidence-based practice (Odom, Collet-Klingenberg, Rogers, & Hatton, 2010). Boutot and Myles (2011) further define "quality" as research that incorporates experimental, quasi-experimental, or single-subject research designs; is replicated multiple times; and is published in peer-reviewed professional journals. It excludes evidence that is supported by anecdotal reports, case studies, and publication in non-refereed journals, magazines, internet, and other media news outlets (Boutot and Myles, 2011, as cites in Polloway et. al., 2008). Perry and Weiss (2007) provide terms for which to look when identifying a

practice as evidence-based, including data-based approaches, empirically-validated treatment, and clinical practice guidelines.

The concept of evidence-based practice began in the medical field in the 1970s (Odom et al., 2005) and was adopted into the field of education with the No Child Left Behind (NCLB) Act (NCLB, 2002), in which the term “scientifically-based research” is mentioned more than 100 times (Simpson, 2005). Special educators are required by professional standards (Council for Exceptional Children, 2009) and United States federal regulation to implement effective educational strategies supported by evidence and research (NCLB, 2002). According to Mayton, Wheeler, Menendez, and Zhang (2010), the field of special education has been confronted with a significant gap between research and practice. Strategies that are supported by research are often not put into practice in the classroom (as cites in Polloway et. al., 2008).

In 2001, the federal No Child Left Behind Act was passed, detailing a plan that would improve education in all schools for all students. This was the first-time teachers were required by law to implement scientifically-based practices in their classrooms. In the past 15 years, curriculum has been rewritten as teachers and students have been held to higher standards. The Individuals with Disabilities Education Act (IDEA) of 2004 goes one step further in specifically requiring the use of evidence-based practice in special education.

Students with disabilities need to receive effective, scientifically-based instruction to help them reach their potential. IDEA requires special educators to use sound research in selecting methods and strategies to use in their classrooms. As students with disabilities often have specific and unique needs, this can be particularly challenging for teachers--one strategy does not fit all. By using strategies that have been scientifically proven to be effective in special education, teachers are setting up their students for success. Special education teachers and administrators need the tools for evaluating the evidence to support the strategies being implemented. When presented with a new teaching approach or evaluating existing strategies, educators should consider the support provided for instructional procedures instead of accepting policy or word-of-mouth that such a practice is effective.

1.2.5 Differentiated Instruction

Differentiated instruction is a process to approach teaching and learning for students of differing abilities in the same class. The intent of differentiating instruction is to maximize each student's growth and individual success by meeting each student where he or she is, and assisting in the learning process (Hall, 2003, as cites in Polloway et. al., 2008). Moreover, Differentiation means tailoring instruction to meet individual needs. Whether teachers differentiate content, process, products, or the learning environment, the use of ongoing assessment and flexible grouping makes this a successful approach to instruction.

In addition, at basic level, differentiation consists of the efforts of teachers to respond to variance among learners in the classroom. Whenever a teacher reaches out to an individual or small group to vary his or her teaching in order to create the best learning experience possible, that teacher is differentiating instruction. The process of differentiating instruction for students depends on the ongoing use of assessment to gather information about where students are in their learning and about their readiness, interests and learning preferences. Teacher can differentiate at least four classroom elements based on student readiness, interest, or learning preferences:

- ***Content:*** what the student needs to learn or how the student will get access to the information;
- ***Process:*** activities in which the student engages in order to make sense of or master the content;
- ***Products:*** culminating projects that ask the student to rehearse, apply, and extend what he or she has learned in a unit; and
- ***Learning environment:*** the way the classroom works and feels.

The integration of the principles of UDL and differentiated instruction provide a potentially powerful way to address the individuals needs of a range of students within the general education classroom. This point is particularly noteworthy, as more students who are at risk, who have special needs, and/or who have debilitating learning-related disabilities are in these settings.

1.2.6 Diversity Considerations

The student population in most school reflects significant diversity. In this sense, diversity implies that any students do not represents the stereotypic image of the typical student. However, the norm of what us typical has changed dramatically in recent years. A multitiered system of intervention, as introduced to before should be designed to address the needs of range of learners with diverse needs. Such a system would be beneficial not only to the students but also to the teachers who are teaching to diverse students. The bottom line is that teachers in schools today must develop a sensitivity to the need of a diverse groups of students. Moreover, teacher must acquire specific knowledge about diverse students and develop skills to address the needs that these students present in the classrooms.

The Individual with Disabilities Education Act (IDEA, 2004) mandates that all children are entitled to a "free and appropriate" education. Children who have disabilities come from different socioeconomic, cultural, and linguistic group receive special education services under designated categories, although many children do not always fit neatly into the designated categories. Although educational services are better determined by the child's need than the category label, special education do serve important functions, such as allowing professionals to more easily communicate with each other and families about the meaningful differences in children's learning and behavior (Heward, 2006).

Nepal is a multicultural, multilingual, and multiethnic country most of the inhabited peoples are from diverse social, cultural, ethnic and religious backgrounds. The national census 2011 revealed that there are 125 caste/ethnic groups and 123 languages spoken as mother tongue in Nepal. Addressing this issue has massive implications for the education sector to reach out the diverse ethnic groups to provide education for all, especially with regard to provisions of special curriculum, textbooks and teacher training in their mother tongues (CBS, 2012; NLC, 2015). In this regard, the government realized the diversities in the country in terms of language, culture, social and educational status, women education, education for disadvantages group, education for people with special needs, play significant role in teaching and learning activities. In these regards, the government opened general, integrated, and special schools for people with disabilities and without disabilities.

1.2.7 Empowerment

Empowerment is a multifaceted concept that embraces many essential aspects of what it truly means to be respected and given dignity. An extension of the movement toward inclusion has been the focus on the empowerment and the related self-determination of individuals with disabilities. Moreover, the emphasis on the rights of students transferring to individuals when they reach the age of majority, as mandated by IDEA, underscore the importance of empowering students with disabilities.

For teachers, a commitment to empowerment as a goal involves the need to give more attention to assessing how well students are developing the ability to make choices, to become advocates for themselves, and to exercise control over their lives. The central feature is self-determination. As Wehmeyer (1992) notes: “Self-determination refers to the attitudes and abilities necessary to act as the primary causal agent in one's life, and to make choices and decisions regarding one’s quality of life free from undue external influence or interference”.

Browder, Wood, Test, Karvonen, and Algozzine (2001) summarized Wehmeyer et al.’s (1998) teachable components within the domain of determination as follows (as cites in Polloway et. al., 2008):

- Decision making
- Choice making
- Problem solving
- Independent living (risk taking and safety skills)
- Goal setting and attainment
- Self-observation, evaluation, and reinforcement
- Self-instruction
- Self-understanding
- Self-advocacy and leadership
- Positive self-efficacy and outcome expectancy
- Internal locus of control
- Self-awareness

The abilities required to achieve self-determination most significantly relate to decision making and problem solving. These concerns need to be part of the responsibilities of teachers and such emphases should be included within the curriculum and presented in the early grades. With the increased likelihood of education being provided in inclusive classes, there should be a similar increase in commitment to a focus on self-determination in such settings (Zhang, 2001, as cites in Polloway et. al., 2008).

1.3 Effective Instruction Strategies

Teacher effectiveness is a function of two dimensions: the learning the child masters and the teaching behaviors associated with this learning (e.g., time and effort). Obviously, the more a student learns, the more effective is the teacher and/or the learning climate. If students learn more quickly from one teacher than from another, the more efficient teacher logically also will be judged as the more effective.

Over 20 years ago, Rosenshine and Stevens (1986) developed a general model of effective instruction highlighting six specific teaching activities validated from research as associated with student achievement that continue to have bearing today (as cites in Polloway et. al., 2008). These are as follows:

- A review or check of the previous day's work (reteaching, if necessary)
- Presentation of new content/skills
- Guided student practice (with verification for understanding)
- Feedback and correction (reteaching, if necessary)
- Independent student practice
- Weekly and monthly reviews

Englert (1983) contributed to the thinking on effective instruction by identifying four teacher behaviors that are associated with direct instruction and are linked to achievement: maintaining a high level of content coverage, providing successful practice activities for students, providing feedback to signal the beginning and the conclusion of individuals learning trails, and maintaining a high level of student task involvement (as cites in Polloway et. al., 2008).

In the twenty-first century classrooms are diverse and thus the challenges for teaching are significant. Students represent diverse cultural backgrounds or are bilingual. In inclusive classrooms, special

education supports are provided to an increased number of students. Students at varying academic levels are being served by one teacher. Consequently, there has not been a time when the use of effective instructional methodologies has been of greater significance. Consistent with IDEA (2004) and NCLB (2002), effective instruction has now been defined as those practices that are research based and empirically validated (Boardman, Arguelles, Vaughan, Hughes, & Clingmer, 2005; Stanovich & Stanovich, 2003, as cites in Polloway et. al., 2008).

Moreover, special education brings to the challenge of inclusion a wealth of instructional strategies that will be discussed here. According Lloyd and Hallahan (2005) noted, the field of learning disabilities in particular has been one of the foremost sources for empirically founded practices-practices that are proven valuable for a wide spectrum of students, not just those with learning disabilities. Reasonably informed people interested in learning disabilities and argue strongly for explicit, systematic instruction that focuses on teaching students' strategies for completing academic tasks and that includes monitoring of progress, so instruction can be adjusted to maximize progress.

In addition, in an important article focused on effectiveness in special education, Heward (2006) identified six dimensions of practice that characterize positive features of instruction. In Table, 1.1, clarifies the dimensions and features. They provide a strong foundation for the focus of effective teaching of students with special needs.

Table 1.1 Dimension and defining features of special education

Dimension	Defining features
Individually planed	• Learning goals and objective based on assessments and incur from parents and student • Teaching methods and instructional materials selected and/or adapted for each student • Setting(s) where instruction will occur determined relative to opportunities for student to learn and use targeted skills
Specialized	• Sometimes involves unique or adapted teaching procedures seldom used in general education • incorporates variety of instructional materials and supports to help

	students acquire and use targeted learning objectives • Related services (audiology, physical therapy) • Assistive technology
Intensive	• Instruction presented with attention to detail, precision, structure, clarity, and repeated practice • Relentless, urgent instruction • Efforts to provide students with incidental, naturalistic opportunities to use targeted knowledge and skill
Goal directed	• Purposeful instruction to help individual students achieve personal self-sufficiency and success in present and future environments • Value of instruction determined by student attainment of outcomes
Research based-method	• Recognizes that all teaching approaches are not equally effective • Instructional programs and teaching procedures selected on basis of research
Guided by student performance	• Careful ongoing monitoring of progress • Frequent and direct measures/assessment of learning that inform modification of instruction

Source: Adapted from Heward, W. L. (2003). Exceptional children: An introduction to special education (7th ed.). pp 40-41 (as cites in Polloway et. al., 2008).

This section describes teaching approaches consistent with both the effective instruction model presented. An overview and description the following effective teaching practices is presented teacher-directed instruction, grouping for instruction, scaffolding, self-regulated learning, and peer-mediated learning.

1.3.1 Teacher Directed Instruction

With teacher-directed instruction, the teacher plays an active role in the teaching process. This role varies depending on the objectives of the lesson or subject area. Students with learning

problems often require special services and instructional supports because they are not dealing well with traditional methods and materials. These students must be provided with lessons in which teachers proceed systematically, sequence within and between lesson, pace instruction briskly, question students appropriately, and involve them actively.

A key aspect of successful instruction is the intensity of the instruction provided. According to Deshler (2005) noted, it must be highly intensive:

Intensive instruction involves helping students maintain a high degree of attention and response during instructional sessions that are scheduled as frequently and consistently as possible. In other words, a key factor affecting learning is both the amount of time and instruction and how effectively each instructional movement is used to engage students in activities that contribute to their learning. Intensity during instruction is achieved by progressive pacing, frequent question answer interactions, and frequent activities that require a physical response (e.g., pointing, writing, raising hands, repeating). Moreover, intensity can also be achieved through reflective or open-ended questions if the activities are focused on a process that engages interest and maintains the student's attention. For adolescents who are far behind, all of these elements must define the instructional dynamic.

One of the most widely used instructional methods is the use of direct instruction. Although there are many versions of direct instruction, it typically includes the essential elements of explaining the skill, teaching the skill, modeling the skill, practicing the skill, and giving feedback on the skill performance.

Teachers who engage in direct instruction present lessons that provide students with opportunities to respond and receive feedback on what they think about the lesson being presented. They are shown how a skill is performed and are then given ample time to perform the new skill in a guided practice situation. Moreover, teacher engage all students by providing positive as well as constructive feedback while they are practicing, the ultimate goal being mastery over the skill. Typically, such lesson follows a pattern so that students can predict the structure of the lesson and the learning environment. The main steps of teacher-directed instruction are as given below:

1. Prepare the student to learn the skill
2. Understand the skill steps

3. Rehearse the skill
4. Perform the self-check
5. Overcome any performance barrier
6. Select other situations where the skill can be performed
7. Evaluate skill performance

The above-mentioned steps provide an example of a systematic instructional approach to provide teachers with a way to remember direct-instructional procedures as well as to employ generalization procedures so that students can perform the skill outside the classroom environment.

1.3.2 Grouping for Instruction

A key consideration that is integral to planning for instruction is grouping. Vaughn and Schumm (1997) provided a detailed analysis of the grouping practices of general and special education teachers respectively. For the former, the most commonly used strategy was whole class grouping with students of mixed ability combined within the group. The most common finding was that general educators use smaller groups for practice and reinforcement activities but not for teacher-led instruction and, when the groups are used for that purpose, the students are of mixed ability (as cites in Polloway et. al., 2008).

On the other hand, special educators reported that they were much more likely to use groups of similar ability. Further, they reported that they had autonomy in making decisions about how students were grouped. Consequently, the traditional pattern of homogeneously set up groupings appeared more common with this group of teachers. To the extent that students need work on specific skills, large group instruction with mixed ability groups would likely not be an effective instructional practice.

Although there is much benefit in the use of skill-based grouping for students with special needs, too often such groups have remained static; achievement level has been the primary determinant of group placement. Instead, teachers should consider options that periodically introduce change and flexibility into grouping procedures. Interest and skill groups should be incorporated into the program at regular intervals.

Interest groups can be formed around a common theme (e.g., marine biology, baseball) regardless of achievement level. The teacher can assign trade book material at levels appropriate for

each student, with questions and activities suitable for the group. In skill groups, students periodically meet with the teacher to work on a specific skill deficit. Here again, students of varying levels of achievement work together on a common problem. With planning assistance from the teacher, this peer tutoring approach can be as motivating and instructional for the tutor as it is for the tutee.

1.3.3 Scaffolding

In special needs education, scaffolding refers to a variety of instructional techniques used to move students progressively toward stronger understanding and, ultimately, greater independence in the learning process. The term itself offers the relevant descriptive metaphor: teachers provide successive levels of temporary support that help students reach higher levels of comprehension and skill acquisition that they would not be able to achieve without assistance. Like physical scaffolding, the supportive strategies are incrementally removed when they are no longer needed, and the teacher gradually shifts more responsibility over the learning process to the student.

One of the main benefits of scaffolded instruction is that it provides for a supportive learning environment. In a scaffolded learning environment, students are free to ask questions, provide feedback and support their peers in learning new material. When teacher incorporate scaffolding in the classroom, we become more of a mentor and facilitator of knowledge rather than the dominant content expert. This teaching style provides the incentive for students to take a more active role in their own learning. Students share the responsibility of teaching and learning through scaffolds that require them to move beyond their current skill and knowledge levels. Through this interaction, students are able to take ownership of the learning process.

Moreover, the concept of scaffolding describes interactions between teachers and students that facilitate the learning process. Stone (1998) describes the scaffolding metaphor as follows:

> *In providing temporary assistance to children as they strive to accomplish a task just out of their competency, adults are said to be providing a scaffold, much like that used by builders in erecting a building. [Scaffolding] connotes a custom-made support for the "construction" of new skills, a support that can be easily disassembled when no longer needed. It also connotes a structure that allows for accomplishment of some goal that would otherwise be either unattainable or quite cumbersome to complete* (as cites in Polloway et. al., 2008).

In scaffolding instruction, teachers think aloud or talk through the steps they follow to reach a specific conclusion. As students begin to understand the process, they gradually take over this talking-through procedure and the teacher acts as a coach, providing prompts when needed.

An example of a scaffolding procedure is seen in this exercise, which focuses student attention on story grammar. The teacher begins by modeling the scaffolding steps, thinking aloud by saying to the students after they have read to a designated point in the story, "I see a problem." The teacher states the problem and writes it on a note sheet for students. The teacher then describes the attempts in the story to solve the problem or conflict and gives an analysis of the events that led to the solution of the problem. After the teacher models these steps, the students begin to talk themselves through a story following the same steps (Gersten & Dimino, 1990, as cites in Polloway et. al., 2008). This strategy leads students into being active participants in the reading process, and when used, students' responses to both lower and higher-level questions are likely to improve.

1.3.4 Self-Regulated Learning

Ultimately, students must become independent learners, able to direct their own behavior in ways that assist in maximizing the amount of time engaged in learning (i.e., student-directed learning). Many students with special needs have significant difficulty in this area, which can limit their success in general education where self-regulated behaviors are expected (but often not directly taught). Teachers have the responsibility for assisting students to become independent learners and to structure the classroom environment to help them achieve this goal. Self-directed learners typically demonstrate a variety of metacognitive skills as well as self-regulation skills resulting in motivation, skills needed to navigate their learning environment, and the social interaction skills needed to support their self- directed behaviors. The learning strategies approach discussed earlier is based on students taking responsibility for directing their own learning.

The following discussion consists of two types of teaching that will foster self-direction skill in students with disabilities: skill building and problem-based learning.

- **Skill Building:** The first type of teaching focuses on skill building through direct instructional procedures. Four self-direction skills illustrate this process. Skill building includes following aspects:

Action planning: It is a procedure used to develop a long-term strategy to identify goals and tasks that might be needed to accomplish a desired life achievement (e.g., going to college, getting a job, moving to different state, attaining financial stability). This long-term strategy includes identifying steps that will lead to attaining the life achievement and analyzing each step and breaking it down into tasks/goals (Serna & Lau Smith, 1995). In addition, action planning gives an individual a purpose for engaging in certain activities. Through the use of direct instruction, students are able to develop their own action plans and determine a strategy that will allow them to accomplish their goals. Seeing each step that is required to accomplish that goal can give purpose to the many tasks that must be completed.

Goal setting: It can be defined as a skill that enables the learner to determine the necessary tasks or events needed to be accomplished for certain outcomes to be obtained. Teachers might introduce this skill to student by stating that many people complain about not having or getting the things they want. Often, they do not know specifically what they want so they have a difficult time working toward getting something.

Goal planning: It allows an individual to develop the steps needed to achieve a particular goal. A student could begin the goal-planning process by reviewing the goal statement just outlined. Next, the student would think of activities or steps (behaviors) that would help in the accomplishment of the goal.

Self-management: It focuses to accomplish goals in a complex set of procedures used to regulate or guide a person's behavior so that a goal can be accomplished. The first subskill in the skill of self-management is developing a reward system, second one is developing a self-monitoring system, and last one is monitoring the desired behavior.

- **Problem-Based Learning:** It consists of activities in which the students become investigators of real problem or topic. In this process, first students are guided, through the different activities like as to explore many topics, issues, and areas into which they may delve more deeply. Teachers must asses the interests of the students and explore several avenues, as students may not know what they would like to learn.

In this process, the second, activity is choosing a topic and determining certain goals and objectives that are to be accomplished in order to develop the content into an interesting project. And the third activity is developing a management plan. This plan includes creating timelines, getting started, and finalizing product ideas.

1.3.5 Peer-Mediated Learning

The main purpose for using peer-mediated strategies is to promote learning as a function of collaborative interactions among students. Although the focus is often placed on making students independent learners, they also need to be interdependent learners. Students benefit not only from being able to direct their own learning activities, but also from knowing how to seek assistance when needed. The focus is on activities in which students with learning-related problems engage along with their fellow students. The discussion in this section focuses on peer tutoring and collaborative learning.

Peer Tutoring: Peer tutoring in special education has been proven to be an effective teaching strategy for student tutors and tutees. Peer tutoring in special education is a strategy where higher performing students are paired with lower performing students or students with disabilities to review or teach academic material. This strategy has been proven to help students on both sides master content and gain self-confidence in specific skills. Peer tutoring has been implemented with students of all ages and levels in all subject areas. Introducing a peer tutoring program to help students with disabilities and their typical peers may be an effective and efficient way to boost academic achievement. Teachers and administrators should consider the different ways to implement a program as well as the advantages and weaknesses as they determine whether a peer tutoring program would be a good fit in their schools and classrooms.

Peer tutoring typically, but not always involves the pairing of a competent student with a student who is less competent in a particular behavioral or academic area. Peer tutoring procedures have been used to teach academic skills and develop social behaviors with regard to classroom discipline, peer relations, and appropriate interaction behaviors. The effectiveness of peer tutoring has been demonstrated across ages, settings, and types of students.

Cooperative Learning: Cooperative learning is a teaching arrangement that refers to small, heterogeneous groups of students working together to achieve a common goal. Students work together to learn and are responsible for their teammates' learning as well as their own. Cooperative learning (CL) also can be employed to enlist the support of students while simultaneously promoting the learning of academic and behavioral skills. According to Schniedewind and Salend (1987), teachers can structure their class lessons so that students work together to achieve a shared academic goal. They state: "cooperative learning is especially worthwhile for a heterogeneous student population, because it encourages liking and learning among students of various academic abilities, [disabilities], and racial and ethnic backgrounds" (as cites in Polloway et. al., 2008). When planning a CL lesson, teachers should con- sider four elements these are as given below:

1. Positive interdependence,
2. Individual accountability,
3. Collaborative skills, and
4. Processing.

Within a lesson, positive interdependence is structured by having each student group agree on the answer to the task and the process for solving each problem.

1.4 The Role of the Special Education Teacher in the School

In an inclusion schools, students with disabilities and other special needs are taught alongside non-disabled students, instead of being segregated in a special education classroom. To help meet students' needs, a special education teacher may work alongside a general education teacher in an inclusion classroom. The role of a special education teacher in such an arrangement varies according to the needs of individual students and how well the two teachers work together.

In an ideal inclusion classroom, the special education teacher and regular education teacher engage in co-planning. They work together to design lesson plans to fit the needs of all students, with the special education teacher focusing on the needs of the special needs students. In some cases, however, the general education teacher plans the classroom lessons and the special education teacher adapts those lessons to meet the needs of her students. She may also use the lessons to develop review materials or plan one-on-one instruction with special needs students before or after the class.

The amount of actual instruction a special education teacher gives in an inclusion classroom varies. In some inclusion classrooms, the two teachers take turns presenting lessons. This may be done on a daily basis, with each teacher taking a portion of the lesson, or the special education teacher may teach the class one or two days a week. When not teaching the entire class, the special education teacher may sit beside students and provide one-on-one help or additional instruction. To help students feel more included as a part of the class, the special education teacher may not be in the inclusion classroom every day, unless a student's needs require it.

Special education teachers often have responsibilities that other teachers do not. These teachers must regularly review and develop Individualized Education Plans – or IEPs – and hold meetings to discuss these plans with parents, administrators, counselors and other individuals involved in the education of a child with special needs. They must regularly administer skills tests and other assessments to determine the progress of special needs students or to determine whether students who are not currently enrolled in a special education program need their services. It's the special education teacher's job to make sure that laws such as the Individuals with Disabilities in Education Act are precisely followed and correct any possible violations.

Let Us Sum Up

Many schools have inclusion classrooms. In part, that’s because the Individuals with Disabilities in Education Act (IDEA, 204) says that children who receive special education services should learn in the “least restrictive environment” (LRE). That means they should spend as much time as possible with students who don’t receive special education services. Inclusive classes are set up in several ways. Some use a collaborative team teaching (or co-teaching) model. With co-teaching, there’s a special education teacher in the room all day. Other inclusive classes have special education teachers “push in” at specific times during the day to teach (instead of pulling kids out of class to a separate room). In either case, both teachers are available to help all students. Studies show that inclusion is beneficial for all students not just those who receive special education services.

Moreover, in an ideal inclusion classroom, the special education teacher and regular education teacher engage in co-planning. They work together to design lesson plans to fit the needs of all students, with the special education teacher focusing on the needs of the special needs students. In some cases, however, the general education teacher plans the classroom lessons and the special education teacher

adapts those lessons to meet the needs of her students. She may also use the lessons to develop review materials or plan one-on-one instruction with special needs students before or after the class.

Unit-End Activities

- **Objective Questions:** **Group "A"**

Tick (↓) the Best Answer.

1. Specially, special education instruction is designed to:
   - **a. Meet the unique needs of students who have different kinds of disabilities**
   - b. Students who is eligible for general education
   - c. Students who is out of school education
   - d. Students who left the school
2. Individual with Disabilities Education Act (IDEA, 2004) focused that children who receive special education service should learn in the…
   - a. Special classes
   - **b. Least restrictive environment**
   - c. General classes
   - d. Integrated schools
3. Which one is the common benefit of the inclusive classroom?
   - a. All students are placed separately
   - b. Only general education teacher teaches a student
   - c. **General and special education teacher work together to meet the needs of students**
   - d. Making decision of the future
4. Performance standards related to…
   - a. Knowledge, skills, and understanding of students
   - b. Problem analysis
   - c. Plan implementation
   - **d. Levels of achievement that students must meet to demonstrate their proficiency in the subject**
5. In Response to Intervention Model, the Tier III is related to…
   - **a. Intensive intervention**
   - b. general intervention

c. Enhanced intervention

d. Planning and interventions

6. Which one is not related to the basic principle of Universal Design for Learning?

a. Intermitted

b. Multiple means of representation

c. Multiple means of expression

d. Multiple means of engagement

7. According to the CBS, 2012 how many languages are spoken in Nepal?

a. 132 languages

b. 123 languages

c. 125 languages

d. 112 languages

- **Short Answer Questions: Group "B"**

1. Define the concept of inclusive classroom.
2. What is standard-based education?
3. Explain the concept of universal design for learning.
4. Define the concept of teacher directed instruction.
5. What is self-regulated learning?

- **Long Answer Questions: Group "C"**

1. What is inclusive classroom? explain the elements of effective instructional strategies.
2. What are key elements of special education in today's schools? Explain in shorts.
3. Show the difference between self-regulated learning and peer mediated learning.

- **Points for Discussion**

- Concept of inclusive classroom and instruction.
- Key elements of special education in today's school.
- Universal design for learning.
- Concept of differentiated instruction.
- Different types of effective instructional strategies.
- Grouping for instruction.
- Concept of scaffolding
- Role of the special education teacher in the school.

Unit II: Best Strategies for Teaching science and Social Studies

2.1 Concept of Teaching Science and Social Studies

Science and social studies are most important subject areas in the field of special education. During the elementary grades, these subjects introduce students to critical content and concepts on which more advanced courses in these areas are based. Furthermore, these subject areas develop sets of skills (e. g., inquiry skills in science and analytical skills in social studies) that will be tapped in later coursework as well as in life outside of school. In addition, most of the students with special needs are experiencing these subject areas at higher rates than ever before for two major reasons. First, IDEA mandates focused that students with disabilities must be provided with access to the general education curriculum. Second, each year more students with disabilities are spending more time in inclusive settings.

Students are typically curious about their surroundings and about the people and things inhabiting them. As a result, they have a natural interest in seeking information about their environment and the events occurring within it. Teachers should take advantage of this curiosity by exposing students to science and social studies topics that capitalize on their interests and backgrounds. This subject area is rich with topics and issues that provide wonderful opportunities for active student involvement and ways to relate knowledge and skills to students' everyday lives. Moreover, in the past. science and social studies have often had a low priority in the educational curriculum for students with mild learning difficulties (Patton, Polloway, & Cronin, 1994, as cites in Polloway et. al., 2008). However, as students with mild learning probems engage in the general education curriculum, as required by IDEA, consideration of these academic areas becomes critically important in order to provide appropriate instruction.

Furthermore, in considering why science and social studies have been underemphasized in the past, Price, Ness, and Stitt (1982) suggest that the overwhelming thrust in many programs for students with mild disabilities was on the development and remediation of basic skills. Without question, most students with mild learning problems were based on difficulties in reading, written language, or math.

Referrals were not made because a student had particular trouble in understanding a science or social studies concept.

In addition, personnel-preparation programs neglected these areas; few special education training programs required or even offered coursework in which topics were dedicated to how to teach science and social studies to students with special learning needs. Patton et al., (1994) found that a significant number of special education teachers reported that they had received no training of any type (i.e., preservice in-service) in these areas. Not surprisingly, most special education personnel feel unprepared and uncomfortable teaching these subjects. However, many of them are assigned to teach in these areas, especially at the secondary level, and often find themselves teaching credit-generating science and social studies courses to students in diploma-track programs. The requirement of students being taught by highly qualified teachers, as espoused by the No Child Left Behind Act, has initiated measures to address this issue, especially for special education teachers at the secondary level.

The typical general education classroom contains students with a range of diverse needs. General educators who teach science and social studies often feel unprepared to work with special learners. Many general education teachers are faced with significant challenges in meeting the needs of students with learning and behavior problems in science and social studies, given the nature of the presenting problems that this group of students brings to the classroom.

The main problem related to accommodate the needs of students learning-related difficulties, especially in terms of science and social studies, is still not adequately covered in the preservice programs of many general education teachers. Moreover, method courses in science and social studies that general education teachers take at the preservice level assign very little time to the concept of universal design for learning (UDL), or the acquisition of skills to be able to accommodate the diverse needs of students.

Instructional suggestions for working with students with diverse learning needs have not usually been effectively conveyed to general education personnel on an in-service basis either. To this reason, special education personnel who work collaboratively and cooperatively with general educators need to be able to assist them in this task. So that, it means special education personnel need to know the content and the methods for teaching science.

rationale for the importance of students with diverse learning needs receiving sound instruction in science and social studies is worth noting. Science along with social studies should be recognized as foundation subjects that have major life skill implications (Patton, 1995, as cites in Polloway et. al., 2008). As a result, these subjects must be taught to all students, sometimes utilizing different emphases depending on the current and future needs of the students. So that, there are many reasons for teaching science and social studies including the following important benefits of quality science programs.

- Firsthand experience particularly helps students become familiar with their surroundings.
- Basic skills can be applied in meaningful contexts.
- A rich experimental background can be developed to establish knowledge frameworks into which students can integrate new ideas, relationships, and details.
- Students have the opportunity to develop higher thinking skills and problem-solving strategies.
- Certain topics covered in science and social studies are essential for dealing successfully with the demands or adulthood and are useful for lifelong interests.

2.2 Challenges for Students with Special Needs in Science and Social studies

Science and social studies are academic disciplines concerned with concepts and knowledge of the physical and social world around us and as such are important subject areas for all students. However, present unique challenges to teachers who must adapt their instruction, materials, and procedures to accommodate students with special needs. Adaptations for students with special needs reflect the approach to instruction being used in the class. That is, many schools employ a textbook oriented approach in which students are taught and learn content information from textbooks about science and social studies. With this approach adaptions may focus on teacher presentations and students independent learning from textbooks.

In addition, to the challenges imposed when teachers are not prepared appropriately to address the diverse and often challenging needs of students with learning related problems, a number of other factors contribute to the challenge of providing appropriate instruction in science and social studies. Some of these factors include:

- Specific characteristics that interfere with learning such as problems with attention or lack of appropriate interpersonal skills
- Specific physical or sensory limitations that require specific accommodations

- Scheduling issues that pull students out of these classes so that they may receive additional remedial attention
- The nature of the curricular materials that are used in the class
- The skill demands associated with activity-oriented lessons that teachers require, and assume, students possess

In this regard, students are unable to read the textbooks or participate appropriately in class discussions and activities. The results are minimum learning and increased undesirable behaviors. Attention to these issues, especially prior to actual instruction is critical. The main challenges for students with special needs in science and social studies are as follows:

Challenges with Curricular Materials

As mentioned previously, few materials are designed with the idea of accommodating students' learning differences right from the start of underlying the concept of UDL (Heron & Jorgensen,1994). Given the heavy reliance on the use of textbooks with nearly 85% of public schools using a textbook approach to teaching science (Brownell & Thomas, 1998, as cites in Polloway et. al., 2008) and the demanding features of these books, it is no surprise that many students have difficulties with these materials.

Moreover, most of the accompanying tasks that students are required to use as in class activities or as homework (e.g., worksheets to complete) present a similar set of challenges for students. Lenz and Schumaker (l999) identified 12 design characteristics that are major determinants of how useful materials are for students with diverse learning needs. These design qualities are presented below along with short explanations (as cites in Polloway et. al., 2008):

1. ***Abstractness:*** Much of the science and social studies involves the understanding of concepts. For many students with diverse learning needs being able to grasp complex concepts is not easy. This is particularly the case of students with mild intellectual disabilities. The content appears too conceptual, hypothetical, and impractical.
2. ***Organizations:*** The organization is not clear or is poorly structured.
3. ***Relevance:*** the information does not appear to have any relationship to students or their lives.
4. ***Interest:*** The information or presentation of the information is boring.

5. ***Skills:*** A range of skills is expected from students in these subject areas. The ability to skim or scan textual passage is essential to complete assignments and to study for texts. The information is written at a level that assumes and requires skills beyond those possessed by students.
6. ***Strategies:*** The information is presented in ways that assume student to know how to approach tasks effectively and efficiently in strategic ways.
7. ***Background:*** Understanding information usually requires critical background knowledge, but students often lack the experiences and concepts (or cannot make connections to personal background experiences) to make new information meaningful.
8. ***Complexity:*** The information or associated tasks have many parts or layers.
9. ***Quantity:*** There is a lot of difficult or complex information that is crucial to remember.
10. ***Activities***: The instructional activities and sequences provided do not lead to understanding or mastery.
11. ***Outcomes:*** The information does not cue students how to think about or study information to meet intended outcomes.
12. ***Responses:*** The material does not provide options for students to demonstrate competence in different ways.

Challenges with Skill Demands

The above-mentioned section already touched on the skills that are needed to handle science and social studies interaction, especially at the upper elementary grades and secondary level. Atwood and Oldham (1985) highlight the three major presenting problems of students who have learning-related problems when placed in activity-oriented general education settings:

- Deficiencies in language (i.e., reading, listening, writing, speaking)
- Difficulty with new concepts and vocabulary
- Inappropriate behaviors

One of most critical problems that students with special needs have is their inability to engage the topics that are being discussed or presented in class. In addition, most of the students with special needs, when in inclusive settings, are faced with a host of demands for which they are not well-equipped to handle. The current situation underscores the reality that the

skill requirements for which minimum levels of competence are needed cut across instructional activities.

Munk, Bruckert, Call, Stoehrmann, and Radandt (1998) describe another perspective on the problem low rates of responding demonstrated by students with special needs in science classes (as cites in Polloway et. al., 2008). They note that students with special needs may display the following:

- Poor performance in discussions requiring recall of vocabulary or simple facts (e.g., failure to recall layers of earth)
- Low rates of active academic responding during extended reading assignments, whole-class lecture, or group activity-based lessons (e.g., not asking questions, waiting for peers to respond to questions or tasks)

The important point to consider from the examples provided above is that the interaction between the demands of science and social studies and the skill levels of students with diverse learning needs will often create significant challenges for general education and special education teachers. Moreover, knowing what to expect in the way of presenting problems is a critical first step in addressing the needs of students either proactively through a "frontloaded" philosophy of dealing with diversity from the start that emphasizes proactive attention to projected needs (Heron & Jorgensen, 1994) or through a more "accommodative" philosophy where solutions are found for the issues as they arise.

2.3 Strategies for Teaching Science

Science is an important part of everyone's daily life. It includes topics that can have a major impact on our life like as; personal, family, workplace, and community needs. It is the right of all citizens to be scientifically literate, since literacy affects the quality of life of every person all over the world. As a result, science should be made meaningful to students in a long-term sense as well as relevant to their current needs. It is essential to interest students of both genders with special needs in science early on and to maintain this interest over their school careers. And now IDEA essentially requires it. As compared to all the other subject areas taught, science may be one of the most fascinating as well as one of the most feared by many teachers.

How exciting to be out on a reef actually seeing, touching, and experiencing nature; but how threatening to realize that a student may know more about something than you do or that someone may ask you a question for which you do not have an immediate answer. Many teachers who do not have extensive science training express reservations about teaching anything connected with science. Nevertheless, by using effective instructional techniques should have help to teacher to make science teaching more effective and interesting. So that teacher can provide dynamic and socially valid science programs.

Teachers need to acquire a comfort level with the subject of science. This includes a recognition that no one will ever know every science fact or even be able to recall instantaneously information that was formally in one's memory. The teacher's role can be thought of as travel guide who leads students on a wonderful journey.

2.3.1 Science Education for Students with Special Needs

Students with special needs tend to show significantly lower achievement in science than their peers. Reasons for this include severe difficulties with academic skills (i.e. reading, math and writing), behavior problems and limited prior understanding of core concepts background knowledge. Despite this miserable image, much is known on how to significantly improve science achievement for students with special needs. A recent comprehensive meta-analysis indicates that inquiry instruction which infuses appropriate scaffolds and supports, can significantly improve science achievement for students with special needs. This article will delineate the types of supports and scaffolds that students with special needs require to be successful in inquiry instruction. It will also provide concrete examples of how these supports have been successfully applied in an inclusive third through fifth grade science approach (i.e. the science writing heuristic).

Teaching science can be exciting and rewarding subject. Few subject areas are as inherently interesting to teach actively involve students as much and can be made as relevant to students of diverse backgrounds. Interestingly, a teacher's attitude may be the most critical variable. Enthusiasm on the teacher's part can lead to excitement in students as well as to higher academic achievement and lower rates of off-task behavior (Brigham, Scruggs, & Mastropieri, 1992, as cites in Polloway et. al., 2008). However, not every student will share this enthusiasm.

Even though many students are stimulated when presented with an engaging science program, others are not and may require other engagement strategies.

Science instruction must be designed for all students, not just those who will be future scientists. Patton et al. (1994) found in their study of special education teachers that substantial numbers of students were not receiving any science instruction and that those who did not have much time allocated to this subject area each week. This trend has changed recently for two primary reasons:

- A greater number of students with learning related problems are in inclusive settings for a greater part of their instructional day including science classes
- The mandate in IDEA 1997 that students with disabilities must have access to the general curriculum that is provided to students without disabilities.

As discussed in the above section, students who are having difficulty in learning will present specific challenges when we attempt to teach them science. Rakes and Choate (1990) have identified a number of science related skills that students need in order to understand the many facets of science instruction. These skills have been organized according to three major dimensions, which are as follows:

- ***Information Acquisition Skills:*** (observation, listening, reading, study skills, and directed experimentation)
- ***Information Processing Skills:*** (organization, analysis, measurement, and classification)
- ***Integration Skills:*** (synthesis, hypothesis, independent experimentation, generalization, and evaluation).

Most of these skills relate closely with the inquiry skills. Teachers must be cognizant of the skill demands of science, particularly in the area of information acquisition, in light of the skill levels of students with special needs. In addition, as pointed out previously, familiarity with the content covered in this subject area along with awareness of features of instructional materials used with students are necessary to teach this subject to students with a range of learning related needs.

Moreover, certain competencies are desirable in special education teachers who work with students with special needs in the area of science. The following list is not exhaustive; however, it

can serve as a preliminary checklist. Although most of the items on this list should be evident in the teaching practices of general education teachers who teach science, some of the entries will require further attention.

- Knowledge of basic content in the area of science
- Awareness of state content and performance standards for a particular grade level or levels
- Ability to follow a preestablished curriculum or to develop one
- Knowledge of various approaches and materials for teaching science to students with special learning needs
- Ability to adapt materials and techniques to accommodate the individual needs of special learners
- Knowledge of skills needed to plan and carry out science investigations
- Understanding of certain laboratory (hands-on) skills
- Familiarity with science related resources (print, Internet, community)
- Ability to apply relevant science education research to the educational programs of special populations
- Ability to relate science topics and concepts to real everyday situations and adult outcomes
- Ability to work cooperatively with other teachers in delivery of science to students with special needs

2.3.2 Content of Science Instruction

Different sources yield different goals for science education. In summarizing the findings of a major research effort that examined science education. Yager (1989) offers the following four goal clusters for science education.

- Science for meeting personal needs
- Science for resolving societal problems
- Science for career awareness
- Science for preparation for further study

Though all of these goal clusters may be appropriate for students with special needs, some of these goals are likely to be more important than others for certain students. On an instructional level, three major objectives are woven throughout science education, these are as follows:

- The acquisition of relevant content and knowledge
- The development of various inquiry-related skills, and
- The nurturing of a scientific attitude.

Most of us have experienced science instruction that focused largely on content acquisition with little opportunity for hands-on activities. In recent years more, emphasis has been given to the importance of skill acquisition and activity-oriented instruction, and attention is being directed toward the attitudinal/affective domain associated with science topics. All these objectives are important, and none should be emphasized to the detriment of the others. Although no generally accepted curricular sequence in science education exists and some would suggest that science is every place we cast our attention, science includes the subjects depicted in Figure 2.1.

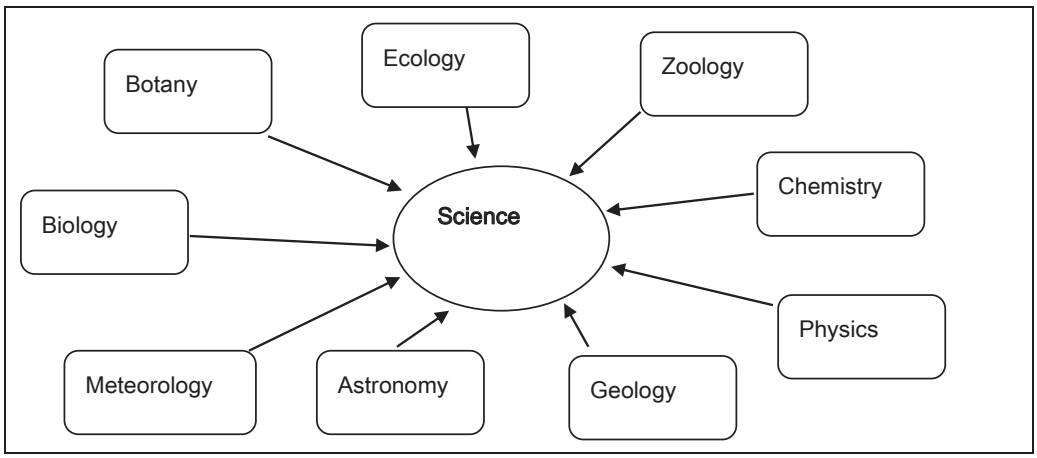


Figure 2.1 Subject areas in science

These subject areas can be organized into three general areas these are as given below:

1. Life Science (the study living things including biology, zoology, botany, ecology)
2. Physical Science (the study of nonliving things including chemistry and physics)
3. Earth Science (the study of such topics as astronomy, meteorology, and geology)

In extracting the key initiatives set forth in the National Science Education Standards document (National Research Council, 1996) and the Project 2061 benchmarks (AAAS, 1993), Sandall (2003) identified the following common recommendations:

- Scientific literacy is for all students.
- Science is active, hands-on learning, and in-depth of fewer topics.
- Science should emphasize critical thinking, problem solving, and developing mathematics and science as a way of thinking and reasoning.
- Science should emphasize integration and interdisciplinary activities.
- Science should emphasize application of science, mathematics, and technology to real-life situations.

Elementary Level: The importance of quality science programs at the elementary level is generally recognized because this level of science instruction provides the foundation in skills, knowledge, and attitudes for further science study that supports a sound science education program. Cawley et al. (2003) identify four curricular models that can be found at the elementary level these are as given below:

1. *Spiral curriculum:* The features of spiral curriculum are as follows:
    - Dominant model of the science at the elementary level (K-5)
    - Textbook driven
    - 15 topics covered each year
    - Topics are repeated each year
    - Scope of content is fixed
    - Same types of activities for each topic at each grade level
2. *Intensified curriculum:* The features of intensified curriculum are as follows:
    - Less is more orientation
    - More-in-depth coverage of topics along with a more activity-oriented, hands-on format
    - Allows for adaptations that might be needed
3. *Integrated curriculum:* The features of integrated curriculum are as given below:
    - Combines two or more main topic
    - Uses the main content of these areas as the basis of the curriculum

- Lack of comprehensiveness is possible

4. ***Theme-based curriculum:*** The main features of theme-based curriculum stated as below:
   - Nature of curriculum based on a particular change-based theme
   - Other concepts and skill development are woven into these themes
   - Opportunity to connect what is being taught to prior topics that were covered is possible

Most elementary programs follow a spiral curriculum orientation. In this curricular structure, the curriculum is driven by the textbook series that has been adopted. For example, a topic like plants will be introduced at an early grade level and covered a number of times in subsequent grades in more conceptually complex ways.

Secondary Level: The nature of science programs for students with special needs at the secondary level will depend the program orientation these students are following. If students are in a general education curriculum, they will take courses such as life science/ biology, physical science, chemistry, physics, or earth and space science. If students are in a curriculum that affords access to the general education curriculum but is not provided in an inclusive setting, materials and procedures may not differ significantly from those used in the general education setting; however, different text books might be used, and different activities might be utilized. If students are in an alternative curriculum, they may be exposed to functional science content that is completely related to skills and/or vocational applications.

2.3.3 Approaches to Teaching Science

A number of descriptors can be used to capture the essence of science instruction that exists in classrooms in schools today. Saul and Newman (1986) conceptualize the various orientations to teaching science in a fascinating way. Their categorization, as well as the advantages and disadvantages of each approach. For special education teachers working in inclusive settings, can provide a strategy for anticipating some of the issues that will arise for students who are in these settings (as cites in Polloway et. al., 2008).

The remainder of this section will discuss approaches to providing science instruction from the perspective of how content is typically presented. The major approaches covered include commercial programs (textbooks, hands-on programs, and special programs designed for

students with special needs), customized programs that usually are developed locally, and Internet-based programs that are emerging. So that most of the researchers have conducted a substantial amount of research on the first two approaches. The short information of the teaching science approaches is stated below:

- **Textbook Approach**

The reality for most students is that they are introduced to science by means of the textbook and continue to be exposed to this type material as the primary "vehicle of instruction throughout their science education". In the recent study of science education in special education settings, Patton et al. (1994) found that nearly 60% of the special education teachers who taught science used a general education textbook in some fashion. This figure is only 60% primarily because many students in special education simply cannot use a regular textbook. Teachers can use commercially published text books in various ways. For most, a textbook is the primary vehicle of the science program, with students regularly reading and consulting it. A class discussion or lecture format usually accompanies this type of approach, which emphasizes a verbal mode of presenting information (Scruggs & Mastropieri, 1993, as cites in Polloway et. al., 2008).

Textbooks can also be used a supplementary way, as a part of a program that utilizes additional sources of science information and activities. In certain science programs, textbooks are used only as occasional reference materials, as in the theme-based Science for All Children program (Cawley, Miller, Sentman, & Bennett, 1993, as cites in Polloway et. al., 2008). Textbook use has both advantages and disadvantage. Textbooks can serve as excellent teacher resources, can be of great assistance to the beginning teacher, and should be aligned with state content standards. On the other hand, they require complex literacy and study skills competence, are often abstract typically have readability levels above the reading levels of students, may be the only source of science information, become outdated, and may not be in concert with the curricular needs or goals of some students.

Student inability to read grade level materials looms the most significant barrier to using science texts with special populations. However, Armbruster and Anderson (1988) noted that, problems with textbooks can also arise because of three other factors such as:

- Structure (arrangement of ideas),

- Coherence (smoothness in the way ideas stick together), and
- Audience appropriateness (suitability to reader's level of knowledge and skills).

Teachers do not have the time to regularly rewrite textual material to meet the needs of their students, nor should they do so. However, if the textbook approach is used, certain textbook series are worth considering because of the nature of the reading demands and their hands-on orientation.

▪ Hands-On/ Activity-Based Approach

Hands-on approaches to science stress the use of process inquiry skills more than the accumulations of substantive information. This approach underscore doing and discovery. In addition, these programs include those associated with the first wave of science curriculum reform in the 1960s and 1970s, as well as newer programs developed in more recent year. Over the 30years, Boekel and Steele (1972) believed that many aspects of these approaches could be used with students with disabilities. Moreover, Scruggs et al., (1993) found that students with learning disabilities who were exposed to activity-oriented science experiences performed better on follow-up unit teaching than those students who used a textbook approach (as cites in Polloway et. al., 2008).

Cawley et al (2003) point out the main attraction of hands-on approaches to teaching science. They suggested the following points:

- Provide the teacher with an opportunity to make on-the-spot adjustment,
- Allow students to raise and answer questions using different sources,
- Enhance conceptualizations through the use of alternative representations,
- Offer the teacher an opportunity to pace the lessons according to the rates of students learning, and
- Present an opportunity for students to demonstrate selected principles at high levels of generalization.

Often hands-on approaches are linked with inquiry-based science instruction. Jarrett (1999) describes three types of inquire based teaching approach these are as follows:

- Structures inquiry

- Guided inquiry
- Students directed inquiry

Among these inquiry-based approaches, structured oriented approach may be the most desirable option for students with special needs. Both, hands-on and inquiry-based approaches require teachers to be facilitators of learning rather than distributors of information or fonts of knowledge.

- **Specially Designed Programs:**

Although not plentiful instructional program developed specially with special populations in mind are available. One of the first comprehensive efforts to develop curricula for students for in special education was the publication of the *Me Now, Me and My Environment, and Me in the Future Program.* This curriculum developed by the biological Science Curriculum Study (BSCS), these programs were originally designed for students with varying levels of intellectual disabilities. These programs were multicomponent kits for conducting science activities.

The most attractive features of this curriculum were that, they did not require reading, thus avoiding this major barrier for some students. Moreover, the curricula focused on topics that were relevant to students. Other features were that the teacher manuals provided precise directions for caring out the activities. The other specially designed programs are as, Science for All Children (SAC), You, Me, and Others, and Application in Biology/Chemistry (ABC).

2.3.4 Teaching Science to Diverse Students with Disabilities

Although science instruction is most often delivered via a textbook-based approach, the available research suggested that students with special needs will learn more effectively through program that are adapted to emphasize more use of hands-on approaches as well as program that focus on big idea and concepts.

In addition, to the challenges of teaching science to children with disabilities, a special challenge involves teaching science to such children who also come from culturally and linguistically diverse backgrounds. Moreover, some studies have been devoted to the teaching science to diverse learners, more are needed. The recent research indicated that these children

learn best when science lesson include inquiry-based and hands-on activities that provide high-context and meaningful opportunities. These types of lesson promote the reciprocal interactions necessary for second-language acquisition with Mother Tongue, Nepali-English bilingual students with disabilities.

2.4 Teaching Social Studies for students with Special Needs

Students with disabilities who are placed in the regular classroom must have appropriate supports and services to succeed, including instructional strategies adapted to their needs. Some supplementary aids and services that educators have successfully used include modifications to the regular curriculum, the assistance of a teacher with special education training, special education training for the regular teacher, the use of computer-assisted devices, the provision of note takers, and the use of a resource room. In these classrooms, students are viewed not as separate groups, disabled and nondisabled, but as students with shared characteristics who also vary.

Teaching resources continue to play a crucial role. Five areas that are examined to help students comprehend social studies resources are vocabulary level; content in terms of conceptual complexity (concrete versus formal ideas); writing style; organization of materials; and special features such as illustrations and graphics. The following is a list of appropriate classroom strategies in social studies for special needs students:

- Activity-oriented instruction
- Instruction related to students' everyday experiences
- Interesting social studies activities
- Appropriate linguistic and conceptual social studies content demands
- Efficient classroom management, establishing ground rules and procedures for social studies activities
- Focus on skills development throughout social studies activities
- Examination of textbooks for the impact they may have on students

A primary reason for including students with special needs in the regular classroom is to increase their contact with a broader range of students. Excellent opportunities exist during social studies activities to promote such contact. Most social studies curricula hold the potential for a wealth of activity-centered

small-group experiences appropriate for a wide range of students. When students work together to achieve a social studies objective, the potential for positive interactions within the group increases. Constructive interactions in the context of a group experience reinforce the interaction skills of all students and develop an appreciation of differences among peers. Other positive results of having students with a varying range of attributes work together cooperatively include tolerance, better appreciation for what a person can do, and opportunities to perform services that help others.

Meeting the personal needs of students with special needs requires thoughtful consideration of many factors. The identification of conditions needing accommodation may require modification of the learning experience to most fully benefit the student. Student abilities and characteristics, combined with the specifications of the Individualized Education Plan (IEP), determine the degree of modification of instructional strategies, curriculum, and evaluation procedures necessary to best serve the student.

2.4.1 Nature of Social Studies Education for Students with Special Needs

The specific goals of social studies are not generally agreed upon but can be extracted from professional organizations and councils, state standards, competency requirements, and professional literature. Many teachers have successfully adapted social studies curriculum materials to meet individual needs (Klumb, 1992, as cites in Polloway et. al., 2008). Adapting social studies materials for students with disabilities is accomplished through six general steps:

1. Identifying the learning needs and characteristics of the students
2. Identifying the goals for instruction
3. Comparing the learning needs and goals to the teaching materials to determine whether the content, instructional techniques, or setting require modification
4. Determining specific modifications of the teaching materials
5. Modifying the materials
6. Conducting ongoing evaluation as the materials are used

It is important that social studies teachers learn to teach social studies standards to both special needs and general learners. However, there is no single technique, approach or strategy that will accomplish this because of the complex nature of the Social Studies. The complexity rests in the diverse nature of the social studies, the wide variety of social studies teachers, the range of learning problems held by learners who are in social studies classrooms, and the many

differences among the social studies standards themselves. However, general areas of advice can be offered to point teachers in the right direction.

Moreover, Social Studies is the integrated study of the social sciences and humanities to promote civic competence. Within the school program, social studies provide coordinated, systematic study drawing upon such disciplines as anthropology, archaeology, economics, geography, history, law, philosophy, political science, psychology, religion and sociology, as well as appropriate content from the humanities, mathematics, and natural sciences. The primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world.

The standards involve ten themes. The teaching of some of these standards to both general and special populations varies from standard to standard. The themes are:

1. Culture
2. Time, Continuity, and Change
3. People, Places, and Environments
4. Individual Development and Identity
5. Individuals, Groups, and Institutions
6. Power, Authority, and Governance
7. Production, Distribution, and Consumption
8. Science, Technology, and Society
9. Global Connections
10. Civic Ideals and Practices

There are general directions that Social Studies teachers can take to do a better job with general and special needs students. These include developing our content specialty, becoming more aware of reading comprehension instructions, being willing to try social studies processes and trying to help a teacher in the areas of social studies.

2.4.2 Content of Social Studies Instruction

The aim of social studies is the promotion of civic competence—the knowledge, intellectual processes, and democratic dispositions required of students to be active and engaged participants in public life. Although civic competence is not the only responsibility of social studies nor is it exclusive to the field, it is more central to social studies than to any other subject area in schools.

The scope and sequence of any social studies program for special education students is likely to depend on where the students receive such instruction which helps to develop or improve their understanding. For the most part, students with mild learning problems are taught in general education classroom, where they have the best access to general to the general curriculum. The subject areas that are represented by the umbrella term of social studies include the 12 areas depicted in figure 2.2.

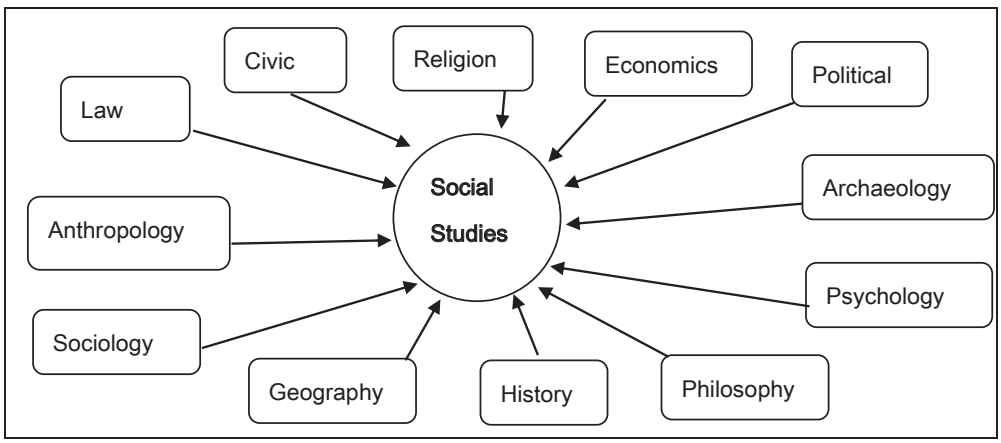


Figure 2.2 Subject areas in social studies

2.4.3 Approaches to Teaching Social Studies

Teaching Social Studies will be a success if the lessons and concepts are contextualized and localized. Students will understand the concepts that are being taught when we begin from what they already know. It is very important that teachers confirm in school the worthwhile values that have been learnt in the home and communities. Moreover, it is also important that teachers and

schools try and work together with the community of parents on some of the issues that are important to our environment. Some of these knowledge, skills and values formally taught at schools will be lost if they are not practiced and supported in the home or if practices in the home and community contradict them. The major approaches discussed in this section fall into three major categories:

1. Textbook/Lecture/Discussion Approach

This approach is characterized by an emphasis on textbooks, lectures, and discussion as the primary mechanisms for organizing the course and disseminating information. Teachers familiar with textbook series in social studies know that the most significant problem is readability or, more specifically, students' inability to manage the textual material and ultimately to comprehend the material. Woodward and Noell (1992) note the complexity of the problem: "Important topics in social studies texts, for example, are discussed insufficiently, references arc ambiguous, too many concepts are presented in too short a space, and a considerable amount of background knowledge is simply assumed".

2. Inquiry Approach

This approach, also referred to as a process approach, puts a premium on skills used in solving problems or addressing issues. Although the attraction of this approach in many ways, this approach requires that students possess certain abilities and prerequisite skills such as the social studies skills previously noted. Many general education social studies teachers find that they must explicitly teach some of these "social studies skills" and provide organizational supports for many students in their classes.

A completely inquiry-oriented approach for teaching social studies to learners with special needs must be used with caution. As in science, the use of process approaches with students with special needs is not prohibited, but a certain amount of structured instruction (i.e., structured inquiry) that helps students make connections across topics and concepts is recommended, and often necessary.

3. Balanced Approach

Most of teachers have developed studies program that combine features of the textbook/lecture/discussion approach with inquiry or issue-oriented elements. For example, a program might use a textbook but also regularly include inquiry-oriented activities.

In addition, most of the balanced programs are developed at a local level. They can be engaging, relevant, and appropriate for special learners. However, teachers should consult available resources for assistance in developing such curricula. It may be important that the customized curriculum not deviate too much from the general education curriculum and the state standards in terms of content even though methodology and selected topics may be very different.

Let Us Sum Up

Science and social studies are most important subject areas in the field of special education. During the elementary grades, these subjects introduce students to critical content and concepts on which more advanced courses in these areas are based. Furthermore, these subject areas develop sets of skills (e. g., inquiry skills in science and analytical skills in social studies) that will be tapped in later coursework as well as in life outside of school.

Science and social studies are academic disciplines concerned with concepts and knowledge of the physical and social world around us and as such are important subject areas for all students. However, present unique challenges to teachers who must adapt their instruction, materials, and procedures to accommodate students with special needs. Adaptations for students with special needs reflect the approach to instruction being used in the class.

However, teaching science and social studies are difficult to teach students with special needs. So that, this chapter helps to professional and paraprofessional to know the teaching strategies about science and social studies teaching and implement in the classroom as needed. The unit try to explain all the strategic aspects of science and social studies, content of science and social studies, approaches of teaching science and social studies, and teaching science and social studies in diverse students with disabilities.

Unit-End Activities

- **Objective Questions:** **Group "A"**

Tick (↓) the Best Answer.

1. The science and social studies subjects are developed the skills of students on…
   - **a. Inquiry skills in science and analytical skills in social studies**
   - b. Mathematical calculation
   - c. Speaking ability
   - d. Listening ability
2. Which one is not the important benefit of quality science program?
   - a. First hand experience
   - **b. Negative attitude**
   - c. Develop new ideas through experiment
   - d. Knowledge of basic skills can be applied in meaningful context
3. ……..are academic discipline concerned with concepts and knowledge of the physical and social world around us.
   - a. Literature
   - b. Mathematics education
   - c. **Science and social studies**
   - d. Basic English
4. What kinds of challenges of providing appropriate instruction in science and social studies?
   - a. Knowledge, skills, and understanding related content
   - b. Plenty number of trained teacher
   - c. School environment
   - **d. Challenges with curricular materials**
5. According to Lenz and Schumaker (1999), how many design features that are major determinants of students with special needs?
   - **a. 12**
   - b. 14
   - c. 21

d. 10

6. One of the most critical problems that……..have is their inability to engage the topics that are being discussed in classroom.

a. Students with special needs

b. General students

c. The curricular activities

d. The teacher role

7. Information processing skills is related to ….

a. Observation

b. Organization

c. Synthesis

d. Hypothesis

- **Short Answer Questions: Group "B"**

1. Define the concept of science.
2. Define the concept of social study.
3. What kinds of content involved in science education?
4. Define the concept of textbook approach.
5. What is spiral curriculum?

- **Long Answer Questions: Group "C"**

1. Explain the strategies for teaching science education for children with special needs.
2. Illustrate the challenges for students with special needs in science and social studies.
3. Describe the approaches to teaching social studies.

- **Points for Discussion**

- Concept of science and social studies.
- Challenges for students with special needs in science and social studies.
- Strategies for teaching science.
- Content of science instruction.
- Teaching science to diverse students with disabilities.
- Approaches for teaching social studies.
- Nature of social study education.
- Content of social study education.

Unit III: Teaching Mathematics for Students with Special Needs

3.1 Concept of Mathematics Education

State and local education agencies across the nation face a critical need to improve the math learning and achievement of students with disabilities. Since passage of the No Child Left Behind (NCLB) Act of 2001 and the Individuals with Disabilities Education Acts (1997 and 2004) schools, districts, and states are required to include students with disabilities in statewide assessments and to show that these students make adequate yearly progress in math. Most students with disabilities perform at low levels on standardized math assessments. State, district, and school leaders have therefore been grappling with what practices and policies to use to improve the math learning of these students (Mastropieri & Scriggs, 2010).

Mathematic is academic discipline concerned with the solution of problems that involve quantity or number. Mathematics includes such branches as arithmetic, algebra, geometry, trigonometry, and calculus. Always an important field of study in education, mathematics has taken on increasing importance in modern society (National Council of Teachers of Mathematics, 2000). Students with disabilities will also need to gain proficiency in mathematics to fully participate in society. For this to occur, teachers must be fluent in a variety of teaching techniques that will allow students with diverse learning needs to meet their greatest potential in math.

Through much of U. S. history, mathematics was taught as a set of facts, rules, and procedure for dealing with numbers and quantitative concepts. Reform in mathematics education initiated by the National Council of Teachers of Mathematics (NCTM) resulted in the *Principles and Standards for School Mathematics* (NCTM, 2000, 2007). In it, six predominant principles are provided to describe features of high-quality mathematics education. These principles include equity, curriculum, teaching, learning, assessment, and technology.

Moreover, NCTM suggested that students with disabilities and other special needs may need accommodations in the form of language support, increased time, oral rather than written assignments,

peer mentoring, and cross-age tutoring (NCTM,2000) This unit presents a number of strategies that may be useful in teaching mathematics to students with special needs in inclusive settings.

3.2 Mathematics and Students with Disabilities

Math disabilities is an emerging field. Because there is neither a standard definition for a math learning disability nor a standard assessment tool for diagnosis, there is debate over how to differentiate between math learning disabilities and math difficulties unrelated to a disability. Thus, there is considerable variation in the extent to which struggling students are identified as having math learning disabilities. For this and other reasons this report focuses on both students with disabilities and other struggling learners.

Moreover, difficulties with math are not unique to students with disabilities. Among 2nd graders 35 percent described math as difficult; only 10 percent said the same for reading (Mazzocco, 2007). As students' progress in school, difficulties may arise as math content becomes more complex and greater skill is required. Solving problems involving fractions is a well-known difficulty for students with learning disabilities and many students without disabilities, as indicated by the National Assessment of Educational Progress (National Center for Education Statistics, 2006).

Some students with disabilities exhibit little difficulty in learning mathematics. However, math is an extremely challenging subject area. Many students with learning disabilities may exhibit difficulties in the areas of memory and general strategy use, literacy and communication, specific processes and strategies associated with math problem, and low motivation and affect (Bryant & Bryant, 2008: Montague & Jitendra, 2006, as cited in Mastropieri & Scruggs, 2010).

Students with intellectual disabilities may exhibit many of these difficulties, as well as problems with acquiring math concepts, remembering and executing math facts and procedures, and mathematical reasoning (Butler, Miller, Lee, & Pierce, 2001). Students with emotional or behavioral disorders often score below grade level on tests of mathematics achievement and students with attention problems may exhibit difficulties organizing information in problem-solving tasks (Marzocchi, Lucangeli, De Meo, Fini, & Cornoldi, 2002, as cited in Mastropieri & Scruggs, 2010).

For students with hearing impairments and communication disorders (as well as those for whom English is a second language), math may be an area of relative strength. Nevertheless, many students

may have difficulty with the English language and communication aspect of mathematics (Lang & Pagliaro, 2007). Like many students with special needs, students with hearing impairments may benefit from authentic mathematic experiences, integrating vocabulary development, and classroom discourse about mathematics (Stewart & Kluvin, 2001). dents with visual impairments may also generally perform well on mathematics tasks, if appropriate adaptations are made (Rosenblum & Amato, 2004). Finally, some students with physical disabilities may need specific assistance if concrete manipulative materials are used (Heller, 2005, as cited in Mastropieri & Scruggs, 2010).

3.3 Teaching Mathematics in Inclusive Setting

Inclusive education means that all students in a school, regardless of strengths or weakness in any area become part of the school. Inclusion is generally accepted to mean that primary instruction and provision of services for a child with disability is provided in an age-appropriate general education class in the school the child would have attended if not disable with appropriate additional supports for the student and the teacher (Lindsay, 2003, as cited in Mastropieri & Scruggs, 2010).

Teaching mathematics in the special education classroom takes patience, creativity, and a variety of instructional strategies. Providing resources, using a multi-sensory approach to instruction, and frequent repetition are strategies that can help struggling students be successful in the math classroom. When teaching math to special education students, there are several factors for an instructor to keep in mind. As well as there are a few common issues special education students face when they are learning mathematical concepts. Some students might have math facts memorized, but struggle when solving real world problems. Other students understand applied problems, but simply cannot memorize their math facts.

In addition, other students know their math facts and can apply them to real world situations but have a habit of reversing numbers or forgetting to line up place values. In any case, there are a few strategies and techniques that can help special education students develop math fluency in the general and special education settings, including providing resources, using a multi-sensory approach to instruction, and frequent repetition.

Carnine (1998) recommends five major components that can be useful in designing effective mathematics instruction. These include the following:

- Focus on “big ideas”-that is, generalizable concepts rather than individual details.
- Teach “conspicuous” strategies (neither too broad nor too specific) for conducting math operations and solving problems.
- Make efficient use of time on prioritized objectives.
- Communicate strategies in a clear, explicit manner.
- Provide practice and review to promote retention.

For all students, and particularly for those with cognitive or intellectual disabilities, development of mathematical understanding can be facilitated by progressing from concrete representations of quantity (e.g., beads or blocks), to semiconcrete (e.g., pictorial) representations, and finally abstract (graphic) representations (Fuchs, Fuchs, & Courey, 2005; Mercer & Mercer, 2005). Mathematics functioning also has been improved by direct instruction, reinforcement, mnemonics, and cognitive strategy training (Mastropieri, Scruggs, Davidson, & Rana, 2004; Stein, Kinder, Sikbert, & Carnine, 2006, as cited in Mastropieri & Scruggs, 2010). Effective teaching strategies for different subject and skill areas are discussed in the following sections.

3.4 Strategies for Teaching Beginning Math

Special education is based on the idea of specialized instruction to meet individual student needs, so resources provided will vary from one student to the next. However, while the resources might vary, they can be delivered in a similar format. Posters, bulletin boards, and other visual supports around the room are excellent resources. The major strategies for teaching beginning math are as given below:

3.4.1 Teach Early Number Concepts

Most children begin school already familiar with many elementary number concepts. These concepts are represented by words like more, less any none, none left, together, how many and each. These concepts are necessary for the development of more complex understandings. It may become clear, however, from student responses to teacher questions (e.g., “Do you want more?” “Which container holds fewer pencils?”) or by a student’s statements that such concepts have not been mastered. Understanding of these concepts can be promoted by applying the strategies for teaching language concepts. For example, during snack period, after a student eats one cracker the teacher could say, “Do you want more?” when the student begins to reply one correctly, the teacher could ask, “What do

you want?" prompting the student to reply, "More crackers." Later, the teacher could hold two crackers in one hand and three in the other, and ask, "Which hand has more crackers?"

3.4.2 Teach Counting

Learning to count is a type of factual (serial list) learning and is best acquired with practice. Counting seems to be a very simple skills but can appear very complicated to those who have not mastered it. Be sure to address all the components of counting in early numeracy. Acoustic counting refers to saying numbers in sequence ("Everybody say with me, One, two three…"). Point counting refers to pointing to objects as each number name is said ("Let's count all the desks in the classroom. Point and count together…"). Done correctly, pointing and counting are synchronized.

Resultative counting refers to the understanding that the order in which items are counted is irrelevant to obtaining the correct total ("Now let's count them in the other direction…."). Counting on is the ability to begin counting with a number other than 1 (and is a good way to introduce adding: "I've got five pencils in my hand; let's count how many there are altogether: "five, six, seven…"). Skip counting or "count-bys" is counting by groups of numbers, such as 2s and 5s. finally, subitizing means totaling small numbers of objects (e.g., 4 pennies) without directly counting (Van Luit & Schopman, 2000, as cited in Mastropieri & Scruggs, 2010). The main teaching strategies for counting are as follows:

- Begin with just a few numbers, such as "One, two, three" and have students clap their hands each they count.
- Students who are having more difficulty may benefit from practicing with a larger group of students.
- As number sequences are mastered, add a few numbers at a time.
- For additional time-on-task, ask peers to count with students who are still learning.
- Use of rhythms or regular emphasis may also help develop counting skills.
- Although group practice is helpful, it is also important to determine that individual students have mastered counting skills by asking them to count independently.

As the series of names of numbers is mastered, students should be introduced to the concept of counting things. Counting the students in the class, or the pencils in a jar, are early means of

demonstrating how similar objects can be counted. Again, practice, additional time-on-task, and use of peer assistance can help enforce the concept of numeration.

3.4.3 Geometry in Early Years

It may be helpful to introduce the concept of shapes during the acquisition of early math concepts. Although precise rules that define particular geometric shapes can be provided later, we can teach students to identify simple shapes such as circle, square, and triangle by the presentation of many examples with pictures and through teacher questioning. Use different types of circles to enforce the relevant attributes of a circle, that shape is what matters, and no other attributes such as color and size. Presenting noninstances also enforces the concept of circle (Is this a circle?" exhibiting a square). Also, give student different shapes, and ask that they hold up the shape that matches the teacher's shape.

3.4.4 One-To-One Correspondence

One-to-one correspondence is the concept that sets of different objects (beads, blocks, and so on) can be matched according quantity (Tucker, Singleton, & Weaver, 2006, as cited in Mastropieri & Scruggs, 2010). That is, even though blocks are not the same as beads, a set of three blocks is equivalent to a set of three beads with respect to quantity. we can reinforce this correspondence by exhibiting two sets of objects, and asking students to match them item for item, as shown in Figure 3.1. Before later concepts can be mastered effectively, it is important that students understand the concept of numerical equivalence.

Figure 3.1 Understanding the concept of one-to-one correspondence numerical equivalence

3.5 Teaching Addition and Subtraction

Memorizing math facts often doesn't work for students with special needs. However, there are ways to teach addition and subtraction make it fun! These include the use of manipulatives and touch math points. The major strategies of teaching addition and subtraction are as given below:

- **Use of Manipulates**

Manipulatives are objects or materials that students can touch and move around in order to help them learn mathematical and other concepts in the classroom. They include blocks, tiles, cubes, popsicle sticks, beads and cereal, among other items. Manipulatives are multisensory as they engage learners physically and visually, which leads to a deeper level of understanding. To really engage learners, use items they prefer, such as favorite characters or colors, stickers and toy cars.

When beginning a lesson with manipulatives, start with small groups of items. Use the same kinds of items in each group, for example, a group of three popsicle sticks and a group of four popsicle sticks. Have students count the number of items in each group. Next, ask students to put all the items together and count the total number of objects. Let them know that they have just added! Do this several more times with a different number of items in each group.

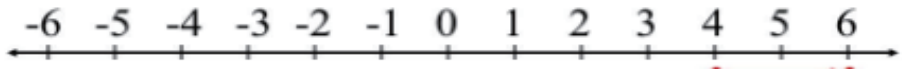
Using such materials as beads, buttons, dried beans, or commercially available base 10 blocks (distributed by companies such as Delta Education), we can help students learn concepts of addition and subtraction by counting. For example, show students 5 beans, and as them to add 4 more. Demonstrate how to select 4 beans to add, and employ a "counting on" strategies, where they start at 5 and add the 4 beans, counting up to 9. We can also teach students to 'take away' by starting with 9 beans and taking away 4, to leave the difference of 5.

- **Use Number Lines to Promote Operations**

A helpful intermediate step between counting actual object and operating with numbers is the use of a number line. Number lines are lines with marks to represent quantity. Here is an example:

To add, have students place their pencils on the first addend on the number line, and count forward using the second addend. For example, to add 2 + 3, students place their pencil on the 2, and then count forward: 1(3), 2(4), 3(5). Conversely, the subtraction problem 5 - 2 is solved by placing the pencil on the 5, counting two steps to the left: 1(4), 2(3), and noting the difference, 3. The relationship between operations with number lines and adding and subtracting beans and buttons should be made explicit. Also, number lines are useful when practicing “count-ons" and "count-backs," as precursors of learning addition and subtraction facts.

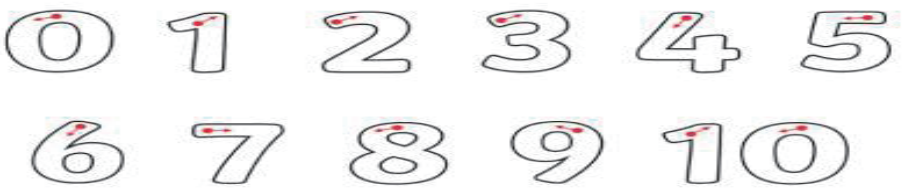
Provide physical assistance, enlarge or darken the number line, or use three-dimensional number lines to provide for special needs. Later, number lines that include negative numbers can be substituted to help students understand concepts of negative numbers:



This line number is used for making students clear about the adding and subtracting concept.

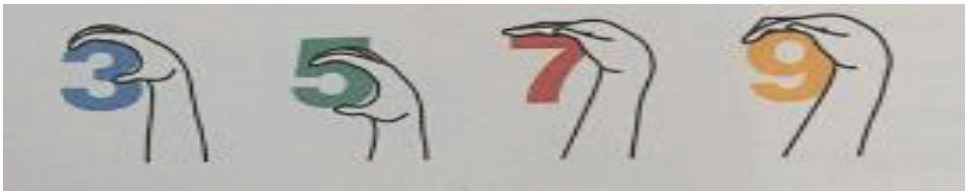
- **Use Strategies for Number Writing**

Some students have difficulty learning to write numbers and may benefit from the use of models, stencils, copying over dashed-line numbers, or from additional practice. Some students may reverse numbers when they write. Although many reversals may be obvious (e.g. 3), other reversals may not. For example, a reversed 2, may look like a 6, and suggest a problem with number facts, when the true problem is writing, as shown in the following illustration:



Most of the students face the problem of math number while writing. They did not follow the proper direction of the writing number and make some kinds of mistakes. In this condition we can apply the writing number worksheets to solve the problem.

Bley and Thornton (2001) suggested a strategy for remembering the spatial orientation of 3, 5, 7, and 9. That is curved part of 3 and 5 can be represented with the right and; and the 7 and 9 can be represented with the right hand and right forearm. That is, if 3, 5, 7, or 9 are written correctly, they can be imitated with the right hand. The example is as follow:



Some, number writing reversals involves two digits. For example, 18 can be written as 81. Again practice, feedback, and self-correction can be helpful in solve these reversals.

- **Use Questioning to Promote Understanding of Symbols**

Ginsburg (1998a, 1998b) described the case of first-grader who could answer problem such as 3 + 4=?, but could not explain what was meant by the 'plus' and 'equal' symbols:

- Toby: ……it tells you three plus four, three plus four, so it is telling you that um, I think, the, um, the end is coming up-the end.
- Interviewer: the end is coming up- what do you mean, the end is coming up?
- Toby: like, if you have equals, and so you have seven, then. [she is gesturing to the problem on the table]. So, if you do three plus four equals seven, that would be right.

Other children may state that = means 'makes' as in "6 + 3 makes 9" (Ginsburg, 1998a). As students acquire skill in mathematics, question them to determine that they also understand concepts represented by mathematical symbols. If not, reemphasize previous concept-building activities, such as equivalence.

- **Use Touch Math to Promote Addition and Subtraction Computation**

This strategy is visually based and inexpensive; we can make our own materials. The numbers are actually manipulatives within themselves because we touch them to count. When students have mastered counting the items, introduce the numbers with their corresponding touch points,

which are the dots on the numbers. Note that the dots with circles around them should be counted twice, meaning that both the dot and the circle should be counted.

Do not try to teach the points on numbers 1-9 in one lesson. Students with special needs need information broken down so that they can process it and are not overwhelmed. Depending on a student's ability level, you might teach numbers 1-3, then 4-6 and finally 7-9. You can make more or less groups of numbers depending on the individual student, such as, 1-5 and 6-9 or 1-2, 3-4, 5-6 and 7-9.

Moreover, even when students have mastered relevant concepts of addition and subtraction, they necessarily be able to calculate problems quickly and accurately. A strategy for assisting with calculating arithmetic problems quickly is Touch Math materials (Innovative Learning Concepts). These materials represent quantity by dots on each of the numbers 1-9, as shown Figure 3.2.

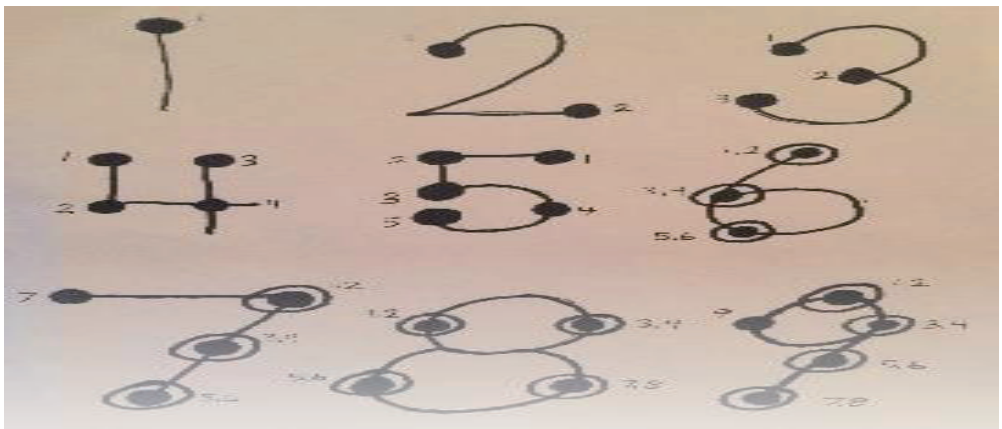


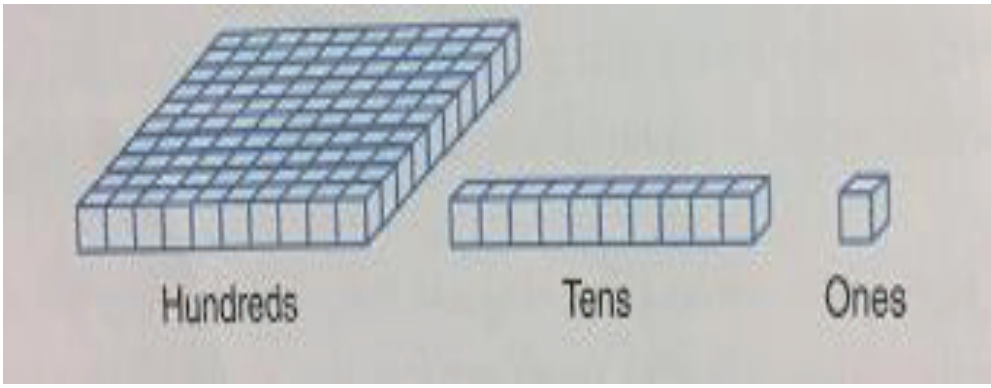
Figure 3.2 Touch Math Numbers

In this process, students learn that each number is associated with a certain number of dots (touch points), which can be counted forward or backward to compute sums and differences. Note that the numbers 1-5 have solid dots, the total representing the quantity of the number. After 5, Touch Math uses circled dots, or "double touch points" each of which represents the quantity 2. Students learn to touch each of the touch points once, and to touch each double touch point twice, with their pencil when counting.

Furthermore, a complete set of touch math materials has been developed along with worksheets and teacher materials and is available from Innovative Learning Concepts. Individuals students can have taught to use touch math methods if they are having particular difficulty remembering addition and subtraction facts, and we want them to engage in computation problem with the rest of the class. In some cases, particularly in the primary grades teachers use touch math with the whole class. However, if remembering math facts is a classroom standard, it may be important to continue to teach these facts.

- **Use Strategies for Place Value and Regrouping**

Place value is a concept of that is linked to our base-10 system, and students must learn this concept as they use numbers of more than one digit. Use of base-10 blocks can be helpful in establishing this concept. First students learn to count individual base-10 units. They next learn that units are combined as groups of 10, and that groups of 10 are combined as groups of 100. Therefore, the quantity 111 can be represented as follows:



When students understand the concept place value, they will be able to explain that the 1 in the quantity 123 represents 1 hundred, the 2 represents 2 tens, or twenty, and the 3 represents three units. We can practice place value by having students build, count, and record numbers from different values of 1s, 10s, and 100s. Students can also learn to add and subtract with base-10 blocks. Making certain the appropriate values are lined up, they add or subtract within each column, as shown in Figure 3.3.

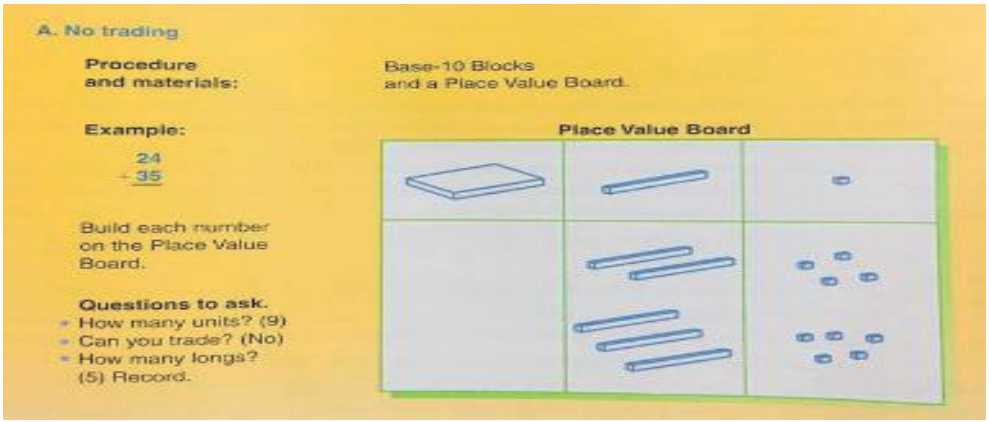


Figure 3.3 Base-10 Representation of 24+35

Regrouping in addition occurs when the unit values of any column exceed 10. These units must then be combined and placed in the next higher value, as shown in Figure 3.4. It is also important for students to see how numbers are used to represent these concepts, by recording number values when the building and counting have been completed.

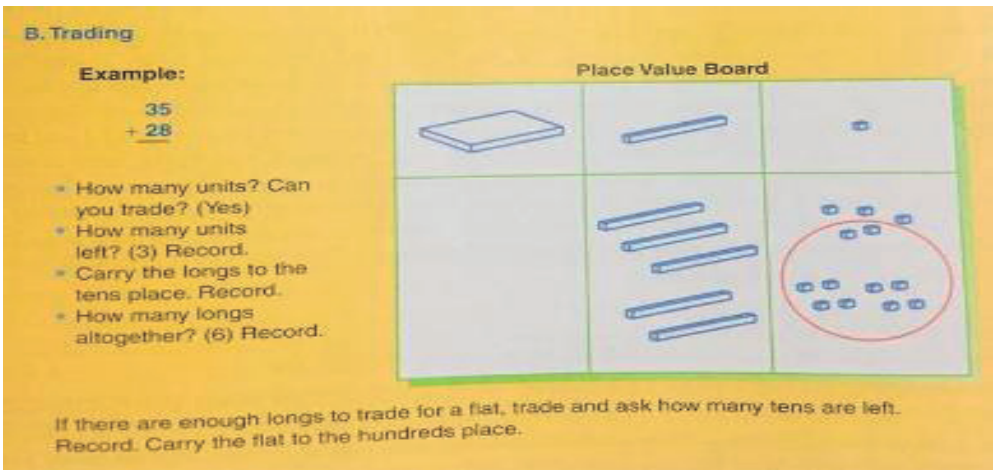


Figure 3.4 Representation of 35+28

For regrouping in subtraction, students must learn to "trade up" for 10 of a particular value in the higher column. For example, for the problem 14-6, students learn the one 10 must be traded for 10 units and added to the 4 unit units column. Subtracting 6 from the 14 units, then leaves 8, the difference.

Uberti, Mastropieri, and Scruggs (2004) scribed the use of a self-monitoring checklist to improve performance on regrouping algorithms. The teacher developed self-monitoring checklists for third-grade students with learning disabilities and some students for whom English was a second language, who were having difficulties with regrouping. The checklists, based on an error analysis for each student, included steps for problem solution, including writing down the unit value in the sum and carrying the 10s value above the tens columns. Students checked each step when they completed it. After several practice tests, students with special needs performed the calculation at the level of the mean of the whole class (as cited in Mastropieri & Scruggs, 2010).

- **Use Small Group Tutoring as a Tier II Intervention**

Response to Intervention (RTI) strategies can be implemented to identify and prevent learning disabilities. Fuchs, Fuchs, and Hollenbeck (2007) described a model of intervention to identify students at risk for development of mathematics difficulty and a Tier system for providing intervention. First-grade students who scored poorly during the third through fifth weeks of the school year (i.e., correctly answering an average of 11 or fewer of 25 problems on weekly tests) were provided with Tier II remedial help in the form of small-group tutoring using concrete, pictorial, and graphic materials; and practice on math facts with software program. After 16 weeks of instruction, two or three times per week, 30 minutes per session, the proportion of students at-risk for math difficulties was sharply reduced (e.g., from 9.75% to 5.14%). Students failed to respond profitably from the Tier II instruction could be considered for special education.

3.6 Strategies for Teaching Multiplication and Division

Knowing multiplication facts and division is an important building block in learning mathematics. Being a mathematics teacher, here we will discuss strategies on how to teach multiplication facts and division to students with disabilities (SWDs). For students with disabilities (SWDs), memorizing and understanding multiplication facts and division can pose a wide range of challenges. These learning challenges can include:

- Poor cognitive development that impacts overall thinking and reasoning
- Processing difficulties that lead to poor memory and the inability to focus on the task at hand

- Behavioral and social-emotional deficits that impact a child's learning

To help SWDs overcome their challenges and master multiplication facts and division, we need to implement specific strategies these are as follows:

- **Use Manipulatives**

Multiplication and division concepts can be enforced through the use of manipulatives, such as base-10 blocks. For example, show students a set of 3 units, and ask them to put together 4 such sets. After this has been done, inform students that they have a set of 3, four times. By counting total units, it can be seen that 3 taken four times, or 4 times 3 is 12.

Students should come to understand that division is “the separation of a quantity into equal size parts”. To enforce division concepts, show students a set of 12 units, and ask them how many separate groups of 3 they can make. It can then be shown that they can divide 12 units into 4 sets of 3. Therefore, 12 divided by 4 is 3. These concepts may not be acquired rapidly by all students, but repeated practice activities, such as those found in Building Understanding with Base Ten Blocks (Activity Resources), can be helpful. It may also be important to extent the activities beyond base-10 blocks to enhance generalization of the concepts, to, for example, beans, beads, or buttons.

- **Teach “Count-Bys”**

A useful bridge between learning multiplication concepts and learning multiplication facts is the use of count-bys. Students who have learned to count by 2 (2, 4, 6, 8, and so on) can use their fingers or pencil tallies to count up to 2 x 6 (2,4, 6, 8, 10, 12). Students also easily learn to count by 5s, because all numbers end in 5 or 0.

It may be helpful to learn to count by other numbers as an introduction to fact learning with those numbers. Touch Math uses strategies involving count-bys to compute multiplication and division facts. In multiplication, students count by one number while touching the points on the other number. For example, for 5 x 4, students count by fives while touching the points on the 4: “5, 10, 15, 20”. Show

students that it works the same if they count by fours while touching the points on the 5: “4, 8, 12, 16, 20". Such procedures also enforce the concept of multiplication (e.g., “5, 4 times= 4, 5 times"). For division, students make tally marks (I) while counting up to the divisor by units of the dividend. The number of tallies is the quotient. For example, for 12 ÷ 4, students count up by 4s while tallying, 4, 8, 12 (marking, / / / or 3).

- **Use Specific Strategies for Teaching Multiplication and Division Facts**

Remember that the learning of multiplication and division facts is more of a verbal learning task than a mathematical reasoning task. That is, while understanding concepts relevant to multiplication and division (e. g., 6 groups of 4) involves mathematical reasoning, immediate recall of the (What is 5 times 4?) requires verbal memory. Because that is the case, strategies for increasing verbal memory are appropriate. Use drill and practice with flash- cards, computer activities, such as Math Blaster (Knowledge Adventure), peer tutoring, and homework assignments. The Research Highlight feature describes an investigation of class-wide assign peer tutoring using peer-assisted learning strategies (PALS) in math.

- **Use Mnemonic Strategies**

The remaining 15 multiplication facts still may not be easy for all students to learn, and many students may not automatically recognize the reverse (commutativity) of each fact. However, there is a mnemonic strategy that might be helpful in some cases like as,

- Used to reinforce objectives to remember specific content,
- Directly taught and practices,
- Combined with comprehension instruction, and
- Included with application activities.

There are three specific types of mnemonic strategies such as =, keyword method, Pegwords method, and letter strategies have been successful in enhancing memory of students with special needs. Using the pegword strategy, rhyming words are developed for all numbers (e. g., 1 is bun, 2 is shoe. 3 is tree, 4 is door, 6 is sticks, 7 is heaven, 8 is gate, 9 is line or vine). Pegwords for relevant numbers higher than 10 include: 12 is elf, 16 is sitting; and 18 is aiding. Twenty is represented as

twin-ty, so 21 is twin buns. Thirty is dirty or thirsty; 40 is party; 50 is gifty (i. e., gift-wrapped); and 60 is witchy. Using these Pegwords, sentences can be developed for each of the 15 remaining facts (Mastropieri & Scruggs, 1991, as cited in Mastropieri & Scruggs, 2010).

Fact	Pegwords Strategies
• Three times three is nine.	• Tree-to-tree vine.
• Three times four is twelve.	• Tree in door is elf.
• Three times six is eighteen.	• Tree losing sticks needs aiding.
• Three times seven is twenty-one.	• Tree in heaven has twin buns.
• Three times eight is twenty-four.	• Tree at a gate has twin doors.
• Four times four is sixteen.	• Door-by-door sitting.
• Four times six is twenty-four.	• Door with sticks has twin doors.
• Four times seven is twenty-eight.	• Door in heaven has twin gates.
• Four times eight is thirty-two.	• Door in gate has dirty shoe.
• Six times six is thirty-six.	• Sticks, sticks, and dirty sticks.
• Six times seven is forty-two.	• Sticks in heaven for party shoe.
• Six times eight is forty-eight.	• Sticks in gate is a party gate.
• Seven times seven is forty-nine.	• Heaven to heaven has party line.
• Seven times eight is fifty-six.	• Heaven's gate has gifty sticks.
• Eight times eight is sixty-four.	• Gate to gate is witchy door.

Some of these facts are easy to imagine: for example, tree-to-tree vine is simply a vine between two different (not twin) trees. Others, however, may be more difficult for students to imagine automatically. In these cases, a picture of the mnemonic may be helpful, such as the pictures for 4 x 4 = 16 and 6 x 6 = 36, shown in Figure 3.5.

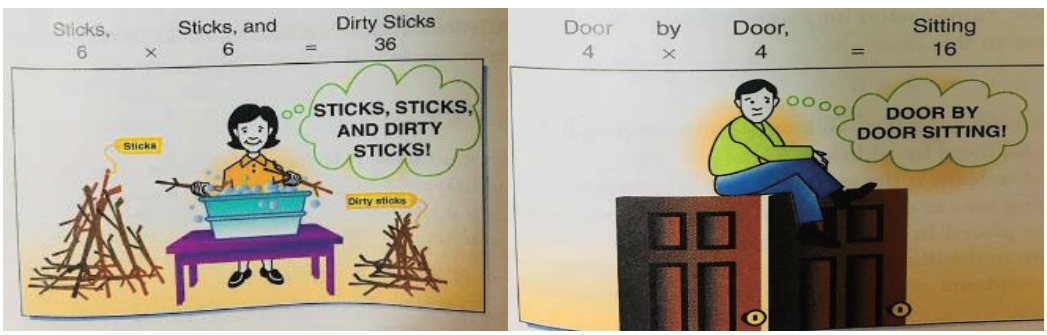


Figure 3.5 Mnemonic Picture of 6 x 6 = 36, and 4 x 4 = 16.

Guide students to learn to say the paired mnemonics together. such as "Heaven's gate has gifty sticks; seven times eight is fifty-six". Reserve these strategies for the facts students appear to be having the most difficulty with, rather than teaching all 15.

- **Use Calculators When Appropriate**

It is sometimes recommended that computers and calculators used to replace memorization math facts and computation exercises. Nevertheless, most schools remain committed to mastery of facts and computation procedures as important mathematics objectives. Of course, if students are not required to memorize math facts, then it is not necessary that time be spent on these objectives. However, in some cases, it may become evident that students are simply not succeeding at memorizing facts and are beginning to lose valuable instructional time in other areas of math because of this problem.

In such cases, it may be prudent to allow individual students to use calculators for help with computation, while proceeding to other math objectives. If such a decision is made, however, make sure those students have a documented failure to learn facts over time, all known strategies and procedures have been attempted, and the students are beginning to lose valuable instructional time in other areas of math.

If these conditions have been met, it may be prudent to allow students to use calculators. For example, Horton, Lovitt, and White (1992) found that junior high school students with mild intellectual disabilities performed similarly to nondisabled students in computation problem when they used calculators. Without calculators, their performance was lower. However, do not assume all students will be able to use calculators without any training. Provide modeling, prompting, and evaluation to ensure students are independent at calculator use. Students should be retested periodically for their capacity to learn facts. It could be that with increasing age and cognitive development, or more familiarity with other aspects of math fact learning can be attained at a future date.

3.7 Strategies for Teaching Money and Time

All children need to learn about money and time in order to become independent adults. Let's look at some effective ways to teach money and time skills in the special education classroom. We use our

understanding of numbers, math, and money every day. Whether we are shopping for groceries, making a budget, or paying a utility bill, we need to understand the basic concepts related to money and time and how much things cost and time schedule. Many children learn money and time skills through general education and personal experience, or by watching their parents. However, students with disabilities often need special instruction to develop money and time skills.

- **Practice Coin Recognition and Counting Money with Appropriate materials**

One of the primary uses of mathematics calculations in adult life involves calculations involving money, and it is important to involve students in this area as soon as possible after basic counting skills have been mastered. An early concept student could learn is to identify coins of different values. This can be done through providing drill and practice and demonstrating instances and noninstances of coin values (simulated coins and bills or bill and coin stamps are available from Delta Education).

Once students have learned to name coins, they need to learn the value of each coin. Again, direct teaching and drill and practice, perhaps using flashcards with the coin on one side and the value on the other, will help enforce these values. When values are mastered, students will be ready to learn to count change as shown by teacher In the Classroom feature. Additionally, the software programs Make Change and Count Money from Math Skill Builders (S & S Software) and Money Challenge (GAMCO Educational Software) can provide for useful practice. In the case of Nepal, teacher will follow above mentioned teaching technique or apply another proper teaching activity which will be applicable to teach money concept.

- **Use Appropriate Methods and Materials for Teaching About Time**

Another important skill for all students is telling time. Materials, such as student clocks that can be set to specific times, are available from suppliers such as Delta education and Harcourt Achieve. Generally, students are best taught by employing a specific set of subskills, as shown by teacher in the classroom feature. Teachers can model times or specific features of a clock on their own model and ask students to repeat the time on their own clock mode. For example, "Recognize the hour hand," teachers can demonstrate 4 o’clock on their own clock, and prompt students to set the hour hand on their own clock to 4 o'clock.

Peer partners, who are fluent in telling time, can be assigned to students who need more practice. Use of the time-telling checklist may be helpful in targeting the exact skills student need to practice. Peers can also be helpful in promoting other students' knowledge of time throughout the day. Finally, students who can recognize numbers but have difficulty learning to tell time may benefit from digital clocks and watches that display time in numerical formats that may be more easily recognizable. Use of digital timepieces can help students' knowledge of time while they are learning to tell time.

Let Us Sum Up

Teaching mathematics in the special education classroom takes patience, creativity, and a variety of instructional strategies. Providing resources, using a multi-sensory approach to instruction, and frequent repetition are strategies that can help struggling students be successful in the math classroom. When teaching math to special education students, there are several factors for an instructor to keep in mind. As well as there are a few common issues special education students face when they are learning mathematical concepts.

Special education is based on the idea of specialized instruction to meet individual student needs, so resources provided will vary from one student to the next. However, while the resources might vary, they can be delivered in a similar format. Posters, bulletin boards, and other visual supports around the room are excellent resources. The major strategies for teaching beginning math, teaching addition and subtraction, teaching division and multiplication, and teaching money and time for special children are described in the unit. Hope, these strategies are helpful for professionals and paraprofessionals to teach students with special needs as well as normal students.

Unit-End Activities

- **Objective Questions:** **Group "A"**

Tick (↓) the Best Answer.

1. Mathematics is academic discipline connected with the solution of problem that involves…
   a. **Quantity or number**
   b. Word or sentences

c. Reading problem

d. Writing problem

2. Mathematics does not include such branches…

a. Algebra

b. Physics

c. Geometry

d. Arithmetic

3. According carnine (1998), which one is not related the components of designing effective Mathletics education?

a. Focus on big ideas

b. Teach conspicuous

c. **Neglects needs of students**

d. Provide practice

4. Which is the best strategies for teaching counting?

a. Knowledge of previous

b. Problem analysis

c. Plan identification

d. Begin with just a few numbers

5. One-to-One correspondence refers to….

a. Set of different objects can be matched according to quantity

b. Match number to words

c. Match word to number

d. Match with expression

6. A helpful intermediate step between counting actual object and operating with numbers is concerned to….

a. Use number line to promote operations

b. Use manipulates

c. One-to-One process

d. Number writing

7. Touch math materials represent the quantity by…..

a. Words of the numbers

b. Dots on each of the numbers

c. Picture of the numbers

d. Write without seeing

8. In which Pegwords strategies is related to three times three is nine?

a. Tree in door is elf

b. Door-by-door sitting

c. Tree-to-tree vine

d. Gate to gate is witchy door

- **Short Answer Questions: Group "B"**

1. Define the concept of mathematics education.
2. Explain the importance of mnemonic strategies in mathematics teaching.
3. List out the strategies for teaching beginning math.
4. Define the concept of touch math to promote addition and subtraction.
5. What is one-to-one correspondence?

- **Long Answer Questions: Group "C"**

1. Explain the strategies for teaching addition and subtraction to the students with special needs.
2. Why mathematics is complicated for students? Explain the different strategies for teaching mathematics.
3. Describe the strategies for teaching money and time to children with special needs.

- **Points for Discussion**

- Mathematics education.
- Mathematics education and students with disabilities.
- Teaching mathematics in inclusive setting.
- Strategies for teaching beginning math.
- Strategies for teaching addition and subtraction.
- Strategies for teaching money and time to students with special needs.
- Strategies for teaching multiplication and division.

Unit IV: Teaching Study Skills for children with special needs

4.1 Concept of Study Skills

Study skills are essential for all students at all grade levels. Although the appropriate use of study skills is particularly essential at the upper elementary, middle, and secondary levels, acquisition of study skills should begin early in the educational career. Hoover and Patton (2007) emphasize the need for integrated study skills programs throughout one's schooling and as lifelong skills. Schumm and Post (1997) wrote that effective use of study skills facilitates personal learning (as cited in Polloway, et al., 2008).

Moreover, most of the need to acquire and use study skills in learning is intuitive based on their connections to various educational tasks. For example:

- Knowing how to take tests contributes to better test taking
- Effective note taking facilitates and greater understating of lecture content
- Efficient use of time contributes to more effectively completing tasks
- Ability to accurately interpret graphic aids is necessary to effectively use picture clues
- Self-management facilitates efficiency in task completion

Study skills are instrument for the success of students with learning disabilities. These examples are strongly implying the necessity for developing study skills, beginning in early elementary school, and continuing into and beyond secondary education. In support, various researchers and experts in the field of study skills have documented research results or other evidence highlighting the significance of study skills and usage. In addition, study skills include those competencies associated with acquiring, recording, organizing, synthesizing, remembering, and using information and ideas. Such skills assist students in confronting the educational tasks associated with the learning process. So that, teaching study skills to the students is a great way to show them how they can take more ownership of their learning.

Students with learning problems often lack strategies for organizing and remembering information (Day & Elkins, 1994). Thus, study skills facilitate mastery of a number of learning components, which are illustrated and defined in the following list:

- ***Acquisition:*** The crucial first step involved in learning; the first experiences encountered by learners
- ***Recording:*** Any activity in the classroom that requires the learner to record responses, answers or ideas, including both written and verbal forms of communication
- ***Location:*** Seeking and finding information
- ***Organization:*** Arranging and managing learning activities effectively
- ***Synthesis:*** Integrating elements or parts to form a whole, creating something that was not clearly evident prior to synthesis
- ***Memorization:*** Remembering learned material; storing and recalling or retrieving information

4.2 Types of Study Skills

Students' success in academic areas is influenced by their use of effective study skills. Study skills are an array of skills which tackle the process of organizing and taking in new information, retaining information, or dealing with assessments. Various study skills exist, including reading at different rates, listening, note taking, report writing, making oral presentation, using graphic aids, test taking, using the library, using reference materials, managing time, organization skills, and managing behavior. These types of study skills and their importance are discussed in the following sections below.

4.2.1 Reading at Different Rates

The ability to use different reading rates is an important study skill (Harris & Sipay, 1990) that is most evident as students' progress through the grades. Teachers at the elementary and secondary levels must often teach their students how to develop reading rate skills. Kiewra and DuBois (1998) stressed the importance of reading with purpose and reading rates vary to meet different purposes. Although various terms are used to describe the different reading rates, reading rates include skimming, scanning, rapid reading, and careful, or study-type reading (as cited in Polloway, et, al., 2008).

Skimming refers to a fast-paced reading rate used to grasp the general idea of material. As students quickly skim materials, they may deliberately skip over different sections. Scanning is also a fast-paced reading rate used to identify specific items or pieces of information. Students might scan material to search for a name or a telephone number. Rapid reading is used to review familiar material or grasp main ideas. In rapid reading, some details may be identified, especially if the reader needs the information only temporarily.

Moreover, normal rate is used when students must identify details or relationships, solve a problem, or find answers to specific questions. Careful or study-type reading is a slow rate used to master details, retain or evaluate information, follow directions, or perform other similar tasks (Harris & Sipay, 1990, as cited in Polloway, et, al., 2008). The nature of the material being read helps to determine the need for varied reading rates; different activities also require different reading rates. In many reading situations two or more rates must be employed. For example, a student may scan several pages to locate a name and then use normal or study-type reading to the details surrounding that name. Varied reading rates, when used appropriately can be highly effective and important study skills for students with learning problems.

4.2.2 Writing Reports

Report writing is widely used method of documenting information and expressing ideas. In addition, report writing involves the various skills necessary to organize and present ideas on paper in a meaningful and appropriate way. Writing report Included topic selection, note taking, organization of ideas, outlining, spelling and punctuation, and sentence structure. Because students with learning problems often have writing problems (Welch & Jensen, 1990), teachers must provide direction in each area associated with written reports to ensure satisfactory growth and progress. Bos and Vaughn (2006) noted that students with special needs require more time devoted to writing than typically spent in classrooms.

4.2.3 Taking Notes/Outlining

Effective note taking/outlining skills allow students to document key points or topics for the future. Taking notes or outlining requires students to document major ideas and relevant topics for later use to classify and organize information. Note taking is a skill that requires students to determine

the most essential information on the topic and record that content (Marzano Pickering, & Pollock, 2001). Outlining is necessary to structure notes into main and subheadings for effective study. Note taking becomes less difficult once outlining skills have been acquired (Ekwall & Shanker, 2003, as cited in Polloway, et, al., 2008). Furthermore, study skills associated with reading, listening, thinking, and using vocabulary may improve significantly as students develop effective notetaking abilities.

These involve summarizing ideas and organizing information into a useful format for future use. Instruction in this study skill area is particularly appropriate for students with learning problems as they often experience difficulties with organizing and recording information. With sufficient practice and systematic instruction, these students are capable of acquiring note taking/outlining skills, even though they tend to exhibit some difficulty in the process. These skills are basically needed for effective note taking process:

- Copy teacher or professor board notes and check Moodle
- Paraphrase professor's words
- Take up as much space as needed
- Review your notes every night or leisure time
- Create your own abbreviations
- Jot down any ideas that the professor repeats
- Notice verbal cues – "Now this is important"
- Highlight your book/class materials
- Write down all examples
- Rewrite your notes after class

4.2.4 Taking Tests

Effective test taking abilities help to ensure more accurate assessment of student abilities. Therefore, students in any grade are frequently subjected to various forms of assessment and evaluation. Even though tests are one of the primary means of assessing student's abilities and performances in school, many students do not possess sufficient test taking skills (Good & Brophy, 1995). Test taking skills are those abilities necessary to:

a. Prepare and study for tests,
b. Take tests, and
c. Review completed and graded test results.

They are important to ensure that tests accurately measure students' knowledge rather than their poor test taking abilities. In addition, test taking skills include reading and following directions, thinking through questions prior to recording responses, and proofreading and checking answers. Students who lack these abilities can learn them through instruction and practice (Good & Brophy, 1995, as cited in Polloway, et, al., 2008).

4.2.5 Using the Library

Library usage skills facilitate easy access to get much information in the areas of all subjects. Therefore, library activities are periodically required of students at every grade level. Moreover, library use requires skills in locating library materials, including using computerized systems; locating films, filmstrips, resource guides, and curriculum materials; and understanding the general layout and organization of the library. Knowledge of the role of the media specialist is also important. Although library use becomes especially important at the secondary level of education, it should be taught gradually and systematically through a student's schooling.

4.3 Strategies for Teaching Study Skills

Teaching study skills to a student is a great way to show them how they can take more ownership of their learning. It doesn't have to take much time, as we can integrate study skills activities into the normal flow of our class. One of the most useful lifetime skills that we can share with our students is to promote good study habits. Many teachers have found that teaching one study skill each day (as part of the opening moments of class, as a transition activity, or as part of the close of class) is effective and not too time-consuming.

Study skills are best learned and used within the actual context of completing meaningful academic tasks and when used strategically it increase class participation (Bos & Vaughn, 2006). This portion presents numerous study skill strategies and teaching suggestions; however, these must be used within the overall classroom structure as well as within specific teaching practices. As with any area of education, the teaching and learning of study skills must be individualized to meet unique learning needs.

Though the development and application of each study kill is specific to that study skill, a general process may be followed for learning and using study skills in the classroom to assist students in their development. One such process is presented next, followed by a discussion of two effective classroom practices for facilitating additional study skills use for students with learning problems.

4.3.1 Steps to Teaching Study Skills

The classroom development and use of study skills should follow a circular process that begins with assessment and is refined through ongoing evaluation. The four components are assessment, selection, implementation, and evaluation.

Assessment: The initial step in teaching study skills to learners is to assess particular needs areas within the classroom to determine the study skills the student must acquire. During the assessment stage, specific study skill areas requiring some development or refinement are determined (e.g., management, report writing, listening during lectures). This process is specific to individual learners as unique classroom needs often arise. The steps for informally assessing needed study skills is most appropriate in this process although standardized general information may be obtained through standardized measures. Once the specific study skill areas requiring development have been determined through assessment the second step begins.

Selection: In this second step two major decisions are must be made these are:

a. Which study skill areas will be initially addressed, and
b. Which methods of strategies will be selected to help the student learn in the identified study skill.

The selection of study skills to initially address should be determined based on classroom needs, immediate academic needs, and student motivation. Once the study skill to address has been selected, one or more methods or strategies for developing the skill must be determined. Numerous strategies for assisting students with the different study skills are presented in this unit. Some of these are individual teaching strategies (e.g., follow a consistent form of note taking, ensure proper reading rates are used, reward effective use of time, review test taking errors); others are fully developed student strategies that contain procedures where a specific process is outlined and followed (e.g., SQ3R, Guided Lecture Procedure [GLP], COPS, TOWER, ReQuest). The short description of these study skills are as follows in table 4.1:

Table 4.1 Study skill strategies

Strategies	Task Areas	process	Description
SQ3R	Reading	• Survey • Question • Read • Recite • Review	SQ3R provides a systematic approach to improve reading comprehension.
GLP	Note taking	• Guided lecture procedure	GLP provides students with a structure for taking notes during lectures. Group activity is involved to facilitate effective note taking.
COPS	Written reports	• Capitalization corrects • Overall appearance • Punctuation corrects • Spelling corrects	This strategy provides a structure for proofreading written work prior to submitting it to the teacher.
TOWER	Written reports	• Think • Order ideas • Write • Edit • Rewrite	It provides a structure for completing initial and final drafts of written reports. It may be used effective with COPS.
ReQuest	Reading Questioning	• Reciprocal questioning	Teacher and student ask each other questions about a selection. Student modeling of teacher questions and teacher feedback are emphasized as the learner explores the meaning of the reading materials.

In the above-mentioned study skill strategies selection step, the teacher and student must identify the study skill area to address (e.g., reading rate, time management) and then select teaching and student strategies that will assist the learner to develop and use the targeted study skill more successfully. Once this process has been completed, the third step begins.

Implementation: During the implementation step, the study skill teaching strategies and student strategies are reviewed and applied within actual classroom situations whenever the targeted study skill is needed. Teaching suggestions can easily be incorporated into various lessons and activities to help the student focus on the appropriate use of the study skill. The use of selected student strategies (e.g., ReQuest) requires some preparation and training on the part of the teacher. These student strategies each contain specific steps to follow to be properly used in the classroom and learning situation. Initial development of these student strategies should include time for practicing and learning the steps. Most of these strategies contain a few simple steps through which students may easily progress. Once the learner is familiar with and has practiced the steps within the selected strategy, its use should be applied on a regular basis when needing the targeted study skill; for example, if COPS is selected it should be used regularly when completing written reports.

The use of selected teaching suggestions and student study strategies should be continued for a specified amount of time (e.g., 2 school weeks; next five written reports) and the impact on the targeted study skill should be documented. For example, if COPS is used for five consecutive written reports, the students should document how their reports have improved in punctuation and capitalization. Once the targeted study skill has been determined and implementation of relevant teaching and student study strategies has begun, the final step occurs.

Evaluation: As discussed in the preceding step, the teacher should determine the specific amount of time strategy will be used. The evaluation of the effectiveness of the strategy used on the targeted study skill must also be determined. That is, how we know if the strategy is working must be determined. Use of simple checklists or anecdotal logs will facilitate regular and easy documentation of the effectiveness of strategy on the student's use of the targeted study skill (e.g., better written reports, more effective use of time, more organized lecture notes). As the study skill strategies are used by the learner, the effects on student use of the study skill will become apparent and should be documented. Use of the strategies should continue for the specified amount of time. Using the ongoing documentation as a guide, the use of the strategy to assist with the targeted study skill should be evaluated. If sufficient progress has been made, its use should continue. If not, other strategies should be tried following the procedures outlined in the second and third steps of the process.

In addition to the four-step process for teaching study skills, other popular and widely used classroom practices facilitate study skills development. Two of these are semantic webbing and cooperative learning. Both teaching practices facilitate the development, maintenance, and generalization of study skills while also assisting students with learning problems with various academic tasks. When used in conjunction with the preceding steps, varied experiences and opportunities are provided for students to develop and use the study skills.

4.3.2 Semantic Webbing and Study skills

Semantic webs are frequently discussed as an effective teaching practice to assist with reading comprehension and related areas of learning (Harris & Sipay, 1990, as cited in Polloway, et, al., 2008). Use of semantic webs provides students opportunity to collectively relate new and existing knowledge. Semantic mapping is also useful in assisting students to learn and apply study skills within actual classroom situations. As students use semantic webs they elaborate on what they know and graphically organize that knowledge. In addition, Marzano, Pickering, and Pollock (2001) indicated that a concrete visual representation of information (i.e. semantic web, graphic organizer), by its very nature further develops that knowledge.

Through semantic webbing, students build on previous study skill knowledge and experiences, no matter how inexperienced they may be in using study skills (Hoover & Rabideau, 1995, as cited in Polloway, et, al., 2008). In table 4.1 listed the most important study skills discussed in the below, along with several suggested semantic web topics for which subordinate ideas may be generated by the students.

Table 4.2 Semantic web topics for major study skills

Study skill	Semantic web topic
Test taking	Essay test, multiple-choice test, short-answer test, studying for test, taking test, reviewing the completed test
Library usage	Cataloging system, library organization, media specialist role
Presenting information	Written reports, oral presentations, visual presentations, topic selection, organizing thought, proper grammar, punctuation using visuals, speaking mechanics
Time management	Task identification, prioritizing tasks, recording task completion,

	daily, weekly, monthly
Reading rate	Fast-paced, slow-paced, getting main idea, locating details, determining sequence ideas, retaining information
Self-management behavior	Monitoring own behavior, assuming responsibility, changing own behavior
Organizational skills	Complete larger amount of work in shorter time frame, higher proficiency due to increased organization

Table 4.2 shows that many different semantic web topics and subtopics exist to help learners use their study skills. These may easily be adapted and expanded. It provides an example of a completed semantic web for helping students learn how to take multiple tests. In this example, the teacher identifies the main topic (test taking: multiple choice) and the subtopics (studying for the test, taking the test, reviewing completed test). The items surrounding subtopics are examples of student-generated ideas for using the study skill and applying the subtopics to their test taking.

Once the web has been completed by an individual or a small group of students, all learners should receive copies of the semantic web and select one or two ideas from the web to begin to apply in their learning. After students complete a multiple-choice test, they should analyze why and in what ways the web ideas helped them and what they can do in the future to best study for complete and review multiple-choice tests. This test-taking example is only one of many that teachers can model and adapt as they use semantic mapping to help students use study skills in the classroom.

Students who have learning problems may require specific training or coaching to successfully complete semantic webs for study skills development. A critical follow-up in the use of semantic webs is to develop and use study skills in actual classroom situations. As students share their success with their study skill webs, they will assist others to become more proficient in that study skill. In addition, use of the various study strategies and teaching suggestions discussed here above will help students apply the study skills they have identified through the semantic webbing.

4.3.3 Study Skills and Cooperative Learning

A classroom structure built on cooperative learning and its principle may also teach essential study skills. Marzano et al., (2001) focused that organizing students in cooperative learning groups has a powerful effect on learning. The use of cooperative learning on a regular basis in the classroom is a decision left to each individual teacher. However, should cooperative learning be used, study skills education should be an integral part of each student's academic and social growth. The following discussion provides a general overview of cooperative learning, along with consideration of ways to teach study skills through this method. Although researcher in this area have identified various ways of implementing cooperative learning, several common elements are frequently discussed (as cited in Polloway, et, al., 2008). These include:

- Positive interdependence
- Individual accountability
- Positive interactions
- Interpersonal training
- Group processing (Roy, 1990).

Through cooperative learning, students learn that their individual goals are best achieved through shared work and cooperation with others. Each of the five elements is briefly summarized below:

Positive Interdependence: It refers to a shared sense of mutual goals and tasks. All members complete their assignments and draw on the knowledge and skills of other group members in their own learning.

Individual Accountability: It allows each student to individually acquire the knowledge and skills, and also requires individual demonstration of mastery while learning in a group situation.

Positive Interactions: It is the element that supports sharing ideas and assisting others in their learning. As students interact in meaningful ways, important individual and group learning occurs.

Interpersonal Training: in this process it is necessary to prepare students, especially those who unfamiliar with cooperative learning to successfully and fully participate in the process. This is an important element in the strategy as the success of cooperative

learning in the classroom depends on how well-prepared students are to take on group work and group functioning.

Group Processing: It is the finale task where the cooperative group members evaluate their own contributions to the task. Through this concluding task, group members discuss their contributions, identify ways to improve overall member interactions, and suggest recommendations for future efforts. Documented student or teacher observations of the group's functioning may facilitate the debriefing of the group by providing objective data for members to discuss.

Effective Use of Study Skills and Cooperative Learning

As previously discussed, study skills were identified as competencies or support skills that learners use to more effectively and efficiently record, organize, synthesize, and evaluate tasks and skills. For making learning more effective in school, regular and consistent use of study skills is necessary, especially in an era when increased workloads and expectations exist for all learners. In addition, as tasks become more complex, use of study skills becomes even more critical. Therefore, whether working cooperatively or independently, students must develop, maintain, and generalize the use of various study skills.

Within the parameters of cooperative learning, a direct relationship exists between effective use of study skills and the efficient implementation of cooperative learning. Positive interdependence, individual accountability, positive interactions, interpersonal training, and group processing provides examples of how study skill development and use are integral to cooperative learning structures. These above discussed five elements of cooperative learning along with suggested connections to students' use of study skills.

The degree to which students use study skills effectively can affect the overall performance of other group members. This includes student development and use of study skills, group sharing of study strategies for effective use of study skills, or the reflection of study skills use by group members during the group processing stage. Conversely, the inefficient use of time, inappropriate behavioral self-management, inefficient library or reference materials usage, ineffective test-taking abilities, or inability to select and use appropriate reading rates can

significantly interfere with the group's overall success. However, when used appropriately in cooperative groups, more effective group interactions and learning can occur.

Let Us Sum up

Study skills are instrumental in the success of students with learning disabilities. These examples are strongly implying the necessity for developing study skills, beginning in early elementary school, and continuing into and beyond secondary education. In support, various researchers and experts in the field of study skills have documented research results or other evidence highlighting the significance of study skills and usage. In addition, study skills include those competencies associated with acquiring, recording, organizing, synthesizing, remembering, and using information and ideas. Such skills assist students in confronting the educational tasks associated with the learning process. Therefore, this unit try to clarify the concept of study skills, types of study skills and their example, and best strategies for teaching study skills for special needs students. In addition, the chapter also explained the areas of study skills and their subskills which help to understand both the students and teachers.

Unit-End Activities

- **Objective Questions:** **Group "A"**

Tick (↓) the Best Answer.

1. Appropriate use of study skills is particularly essential at…..
    - **a. Upper elementary, middle, and secondary levels**
    - b. Higher level
    - c. All levels
    - d. Life-long
2. Which is not related to types of study skills?
    - a. Reading at different rates
    - **b. Acquisition**
    - c. Writing reports
    - d. Taking notes
3. Which skill are basically needed for effective note taking process?

a. Recording
b. Location
c. **Copy teachers board notes and check Moodle**
d. Synthesis

4. ……abilities help to ensure more accurate assessment of student abilities.
   a. Note taking
   b. One-to-one
   c. Using the library
   d. **Taking tests**
5. Guided lecture procedure (GLP) task areas is related to…..
   a. **Note taking**
   b. general intervention
   c. Questions
   d. Planning
6. The study skills COPS task areas is concerned to……
   a. **Written reports**
   b. Representation
   c. Engagement
   d. Reading
7. During ……step, the study skill teaching strategies and student strategies are reviewed and applied within the actual classroom situation.
   a. Evaluation
   b. **Implementation**
   c. Assessment
   d. Identification
8. Cataloging semantic web topic is concerned to…….
   a. Test taking
   b. Reading rate
   c. **Library uses**
   d. Time management

- **Short Answer Questions:** **Group "B"**
  1. Define the concept of study skills.

2. List out the types of study skills.
3. Define the concept of semantic webbing.
4. List out the process of effective note taking.
5. Explain the concept of study skill and cooperative learning.

- **Long Answer Questions:** **Group "C"**

1. What is study skills? Explain the importance and types of study skills.
2. Explain the strategies for teaching study skills to the students with special needs.
3. Show the difference between semantic webbing and cooperative learning.

- **Points for Discussion**

- Concept of study skills.
- Types of study skills.
- Strategies for teaching study skills.
- Concept of writing reports and taking notes.
- Concept of using the library.
- Semantic webbing and study skills.
- Study skills and cooperative learning.

Unit V: Teaching Reading Comprehension

5.1 Concept of Reading Comprehension

Reading comprehension is the process of making meaning from text. The goal, therefore, is to gain an overall understanding of what is described in the text rather than to obtain meaning from isolated words or sentences. In understanding read text information children develop mental models, or representations of meaning of the text ideas during the reading process. Mastropieri and Scruggs (1997) define comprehension as "a process of constructing meaning from written texts, based on a complex coordination of a number of interrelated sources of information". In addition, the authors of the RAND Reading Study Group (2002) define reading comprehension as "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (as cited in Polloway, et, al., 2008).

Above mentioned both definitions convey the complexity of this skill and also suggest the complexities associated with effective instruction. A strong argument can be made that comprehension is the most important academic skill that is taught in school. Shaywitz (2003) estimates that students who are good readers read l.8 million words per year, whereas those who are poor readers read only 8,000 words per year. Reading is required throughout the school experience and to deal effectively with the demands of adult living (i.e., lifelong learning). Furthermore, it must be applied to a variety of types of textual material (e.g., narrative and expository materials). Comparing good readers with poor readers provides a way to conceptualize the problems that poor readers present within classrooms. Therefore, a poor reader that require educational attention through well planned and explicit instruction.

Reading comprehension is certainly an area that is problematic for many students. A combination of key factors associated with the student, the textual material, and the reading comprehension process contribute to the difficulties that some students have. Therefore, their reading programs must emphasize and explicitly teach comprehension skills. Unfortunately, reading comprehension has been an area to which inadequate amounts of instructional time and attention have too often been dedicated (Carnine, Silbert, Kame'enui, & Tarver, 2004, as cited in Polloway, et, al., 2008). Students with special needs commonly encounter problems in understanding, figuring out, and remembering what they read for many

different reasons, ranging from decoding words to monitoring their understanding of what is read (Vaughn & Edmonds, 2006, as cited in Polloway, et, al., 2008). Often, the lack the background and experiences that contribute to making sense out of text. Dealing with abstract constructs and complex concepts poses significant challenges to some students. The nature of the textual material itself (e.g., the way it is organized, the type of textual material) further contributes to the problems of some students. When engaging printed text, strategic behaviors are needed and many students with special needs do not produce these strategies naturally.

How can reading comprehension be promoted and advanced in learners with special needs? Shanahan (2003), in referring to the National Reading Panel Report (2000) points out that teaching does matter.

> *Children can figure out lots of things on their own, of course, and practice can be as helpful in reading as in anything. But the greatest success is accomplished when teachers offer explicit instruction and guidance in several different reading skills and strategies simultaneously.*

Therefore, a solid argument can be made that comprehension is the most important academic skill that is taught in school. The ability to understand written material involves two facets of comprehension: word knowledge and text comprehension. The word knowledge facet relates to development of an adequate and functional vocabulary. And then, text comprehension facet relates to the ability to acquire meaning understanding, figuring out, and remembering what is read from interacting with a variety of textual materials (Shanahan, 2003, as cited in Polloway, et, al., 2008).

5.2 Nature of Reading Comprehension

The definitions of comprehension presented at above is indicate that this complex skill involves more than being able to answer questions after one has read some type of printed material. The importance of comprehension is evident not only in most school contexts but also in most life contexts, as the demand of being able to comprehend oral and written information on a daily basis is clearly apparent.

A number of key concepts associated with comprehension need to be addressed prior to the subsequent discussions of assessment and intervention. These topics include the principal components of comprehension (inclusion of work and text comprehension skills); types of text structure, specific phases of the reading process; and the instructional implications of contemporary research.

5.2.1 Principal Components

Comprehension can involve either oral or written input. Understanding information presented orally is a complex process as well and can also be characterized as interactive, strategic, and adaptable. The National Reading Panel (NRP) (2000) identifies five essential areas of reading instruction these are as given below:

- Phonemic awareness instruction
- Phonics instruction
- Fluency instruction
- Vocabulary instruction
- Text comprehension instruction

The last two areas noted by the NRP relate directly to the understanding of textual material. The two main components of comprehension are word knowledge (vocabulary) and text comprehension. Word knowledge simply means that students understand the meaning of words and word variations such as figurative language. As well as text comprehension means that students are able to make sense out of passages of varying length and to use this information in other ways.

Specific skills in comprehension do not fit into a clear scope and sequence to the degree that is often seen with word recognition, but there are clearly areas of emphasis that teachers need to assess and address as part of a systematic instructional program. Lerner (2000) divided comprehension skills into four semi-distinct levels: literal, inferential, critical, and creative. Students need to become proficient in each of these areas. State standards in English/language arts require it. For instance, examining the performance standards for a typical standard as "Read with understanding and fluency" indicates that students must be able to demonstrate competence in these areas. Lerner's (2000), four levels of comprehension are as follows:

Literal Comprehension: It refers to information as printed in text. Attention to literal recall includes comprehension for details, sequence of events, and major characters in the story. Most reading programs have traditionally addressed literal comprehension as their primary concern.

Inferential Comprehension: It requires the reader to move beyond the literal information to infer the meaning of text. Although it is often mistakenly referred to as a lower-level skill, deriving the main idea from text is a good example of inferential comprehension. In this case, students are required to consider what they have read and infer the primary focus of the author.

Critical Comprehension: It requires the reader to analyze and evaluate the information that has been read, typically to develop new perspectives relative to the content. All comprehension draws on prior knowledge, but critical comprehension in particular tasks the reader to use new information, for example, to compare and contrast it with other information learned at a prior time or to make judgments related to what was read.

Creative Comprehension: It refers to refining what was read to a level where the student produces new insights and thoughts that spin off the content read.

To complement this model of four levels of comprehension just described, Idol (1997) provides an alternative way to look at text comprehension, these are as follows:

- *Text explicit:* This type of comprehension text is dependent in that the answer is explicitly stated in the text (passage or picture).
- *Text implicit:* This type of comprehension is implied within the text or pictures. The derivation of this type of information is based upon two or more nonexplicitly connected details of the passage or picture.
- *Script implicit:* This type of comprehension requires integration of prior knowledge about the subject being read with one or more details from the passage or picture.

5.2.2 Types of Text Structure

To fully recognize the complexities of reading comprehension, it is necessary to recognize that different types of textual material exist. This is important because these different types of textual material present different demands and, as a result, the need arises to teach students to recognize the differences in text structure and to use appropriate strategies for the type of material they are reading. The two major forms of text structure are given below:

Narrative text: It is related to storytelling. In addition, it is manifest in material such as short stories, legends, science fiction, and other types of fiction. According to the Texas Reading Initiative (2000), narrative structure most often features a beginning, a middle, and an ending. It also typically includes clear story elements or story grammar, including characters, setting themes, a central problem or conflict, a sequence of events that forms the story line, and a resolution to the conflict.

Expository text: It relates to material that is factual. Examples of expository text include textbooks, biographies, newspapers, magazines, catalogs, and other nonfiction materials. Most of the material that is encountered on the Internet is expository in nature. Expository text will not have the story grammar elements associated with narrative text but is likely to have other types of structures that students must be able to master (e.g., cause-and-effect or compare/contrast features). In addition, expository text (such as illustrated with this textbook) typically will incorporate headings and graphics into the textual material.

5.2.3 Phases of the Reading Process

The key elements of reading comprehension can be examined across three phases of the reading process: before, during, and after reading. Features that contribute to proficiency and that the student needs to display are listed for each of these phases.

Before Reading

- Adequate and dependable reading vocabulary in place
- Purpose and motivation for reading established
- Awareness of text structure

During Reading

- Awareness of one's reading by monitoring comprehension
- Words, phrases, sentences read accurately and quickly
- Connections made between/among sentences/statements
- Questions generated about what is being read

- Background experiences called upon to make predictions and establish relevance to content encountered
- Selectivity applied to what is and is not read
- Content that is of central importance, that is supportive or supplemental, and that is not important can be identified
- Visualizations (e.g., character, setting) can be created to help understand what is being read
- Inferences made in regard to topics presented

After Reading

- Reflections made on what has been read
- Summarization of what was read
- Main idea and key points identified
- Connections made from what was read to new situations

5.2.4 Implication for Instruction

The literature on reading comprehension instruction has been consistent in recommending that instruction be characterized as being explicit, intensive, and persistent. In addition, it needs to be well-organized and systematic.

Explicit instruction implies that the skills and strategies needed by students are taught to them using some form of direct instruction. The modeling/guided practice/independent practice paradigm should be implemented.

Intensive instruction suggests that sufficient time is allocated to comprehension. Moreover, intensive instruction includes a broad scope and sequence, incorporating the active participation of the student in the lessons. Lessons should include many opportunities for the students to try out what they have learned and should include ample feedback to the students.

Persistent instruction refers to the idea that instruction must be planned in such a way that a systematic set of lessons are developed and presented over time. What we want to avoid is

the "quick hit" type of lesson that does not provide enough opportunities for the students to master the skills being taught before moving on to other skill development.

Recently, much attention has been given to the use of science-based or empirically validated approaches to teaching reading. This emphasis gained national attention as part of the No Child Left Behind Act (NCLBA). A number of efforts were initiated to identify which reading practices had empirical support. One of these efforts was the creation of the National Reading Panel (NRP).

5.3 Instructional Approaches of Reading Comprehension

The selection of a general approach or approaches to teach word knowledge and text comprehension provides a basis for a program to enhance learning to read. The following examples illustrate some options that teachers have and that, as needed can be blended in with decoding programs. The focus of here is primarily on elementary level learners; in a subsequent section, special considerations for middle and secondary school students are addressed.

5.3.1 Basal Reading Approach

Basal reading programs are used in the vast majority of elementary schools; consequently, such materials are readily available. It usually contains a series of books or stories written at different difficulty levels, with most beginning at preprimary and primary levels and progressing through upper elementary levels. Most readers also have workbooks that allow students to practice specific skills.

Comprehensive, highly structured teacher manuals that completely outline each lesson typically accompany most basal readers. They provide skill objectives, new vocabulary, suggested motivational activities, verbatim questions to check comprehension on each page of text, and lesson activities. The lessons follow hierarchy of specific reading skills. Although some teachers think basal manuals limit creativity, others find their structure and guidance valuable.

A basal program exposes students to a basic vocabulary that provides for repetition. Although structured in format, basal programs can be modified to meet individual needs while following a sequential developmental pattern of skill building. They have often been used to

assess a student's reading level and subsequent placement in an appropriate reading group. As long as the basal meets students' needs and falls within their interests and abilities, such placement may be temporarily adequate. Basal programs will not meet all needs, however, so the teacher must be prepared to revise and supplement the program.

Moreover, several methods can be used to supplement basal reading programs when students begin to have difficulty with the vocabulary or text comprehension demanded at increasingly higher levels. Teachers should avoid recycling students through the same stories, which can lower students' motivation to read. One alternative is to place students in another basal series at approximately the same level, thus giving them different reading experiences at approximately the same level and allowing for overlearning, which is important to students who have learning problems.

A second option is to follow the series' outline of skills as the manual presents them, supplementing them with other commercial reading materials. Many low-vocabulary supplemental materials cover interesting topics. In addition, a third option is to require students to write their own stories, as in the language experience approach. Such an experience can provide practice on reading skills that need reinforcement, and the students' stories can provide reading materials. Furthermore, a final option is to discontinue basal in favor of an alternative approach. Teachers should realize that many students cannot learn effectively through basal programs and should not force such student to fit into a program that is inappropriate for them.

5.3.2 Language Experience Approach

While language learning approach (LEA) was mentioned briefly above as an alternative to use with a basal series, it need not be used only with other approaches. In their classic work, Allen and Halvorsen (1961) described the basis for LEA:

- *What I can think about, I can talk about*
- *What I can say, I can write*
- *What I can write, I can read*

LEA encourages students to verbalize their thoughts and experiences, which are written down by the teacher or the student and can be read. These stories are reread by the student and

by other students as the program progresses. Word lists are made from the words used in the stories to develop word-recognition skills and a working vocabulary. Phonetic and structural analysis skills can be taught when the teacher observes the student's readiness for such instruction. However, because LEA lacks the developmental structure of the basal approach, most teachers choose to follow the outline of a basal or another sequential program to guide students successfully through an LEA program.

The formal stages for using LEA are straightforward. Tompkins (2005) outlines these stages are as follows (as cited in Polloway, et, al., 2008):

1. ***Provide an experience:*** A meaningful experience is identified to serve as the stimulus for writing.
2. ***Talk about the experience:*** Students and teacher discuss the experience prior to writing. The purpose of the talk is to generate words and review the experience so that the children's dictation will be more interesting and complete.
3. ***Record the dictation:*** Teachers write down the child's dictation. Texts for individual children are written on sheets of writing paper or in small booklets, and group texts are written on chart paper.
4. ***Read the text:*** After the text has been dictated, the teacher reads it aloud, pointing to each word. This reading reminds children of the content of the text and demonstrates how to read it aloud with appropriate intonation. Then children join in the reading.

Beginning readers may be introduced to LEA as a class. The teacher should establish a common interest, such as a class animal, field trip, or television program. As students tell about their experiences, the teacher needs to assist them in transcribing the words on paper. Students then receive copies of the stories for their books. Word lists and seatwork activities are made from the stories. Independent reading books are also made available and should be encouraged. The transition from student-written material must be made at some points.

Moreover, commercial materials should be presented early in the program, but it must be well within the student’s independent level to ensure success. Because of LEA’s versatility and valuable motivational qualities, it is recommended as a supplementary program for students of

any age. It is most appropriately used for students with special needs when it accompanies systematic instruction in word-attack skills.

5.3.3 Whole Language and Literature-Based approach

Whole language is a reading instructional method that represents a logical expansion of the philosophy of the LEA. As Engelhard (1991) notes:

> *Whole language is conceptualized as a philosophy in which children learn naturally and holistically through the integration of reading and writing with good literature, emphasizing meaning and the use of real texts such as familiar stories and content area texts instead of basal readers. Furthermore, all aspects of language (oral and written) are integrated and taught across content areas.*

Polloway, Miller, and Smith (2004), provide the following summary of the concepts underlining the whole language approach (as cited in Polloway, et, al., 2008):

- Language, including speaking, listening, reading and writing, develops interdependently as well as in a social context.
- Students learn to read using authentic books, not basal.
- Students learn to write by engaging in the writing process.
- Students are allowed to learn at their own pace.
- Teachers serve as mediators, providing support but not interfering with the learning process.
- Students become involved in reading and writing that is connected to their own lives.
- Students should be immersed in an environment that is filled with language materials and activities, including high-interest reading materials, and print that they have helped produce.
- Students must be encouraged and motivated to share their experiences through literature.

Moreover, Core instructional activities that characterize this approach include following aspects:

a. Teacher-led discussions of stories
b. Shared book experiences through material such as Big Books

c. Sustained silent reading (SSR) (i.e., a regular time when students have an opportunity to practice reading using self-selected stories and content silently)
d. Silent reading time segments in which students write responses to what they are reading and share these with other students or with the teacher in individual conferences
e. Language experience activities in which children write stories in a group or individually to be used for future reading experiences
f. Time set aside for large-group writing instruction, followed by students' writing, revising, editing, and sharing their own writing
g. Reading and writing activities that involve a content-area theme such as science or social studies

Brand (1989) suggests theoretical reasons why such activities may be useful in addressing some of the difficulties students with disabilities experience. Organizing teaching around themes or topics may be easier for students with memory or cognitive difficulties than learning isolated skills or changing from one topic to another. Anxieties may be lessened, and self-esteem enhanced because whole language provides more opportunities for students to feel personal success when telling or writing an original story or experience (as cited in Polloway, et, al., 2008).

A program based on whole language has much to offer in the area of reading instruction. It provides an emphasis on reading authentic texts rather than the contrived stories that may often appear in basal readers, it provides a way to blend reading with instruction in the other language arts, and it emphasizes student active involvement in constructing meaning.

A key aspect of whole language programs is the reliance on literature (including novels, stories, magazines, and trade books) as the source of content for reading opportunities. Most of the researchers noted that, literature has the advantages of being authentic, varied, on the market faster, and thus current. It can meet diverse student needs and interests and offers alternative points of views on topics and issues as well as the opportunity to study topics in depth.

Let us Sum Up

Reading comprehension as the process of simultaneously extracting and constructing meaning through interaction and involvement with written language. moreover, reading comprehension has been an area

to which inadequate amounts of instructional time and attention have too often been dedicated. Students with special needs commonly encounter problems in understanding, figuring out, and remembering what they read for many different reasons, ranging from decoding words to monitoring their understanding of what is read.

This chapter illustrate the concept and importance of reading comprehension to students with special needs. In addition, the unit presented the actual nature of the reading comprehension including principal components, types of text structure, phases of learning process, and implications for instruction which directly or indirectly helps to the both teacher and students. As well as the chapter also clarify the instructional approaches to reading comprehension.

Unit-End Activities

- **Objective Questions:** **Group "A"**

Tick (↓) the Best Answer.

1. Reading comprehension is the process of …….
    - **a. Making meaning form text**
    - b. From history
    - c. From geometry
    - d. From culture
2. According to Shaywitz (2003), a student who are good readers read……. million words per year.
    - a. 1.5 million
    - **b. 1.8 million**
    - c. 1.2 million
    - d. 1 million

3. A students who are poor readers read ….. words per year.
    - a. 5 thousand
    - b. 6 thousand
    - c. **8 thousand**
    - d. 7 thousand

4. The word knowledge facet relates to development of an….
    a. Figuring out
    b. Seek out
    c. Remembering
    d. Adequate and functional vocabulary
5. Which is not related to alternative way to look at text comprehension?
    a. Text taking
    b. Text explicit
    c. Text implicit
    d. Script implicit
6. Narrative text is related to….
    a. Storytelling
    b. Representation
    c. Reading
    d. Memorizing
7. How many phases in reading process?
    a. 2
    b. 3
    c. 4
    d. 5
8. Which activities is related to after reading phase?
    a. Visualizations
    b. Awareness of text structure
    c. Summarization of what was read
    d. Time management

- **Short Answer Questions: Group "B"**
    1. Define the concept of reading comprehension.
    2. List out the nature of reading comprehension.
    3. Define the concept of basal reading approach.
    4. List out the instructional strategies of reading comprehension.
    5. Explain the concept of principal components.

- **Long Answer Questions:** **Group "C"**

1. Explain the concept of reading comprehension and its importance.
2. Describe the nature of reading comprehension.
3. Show the difference between basal reading approach and language experience approach.

- **Points for Discussion**

- Concept of reading comprehension.
- Nature of reading comprehension.
- Types of text structure.
- Phases of reading process.
- Instructional strategies of reading comprehension.
- Basal reading approach.
- Language experience approach.

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