Efficacy of Self learning Adapted Social Studies Lessons in Kannada and Telugu for Children with Hearing Impairment at Secondary School Level

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Abstract

Textbooks are a vital tool in formal education serving dual purpose of teachers guide and learners. Children with hearing impairment find difficulty in using school textbooks due to their delayed language development. Therefore, to make them understand the lessons meaningfully ‘adaptation technique’ can be used. The present study employed a comparative experimental design to investigate the effectiveness of self-learning adapted lessons in enabling better understanding of social studies lessons in Kannada and Telugu among children with hearing impairment who are studying at secondary school level in Special schools. The main objectives of the study were to develop self-learning adapted lessons one from geography, history, civics and economics lessons of social studies textbook of Karnataka and Andhra Pradesh State Education Boards at secondary school level for children with hearing impairment as well as to develop pre and post tests material based on the textbook content and relevant adapted self-learning material. Another objective was to study the comparative effectiveness of adapted self-learning lessons versus social studies textbooks among children with hearing impairment. A total of 165 children with hearing impairment were

selected and stratified based on their grades and medium of instruction. Through random sampling they were divided into two groups i.e. users of textbook and users of self learning adapted material. The textbook and the adapted self learning materials developed for the social studies lessons in geography, history, civics and economics with Kannada and Telugu as medium of instruction were used during the experimentation process. Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the social studies lessons in Kannada as well as in Telugu languages. Self learning adapted materials were found to exert all round, positive impact on promoting learning in children with hearing impairment Thus, implying that adapted self learning materials were more effective as compared to textbook.

CHAPTER 1

INTRODUCTION

1.1 Hearing loss and its implications in academic learning

Hearing is critical to speech and language development, communication and learning. Hearing loss causes delays in development of speech and language, and those delays then lead to learning problems, often resulting in poor school performance. According to the American Speech-Language Hearing Association (ASHA, 1981), children with hearing loss who do not get early and adequate intervention services are likely to trail behind their hearing peers by anywhere from one to four grade levels.

The reasons behind this education gap may be because the classroom environment itself doesn't support a child with hearing loss. A busy teacher who has many students to tend to, or a teacher with a poor understanding of implications of hearing loss, often is unable to alter his/ her teaching style or keep a student's hearing loss in mind while teaching a lesson or assigning homework. For example, if a teacher turns his/ her back to the students while teaching, his/ her voice will be directed toward the blackboard, causing a student with hearing loss to miss part of the

lesson. Oral changes to homework assignments, an unfamiliar accent or a teacher who talks too rapidly can all hinder the learning progress of a student with hearing loss. (Luckner & Denzin 1998)

Classroom environment should be accessible for a child with hearing loss. While the inability to hear affects all aspects of academic achievement, the areas most affected are those involving language concepts, vocabulary, language arts, sentence structure and idiomatic expressions, which are extremely difficult for a child affected by hearing loss to grasp. Frustration and confusion can also play a big part in poor academic performance. Even children with mild hearing loss have trouble hearing in a classroom environment, especially listening to a teacher from a distance or amid background noise. They have difficulty in hearing the high frequency consonants in the language (for example: ch, f, k, p, s, sh, t and th) (Brannon & Murry 1966).

According to Antia et al. (2009), in terms of academic performances, children with hearing impairment often lag behind their hearing peers. Moores (2001) insists that most of the children who are deaf have normal intellectual capacity, and it has been repeatedly demonstrated that their scores on non-verbal intelligence tests are approximately the same as those of the general population. Hearing loss does not have any limitations on

the cognitive capabilities of individuals. Students with hearing loss always face difficulties in perceptual abilities and it is only the demands of spoken and written language that they are confounded with (Hoemann & Briga, 1981).

The grammar and structure of language in children with hearing impairment often do not follow logical rules (Norris & Hoffman, 1993). Many students who are deaf tend to write sentences that are short, incomplete or improperly arranged. They may omit endings of words, such as the plural-s, –ed, –ing, etc. They may even have difficulty in differentiating questions from statement and children with significant hearing losses lag behind hearing children on mathematics achievement tests by roughly three years, despite displaying normal intelligence quotients (Traxler, 2000). Even as they face difficulties in a skill-based subjects involving limited use of language like mathematics, they face even more severe deprivations in knowledge-based subjects like sciences and social studies (Paul & Quigley, 1990). Especially social sciences, as the instructional transaction is predominantly verbal in nature.

1.2 Lacunae in instruction of children with hearing impairment

According to Rachel McKee and Eileen Smith (2003), the following difficulties are encountered in instructing children with hearing impairment:

- Due to the lack of language, children with hearing impairment do not feel as being a part of the instructional process.
- Because of the communicational difficulties, teachers are less accepting of children with hearing impairment. Consequently these children are ostracized in the class room.
- Teachers may not be aware of the full implications of hearing loss and they may not be trained to adapt and teach lessons for children with hearing impairment.
- Sometimes teachers are found lacking even in essential knowledge about subject matter and skills for imparting effective learning.
- Even if they had necessary knowledge and skills, teachers do not have sufficient time to adapt and teach lessons for children with hearing impairment.

- In many instances, teachers are also found incapable of managing atypical behaviours in children with hearing impairment.
- Communicational problems existing between teacher and children with hearing impairment also creates lacunae in academic learning.
- Children with hearing impairment find it difficult to follow classroom instruction and they may miss information.
- Pace of curriculum in general is too fast for most children with hearing impairment, without providing enough time and space for pre and post teaching of concepts, new vocabulary, etc.
- Even when teachers feel the need for extended time frame, the academic schedules do not provide opportunity for it.
- Attitudes of teachers like lack of understanding/ appreciation of the difficulties of students with hearing impairment and their unwillingness to make adaptations also leads to problems in academic instruction.
- Teachers or schools may not have enough resources (like trained teachers; teaching-learning material; accessible physical,

communicational and instructional environment) to train children with hearing impairment.

Ultimately, all these difficulties leave children with hearing impairment stranded in the process of class room learning; implying impending need for adapting the instructional process to accommodate their special needs.

1.3 Difficulties faced by learners with hearing impairment in using textbooks

If children with hearing impairment are not identified early and intervened, they might hardly have age-appropriate receptive and expressive language. Consequently, they find it difficult to use school textbooks because the language used in the textbook either differs from everyday language or it is made suitable to the language level of typically hearing children. In addition, there are other problems in textbooks such as presenting too many concepts together, vocabulary load, complex and long sentence structures, usage of too many concrete and abstract words, and usage of idiomatic language and figures of speech (Luckner & Denzin, 1998).

Therefore, children with hearing impairment have to be taught using special methods and techniques to make them understand the concepts meaningfully. In order to solve the problems of the textbook as well as to

make teaching learning process interesting *'adaptation technique'* can be used. Even though, social studies is an important subject in helping children to learn about the past events, contents of the society, environment and civic life around them; social studies textbooks are dull and boring. Hence, it is essential to adapt social science textbooks to become interesting and useful for learners with hearing impairment.

1.4 Vitality of adapting textbook content

A textbook acts as a guide to the teacher in teaching-learning process. The textbook selected by the teacher/ school should be user friendly, clear and easy to use. To understand directly from the textbook is difficult for children with hearing impairment and many times they reproduce the words without understanding the actual meaning and use superficial visual matching while answering the questions. Adaptation technique helps children with hearing impairment in understanding the concepts in a more meaningful manner (Hutton & Halifax, 1869). It is in this backdrop the Persons with Disability Act (1995) has stressed the need for curricular adaptation and has made provisions for language exemption, curricular restructuring and adaptation of evaluation strategies. Developing readily available adapted text content that will help self-learn subject matter, especially minimally taxing the teachers will, empower learners with

hearing impairment, as well as increase the efficiency of the teaching learning process.

1.5 Need for the study

In classroom situation, educators of children with hearing impairment face serious problems when using the same textbook as that of the typically hearing children. Teachers evade making adaptations because it is very time consuming and they may lack adequate knowledge or skills to do. So, therefore the present study was an attempt to develop adapted self-learning lessons which can be used by the teachers as readymade base models in hand for adapting the lessons. Not many endeavours have been conducted in this regard for children with hearing impairment. Hence, an attempt was made to take up the present study.

Adaptation technique is a useful technique but research evidences available are few in number. More research is required to support the usefulness of the technique in teaching learning process for children with hearing impairment. Such constructive research would result in accrual of useful adapted learning material for all areas and levels of school curricula. It would be worthwhile, if adapted lessons can be developed and disseminated at the national level for children with hearing impairment so that teachers and caregivers can become familiar with

adaptation techniques and are able to support the learning of children with hearing impairment.

1.6 Definition of the problem

This study involves investigation of the usefulness and effectiveness of adapted self-learning materials for secondary school students with hearing impairment over existing textbooks.

1.7 Aims and objectives of the study

1.7.1 Aim of the study

To develop adapted self-learning material and investigate its effectiveness with learners with hearing impairment at secondary school level.

1.7.2 Objectives of the study

- To develop self-learning adapted lessons one from geography, history, civics and economics lessons of social studies textbook of Karnataka and Andhra Pradesh State Education Boards at secondary school level for children with hearing impairment.
- To develop pre and post tests material based on the textbook content and relevant adapted self-learning material.

- To study the comparative effectiveness of adapted self-learning lessons versus social studies textbooks among children with hearing impairment.

1.8 Hypotheses of the study

The following hypotheses were proposed for the study:

1. Children, who used adapted self-learning material, do not gain better comprehension than their peers who used existing textbooks in the following lessons in Kannada from Karnataka Education Board.

   i. ¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ (Transliteration: Bharathada prakruthika lakshnagalu; Translation: Physical features of India)

   ii. PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ (Transliteration: Kranthi haagu rashtra prabhutwagala udaya; Translation: Revolution and raise of nation states)

   iii. §qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ (Transliteration: Badatana mattu hasiv; Translation: Poverty and hunger)

   iv. ¨sÁgÀvÀzÀ d£À¸ÀASÉå (Transliteration: Bharathada janasankhye; Translation: Population of India)

2. Children, who used adapted self-learning material, do not gain better comprehension than their peers who used existing textbooks in the following lessons in Telugu from Andhra Pradesh Education Board.

i. sû'±µhµ lÉ¶¥A: sÔSÐz0µ ¶ªö±µÃq¸vÀ (Transliteration: Bharatha desham bhowgolika swaroopalu; Translation:India- relief features)

ii. 17, 18 ¶¢ ¶¥h¸s'ç vvÑ ¶pñy'«¸öÉÀ0µ, y'j±ÀµÀ¢¸lµ £¶pô¢¸vÀ (Transliteration:17,18va shathabdalalo prajaswamika jatiyayavaada viplavaalu; Translation: Democratic and nationalist revelutions 17th and 18th centuries)

iii. Êplµ±'/40µA – C¶¢S¸¶¬¶m (Transliteration: Pedarikam-avagaahana; Translation: Understanding poverty)

iv. ¶pñyvÀ (Transliteration: Prajalu; Translation:The people)

1.9 Operational definitions

- **Self-learning material:** Self-learning materials (SLMs) are basically learner-centred materials, that are flexible and provide freedom to learn on their own, at a time, pace and place of their own choice.

- **Adapted lessons:** Lessons that are modified with suitable language and other enabling features like illustrations without changing curricular content.
- **Adapted self-learning material**: The material which meets the unique needs of each learner with suitable modifications in subject lessons to make the learner to perform better in academic learning.
- **Pre test**: It is a preliminary test to measure a starting point or the amount of pre-existing knowledge on a course topic or to check how much they know about a subject.
- **Post test**: It is a test to measure the learning as a result of an experimented experience and to analyze the appropriateness of the learning objectives
- **Children with hearing impairment:** Children with 60dB loss or more in the better ear in the conversational frequencies of 250 HZ to 4 KHZ (as per PWD Act, 1995).
- **Secondary school level:** Classes of VIII, IX and X including students in the age range of 13 to 16 years.

1.10 Implications of the study

- Developing right attitude among teachers of children with hearing impairment towards learning abilities of children with hearing impairment and necessary lesson adaptations.
- Making available ready-made adapted lessons for use by teachers, caregivers and peer tutors.
- Providing prototypes for lesson adaptation to teachers and caregivers that could be replicated.
- Enabling teachers to assess the lesson comprehension of children with hearing impairment from different dimensions using adapted assessments after every lesson.
- Extending curricular adaptation endeavours to other curricular areas and school levels.

CHAPTER 2

REVIEW OF LITERATURE

2.0 Curriculum and adaptation

Curriculum in most simple terms can be described as the content for instruction arising out of the learning objectives and accompanied by directions related to the method, material and evaluation to be observed when implementing the same. Expert opinions about curriculum also seem to reiterate these multiple facets of curriculum. Majority of the pedagogists across the ages-Dewey (1902), Rugg (1927), Caswell and Campbell (1935), Tyler (1957), Gagne (1967), Forbes (1996), and Forbes and Martin (2004), among others highlight the essence of curriculum as an holistic organization of learning experiences that lead learners to process new, useful information and skills. Indiana Department of Education (2010)

emphasizes on the instructional content, materials, resources and processes of the evaluation; while Popham (2000) and Baker's description (1995) focuses on the learning outcomes and consequences. To sum up, Donald Deshler and Schumaker (2005) describe curriculum of a formal educational programme like schooling as that which is structured based on the goals and purposes of the programme, progressing through the process and methods using which they are implemented, and culminating in assessment and evaluation of whether the goals and purposes are achieved.

2.1 Curriculum adaptation and its significance

Curriculum adaptation in lay terms can be described as the process of making changes in the curriculum to suit learning styles or meet special educational needs in individual learners. Several educators have attempted describing curriculum adaptation highlighting its significance. According to Comfort (1990) and King Sears (2001) curriculum adaptation is a change in content knowledge, the method of instruction and students learning outcomes through the modification of materials and programs. Bunch (1987) draw out the need of curriculum from the perspective of learners with special needs. They state that curricular adaptation is the modification of contents, instructions and learning outcomes for different or diverse student needs. In other words, curricular adaptation not only

involves instructional change but also the modification of educational components. Lee et al. (2006) say that such adaptation will help learners with different needs engage with and respond to curriculum.

Reisburg (1990) enumerates different types of examples for adaptation like simplification of content, modification of teaching learning process/ strategies, teaching according to the needs of the students, setting appropriate goals and objectives, etc. To this end, modification of teaching components should be considered as curriculum adaptation.

Such curriculum adaptation is beneficial in:

- Making learning reasonable for an individual learner or particular group of learners (Comfort, 1990).
- Increase success in learning for students from varied backgrounds with different kinds of learning and experiences (Sahasewiyon, 2004)
- To acknowledge diverse learning needs in students and ensure their success (Yamauchi, 2003, Kalbach & Forester, 2006; Sealey & Noyes, 2010; Braund & Reiss, 2006).
- To help learners to apply their learning to real life situations and promote meaningful learning (Smith, 2003; Paliwal, & Subramaniam, 2006).

- To draw the interest of learners and to involve learners actively in teaching learning process (Cook-Sather, 2006; Souto-Manning, 2008).
- To make learning interesting and motivating through diversified approaches/ variety of approaches (Gillespie, 2002; Yamauchi, 2003; King et al., 2008)

To conclude, students whose learning needs are addressed and who are actively involved in the learning process are said to understand instruction and achieve better outcomes (Hartnell-Young & Vetere, 2008, Goodson & Crick, 2009). Realization of the above mentioned benefits requires active involvement of the teachers (Priestle, Biesta, & Robinson, 2010) who are sensitive to learner needs and are able to apply new methods and approaches to meet them (Davies, 2006).

2.2 Need of curricular adaptation for learners with special needs

Though curricular adaptations are recommended for every learner to make learning suitable to his/ her individual learning style and needs, it may not be practically feasible to implement on a large scale basis. Especially in individual class rooms with large number of learners from multicultural background. Hence, several educators recommend for adaptations only in situations of acute needs and difficulties. For example, learners with

sensory impairments may not require simplification of the difficulty levels in cognitive tasks. Whereas learners with intellectual difficulties, who require such adaptation may not require adaptations in physical tasks and so on. Ultimately the need for adaptation should be decided based on the learner's abilities as well as learner's long term goals for life. To be more specific, curricular adaptations have to be mad according to individual learners with special needs (Reisberg, 1990):

- Preparation of contents of teaching to make it relevant to learners with special needs.
- To design and implement comprehensive and connected learning experiences to strengthen learning in children with special needs.
- To generate productive evaluation techniques that will enable learners with special needs to generalize learning outside the learning environment.
- To develop an emotional involvement in learners with special needs towards the teaching learning process.
- Ultimately to empower any learner to appropriately recognize his/ her abilities and on that basis choose their future learning targets independently and achieve the same.

2.3 Considerations in adapting curriculum

There are certain essential concerns that every educator involved in curriculum adaption should be conscious of (Bunch, 1987):

- Curriculum adaptation should include child centred pedagogy keeping in mind the child's psychological development and specific learning needs.
- It should have equal accessibilities in terms of physical, attitudinal, academic and social opportunities to maximize learning.
- It should involve accessible material, positive attitudes and relevant adaptive teaching strategies.
- Adaptation should be there in all the components of education like content, method, material and evaluation.
- It should lead to the development of knowledge by connecting new ideas to existing ideas on the basis of materials or activities.
- Teaching learning process should involve collaborative learning with the help of different methods like peer tutoring, group learning, etc.
- It should prescribe for the use of available technologies to ensure equal participation of and effective learning in children, specifically children with special needs.

- It should ensure equal participation in terms of play, games, social and cultural activities to improve the physical and mental health by developing appropriate adaptations.
- Teachers should provide information to students with special needs about the concessions available for them.
- Teachers should make medium of instruction support child's functional language.
- Teachers should use total and/or alternative and augmentative communication in the class room as an additional medium of instruction.
- Teachers should be flexible and more creative in building knowledge in all students with and without special needs.
- It should include the components of life skills through transitional stages working towards independent living.
- It should integrate work pedagogy in education and include broad based work experiences taking care of the needs of children with disabilities.

2.4 Types of adaptation

In the previous decades, pioneers in the field of inclusive education (King-Sears, 2001) have described the various possible modes of instruction in the inclusive learning environment like:

- Adaptations
- Parallel Curriculum
- Overlapping Curriculum

Expert pedagogists like Feldhusen, Hansen and Kennedy (1989), Maker (1982), TAG (1989) and VanTassel-Baska et al. (1988) have suggested major strategies for adaptations. According to them developing an effective, differentiated curriculum that takes into concern needs of diverse student population might imply need for –

- Modification of content
- Modification of process
- Modification of environment
- Modification of product expectations and student outcomes

2.4.1 Major strategies for adaptation:

Special educational experts like Deschenes, Ebeling and Sprague (1994) have further elaborated about ***nine specific processes*** through which adaptation could be implemented.

- **Input:** Adapt the way instruction is delivered to the learner, like for example, use different visual material, plan more concrete examples, provide hands on activities, place students in cooperative groups, and so on.
- **Output:** Adapt how the learner can respond to instruction, like for example allow a verbal vs. written response, use a communication book for students, allow students to show knowledge with hands on materials
- **Time:** Adapt the time allotted and allowed for learning task completion or testing, like for example individualize a timeline for completing a task and pace learning differently (increase or decrease) for some learners
- **Difficulty:** Adapt the skill level, problem type or the rules on how the learner may approach the work, like for example allow a calculator for mathematic problems, simplify task directions, and change rules to accommodate learner needs among others.
- **Level of support:** Increase the amount of personal assistance with specific learner, like for example assign peer buddies, teaching assistants, peer tutors or cross age tutors.
- **Size/ content:** Adapt the quantity of information or the number of task that the learner is expected to learn or compete, like for

example reduce the number of names of countries in social studies that a learner must learn at any one time. Provide lesser number of problems to solve in mathematics

- **Degree of participation:** Adapt the extent to which a learner is actively involved in the task, like for example in geography, have a student with severe special need just hold the globe, while others point out the locations.
- **Alternate goals:** Adapt the goals or outcome expectations while using the same materials, like for example in social studies, expect one student to be able to locate just the states while others learn to locate capitals as well.
- **Substitute curriculum:** Provide different instruction and materials to meet a learner's individual goals, like for example training in life skills, vocational skills instead of complex academic learning.

Apart from these major strategies for adaptation in goals, mode of instruction, and evaluation; content adaptation of textbook material is another fundamental mode of curriculum adaptation, especially for learners with special needs arising out of communication disorders like hearing impairment.

2.4.2 Textbook adaptation

In developing countries, textbook forms the primary basis for instruction. It serves as a reference material for the teacher and fundamental learning material for learners. Curriculum is primarily transacted through textbooks. Just providing textbooks will not help learners to acquire knowledge. Presence of disability may prevent children from accessing information from textbooks. For example, a child with visual impairment may not be able to use a printed textbook. A child with learning disability may also find it difficult to access information conveyed in the form of abstract written symbols. So, it is necessary to convert the information into tactile information i.e. perceptible dots (Braille) for children with visual impairment. Augmentation with iconic visual information will be helpful for children with learning disabilities and children with hearing impairment who are visual learners, whereas intellectually challenged learners will require condensation and simplification of the information. Variety of review exercises will help in retention among all types of learners. Such need based adaptations will make textbooks more viable and useful to children with different kinds of special needs. Hence it is important to make text books more accessible/ inclusive, so that it can be easily comprehended by a diverse group of learners.

2.4.2.1 General guidelines for adaptation of textbook material

According to Cunningsworth (1995), textbook adaptation may take a variety of forms, like:

- **Modifying content:** Textbook content should be related to the learner's age, gender, social class, occupation, religion or cultural background. So, the teacher has to verify whether the content is appropriate and appreciated by the learner, if not she/he have to modify the content according to the learner.
- **Addressing omissions and commissions/ additions:** A textbook may contain too much or too little information related to the concept. There might be surplus information which may not be useful for the children with special needs. The excess information has to be removed. A textbook may omit items which are important for students; hence necessary information has to be added. For example, a teacher can add additional information or highlights like glossary list, chronological chart, etc.
- **Reorganizing content:** A textbook may contain unorganized syllabus or content. It may affect the learning as well as the retention in children with special needs. So, a teacher has to organize the content in some meaningful order (i.e. easy to

difficult, known to unknown/ concrete to abstract information, and so on) to suit their learning needs.

- **Modifying task:** Exercises and activities may need to be changed to give them an additional focus. For example, a listening activity that focuses only on listening for information is adapted so that student listens a second or third time for a different purpose like identifying rhyming words or activitities may be extended to provide opportunities for more personalized practice.
- **Extending tasks:** Exercises may contain insufficient practice so that additional practice tasks may need to be added to achieve mastery in slow learners, like vocabulary activities or grammar activities appended to a unit for children with difficulties in learning languages.

2.4.2.2 Guidelines for adapting textbook content for children with hearing impairment

Especially when adapting curriculum for children with communicational disorders like hearing impairment, experts like Yathiraj, 2014 suggest that, lessons could be simplified in any of the following ways:

- Language and the vocabulary should be simple

- Length of the content should be appropriate to the learners ability
- Complexity of the information should be reduced
- It is also suggest that addition of relevant illustrations and practical examples will help these learners in meaningful learning and retention.

Cunningsworth (1995) proposes four criteria for evaluating textbooks and determining whether they need to be adapted:

- Textbooks should always relate to the learner's need. They should suit the learner's age, gender, social class, occupation, religion or cultural background, etc.
- They should be in line with the aims and objectives of the language learning program.
- They should take account of students needs as learners and should facilitate their learning processes, without dogmatically imposing a rigid method.
- They should reflect the (present or future) uses which learners will make out of effective learning.
- They should have a clear role as a support for learning. Like they should help teachers, in mediating between the learning targets and the learners.

If the above requisites are not met, then it implies that the textbook content needs to be adapted.

2.5 Process of adaptation

The main steps involved in curricular adaptations (Marschark, Lang, & Albertini, 2002):

- **Identification of goals and objectives:** Identification of individual educational goals and objectives for specific students with special needs.
- **Determination of learning outcomes:** The minimal/ optimal learning outcomes that can be expected from the learner against instructional goals/ objectives have to be clearly articulated in measurable terms.
- **Selection of content:** Appropriate content (theme or unit study, etc.) for teaching, and/ or skills for training in educational activity have to be carefully selected.
- **Selection of instructional methods:** Appropriate, if necessary augmentative and additional training methods which are suitable to the learning styles of children with special needs have to be chosen.

- **Framing appropriate design for adaptation:** Ultimately a comprehensive instructional design which includes instructional arrangement, lesson format, student specific teaching strategies, curricular goals specific to the lesson, teaching materials, adaptation of physical class room and support services in class room has to be spelt out and implemented.
- **Evaluation of effectiveness of adaptations:** Implementation has to be followed up with ongoing evaluation on curricular adaptations. If the adaptation strategies are not effective, alternative activities for the students have to be designed and implemented.

2.6 Principles of curriculum construction and adaptations

2.6.1 General principles

Rao (2008), lists the essential principles to be considered when designing and/or adapting curriculum

- Principles of Child Centeredness
- Principle of Community Centeredness
- Principle of Activity Centeredness
- Principle of Variety

- Principle of Co-ordination and Integration
- Principle of Conservation
- Principle of Creativity
- Principle of Forward, Looking/ Progressiveness
- Principle of Flexibility
- Principle of Balance
- Principle of Utility

Rao (2008) further elaborates on these principles, as described below:

- **Principle of child centeredness:** As modern education is child-centred, the curriculum should also be child-centred. It should be based on the child's needs, interests, abilities, aptitude, age level and circumstances. The child should be the central figure in any scheme of curriculum construction. In fact, curriculum is meant to bring about the development of the child in the desired direction so that s/he is able to adjust well in life.

- **Principle of community centeredness:** Though the child's physical and cognitive development and growth is the main consideration of curriculum construction, yet his/her social behaviour is also to be suitably developed. Both the individual

development and the social development of the child deserve equal attention. He/she is to live in and for the society. Therefore, his/her needs and desires must be in conformity with the needs and desires of the society in which he/she is to live. The values, attitudes and skills that are prevailing in the community must be reflected in the curriculum. However, the society is not static. It is dynamic. Its needs and requirements are changing with the rapid developments taking place in all fields. The developmental process of evolving a comprehensive curriculum should incorporate this factor of social dynamics.

- **Principle of activity centeredness:** The curriculum should centre on the multifarious activities of pupils. In contemporary education, learners are expected to be active participants in the instructional process. Therefore, the curriculum should provide well selected activities according to the general interests and developmental stages of children. It should provide constructive, creative and project activities. For small children, play activities should also be provided. Purposeful activities both in the class-room and outside the class-room should be provided. It is through a network of activities that the desired experiences can be provided and

consequently desirable behavioural changes can be brought about in children.

- **Principle of variety:** The curriculum should be broad-based so as to accommodate the needs of varied categories of pupils, so that they are able to take up subjects and participate in activities according their capacities and interests. The needs of pupils also change from place to place. For example, the pupils in rural areas, urban areas, and hilly areas will have different needs. Varied socio cultural and regional backgrounds also imply need for variety in curriculum. So these considerations should be reflected in the curriculum.

- **Principle of co-ordination and integration:** Any school curriculum will be providing diverse learning experiences through various subjects. However these diverse activities must be well integrated. Various subjects and activities have to serve the same ultimate purpose, that is, the achievement of the aims of education and all round development. The activities and subjects should not be put in air-tight compartments, but these should be inter-related and well integrated so as to develop the whole child.

- **Principles of conservation:** One of the main functions of education is to preserve and transmit our cultural heritage. This is essential for human progress. Culture consists of traditions, customs, attitudes, skills, conduct, values and knowledge. However, the curriculum framers must make a suitable selection of the elements of culture, keeping n view their educational value and the developmental stage of pupils.

- **Principle of creativity:** The conservation of culture helps to sustain the society. The culture should not be simply transmitted but also enriched. There should be provision in the curriculum to develop the creative powers of the child so that he/she become a contributory member of the society. Tyler (2013) says, "In curriculum that is suited to the needs of today and of the future, there must be definitely creative subjects". Cultivation of creativity is not restricted to artistic domains/ subjects. It is required even for problem solving and innovations in subjects of logical nature like mathematics.

- **Principle of progressiveness:** Education is to enable the child to lead a successful social life. So curriculum should not cater to the present needs of the child alone. The needs of his/her future life

should also be considered. The curriculum should also include knowledge, skills, experiences, influences, etc.; which will develop abilities and power to make effective adjustments in the later life of the child.

- **Principle of flexibility:** In our age, rapid developments are taking place in various fields. Consequently the needs of society are changing. The content of curriculum cannot be same for all times to come. It should not be static. It must be dynamic and change with the changing times. It should reflect the latest trends in the field of education, psychology and technology.

- **Principle of balance:** The curriculum must maintain a balance between curricular and co-curricular domains, between direct and indirect experiences, between academic and vocational education, between compulsory and optional subjects, between formal and informal modes, between individual and social aims of education, etc.

- **Principle of utility:** Curriculum should be useful rather than ornamental. It should not include subjects which owe their place in it due to tradition. The curriculum must have practical utility for students. So there should be some provision for technical and

vocational education in the curriculum. The above discussed principles of curriculum construction should be kept in mind even while adapting it for children with special needs. Various regional and national conditions should also be given due consideration.

These apart, there are two other important principles of curriculum construction that significantly correlate with curriculum adaptation.

- **Principles of commission and omission:** These principles indicate that the curriculum needs to be continuously reviewed and revised from the learner's perspectives and according to the changing environmental and societal conditions. From the learner's perspective, the curriculum has to be aligned to suit their abilities, interest, needs and learning styles. Accordingly inputs that a learner requires have to be added to the curriculum and that which are irrelevant have to be removed from it. This is the major principle of curriculum construction that justifies and paves way for further adaptations according to individual learners.

2.6.2. Considerations for learners with exceptional needs

In well-developed educational systems, focused adaptation approaches called as school wide enrichment is being practiced for learners with

exceptional abilities. This concept of enrichment described by Johnson (2000) has three functional domains, i.e. *Organizational components* which include stakeholders like teachers and caregivers; *Structural components* which include the regular curriculum, enrichment clusters and continuum of special services; and *Instructional components* which include the delivery of enriched instruction and teacher trainings.

Johnson (2000) further elaborates on two techniques of curricular modification for exceptional learners, i.e. *Curriculum Compacting*, which is the elimination of content that a student has previously mastered or to streamlining content so that it is commensurate with a student's level of motivation and ability, and *Integrated Instructional Themes* which is a cross-subject, thematic integration of curriculum based on student's interests in their total talent portfolios.

The underlying ideas of curriculum modification in the school wide enrichment is that effective curriculum emphasizes both content and process, develops inquiry and establishes the interconnectedness of knowledge and skills. It should result in curriculum modification that focuses on student's strengths and interests and includes teacher-directed modification of specific knowledge, methodology and application in the

prescribed curriculum and the modification will apply to instructional objectives and strategies, content, processes, products and effect.

2.6.3. Considerations for learners with special needs like hearing impairment

Curriculum is a vital tool for the development of knowledge and skills. It helps the learners to use their knowledge in real life situations also. However the general curriculum does not meet the needs of children with hearing impairment. Adaptation technique is useful for special as well as for normal children also. It is a technique through which the learners can understand concepts meaningfully. Text books involve lots of abstract and extra or unnecessary information which may be difficult for children with hearing impairment to understand the concept. So, there is a need to adapt curriculum to become more flexible and interesting to all children with and without disabilities. Carnine (1997) suggests the use of big ideas, conspicuous strategies, efficient use of time, clear, explicit instructional strategies and appropriate practice and review to meet the educational needs of children with hearing impairment. Switlick (1997), reports that

supplementary resource material will help learners with hearing impairment overcome their language difficulties.

It is essential to make teaching learning process interesting by adapting the lessons which are involved in textbooks. Witt and Elliott (1985) report that a*ctiveness* of adaptation is important; if the material is not acceptable, it is unlikely to be useful. Nair in 2004 through her dissertation research had demonstrated effectiveness of individualized instructional materials adapted to suit needs of learners with hearing impairment.

Some strategies given by James and Brown (1998); Squires (2001) which can be used for adapting the resource materials for children with special needs are as follows:

- Simple language vocabulary and sentences should be used.
- New vocabulary should be taught/ introduced earlier.
- Ample illustrations which enable easy and clear comprehension should be used.
- Legibility of print and layout should be optimal.
- Extra information which is unnecessary for the learners should be removed.
- Simple sentences and bullet points should be used to present information for learners

- Clarity in printing should be ensured with quality ink and paper should be used.
- Cues or prompts should be used where responses are required from the students

Golladay (1951), as early as nearly 7 decades back, had laid down the ground rules for adapting textbook content specifically for learners with communicational disorders like hearing impairment. The guidelines delineate considerations on the basics of two major domains namely, content and layout. The specifications have been elaborated below.

- **Content**

  The content of textbooks could again be delineated into textual matter and illustrations. Golladay (1951) had provided specific instructions to pertaining to –

  - ***Textual content and language:***

  ~ Long sentences should be broken into smaller components. Difficult vocabulary should be replaced by simpler on familiar vocabulary.

  ~ Intense ideas have to be reduced in complexity like abstract concepts being introduced through concrete learning

experiences. Colloquial and idiomatic expression should be explained clearly.

~ Cause and effect relationships in concepts as well as language have to be presented with clarity.

~ Lot of guiding questions have to be incorporated to help learners apply their previous knowledge; Para phrase present information, as well as get ready to link to new information.

~ Clear references to use of pronouns should be ensured.

~ Active verbs should be used rather than passive voices.

~ Use of negatives should be reduced. Rhetorical language should also be limited. Information has to be presented in a systematic manner with logical sequence.

~ Information presented has to be prioritized commencing with direct information and then proceeding to other indirect information.

o ***Illustration:***

~ Ample instruction, pictures, graphs etc. should be used to overcome difficulty in understanding textual language.

~ The illustrations should be simple and clear.

~ Illustrations should be placed adjacent to the textual content that they refer to.

~ Context of direct speech could be made easier to understand with the help of speech balloons.

- **Layout:**
  - Possible and necessary information has to be systematically categorized and sequenced using flow charts and tables for children with hearing impairment.
  - Subject matter has to be segmented and presented and using bullet points rather than as continuous information in paragraphs.
  - Whenever it is necessary additional information and explanation have to be provided through footnotes or notes in margins.
  - Important information can be highlighted using textboxes and special fonts like italics, bold, etc.
  - Key ideas or points should be summarized at the end of the content.
  - Word bank or glossaries can be appended highlighting keywords in the lesson and their meaning.

2.7 Evidences for benefits for curriculum adaptation

2.7.1 In general education

Though generally it is believed that curriculum adaptation is requirement for learners with special needs there have been successful experiments that have demonstrated the effectiveness of individualized and enhanced lessons for typical learners also. Tieso (2001) in USA had carried out a comparative study through 12 mathematics teachers from 5^{th} to 8^{th} grades. Of these teachers two served as control group, teaching with regular textbook curriculum. Whereas 10 other teachers taught using modified curriculum involving enhanced learning objectives, engaging instructions, authentic resources and assessment techniques. In the process of experimentation, students who were exposed to modified curriculum found learning more fun, complex, engaging and challenging than a regular textbook unit. Though the study did not focus on the learning product, it came out with qualitative evidences that modification of textbook curriculum can make learning interesting and meaningful for any learner.

Around the same time Moon and Callahan (2001) investigated the effectiveness of curriculum modification on learning achievement of typical learners. They undertook a two year long study comprising 273 elementary school students from diverse ethnic and socio-economic back grounds as participants. The participants were first and second grade

students who came from 16 urban schools, however more than 60% of them belonged to lower economic status. Lessons of language arts and mathematics were adapted to become appropriate to the learner's cultural and socio-economic backgrounds. The results of the study show that the modified curriculum had positively affected the learning ability and academic achievement of the participant students. Especially, it was highlighted that students at-risk were found to attain grade level development at the end of the experiment. The study was able to draw out the significant impact on at risk learners by enabling them to grade level development.

2.7.2 In special education

2.7.2.1 Impact on learners with inadequate abilities

Cosier, Causton-Theoharis and Theoharis (2013) had experimented with the influence of curriculum modification in learners with special needs. They had examined a data set that included 1300 elementary school students with special needs in 180 school districts in USA. The results showed that the performance of students with disabilities increased by 49% on reading assessment and 37% on mathematics assessment as compared with their previous performances. This proves the effectiveness of curriculum modification.

Hehir et al. (2014) looked at data of students with disabilities from 2006-2012 and followed three cohorts of students from IX grade to graduation. They found that on an average, students educated in modified curricular classrooms earned higher scores on standardized, state wide assessments and graduated high school at higher scores than similar students who were educated without curricular adaptation. Together, both studies suggest that more access and time spent in a modified educational environment provided students with disabilities more opportunities for better educational attainment. It was also found to help them to acquire the academic knowledge and skills essential for post-secondary attainment and career readiness. Curriculum modification is very important for learners with special needs to access the general education environment.

Cosier et al. had carried out a literature review of 15 empirical studies that were conducted between 1989 and 2013 to investigate the multifaceted impact of curriculum modification. They have also pursued four conceptual studies relevant to the empirical findings. Ultimately the findings of the 19 studies draw out the significant impact of modified curriculum on the following four major dimensions of teaching.

- Acceleration of student learning,
- Enhancement of desirable behaviours,

- Promotion of inclusion in the learning environment and
- Boosting self-determination in students.

2.7.2.2 Impact on learners with hearing impairment

There has been focused investigation carried out on usefulness of adapted lessons for learners with special needs like hearing impairment, especially in social studies which is considered as a difficult subject for learners with hearing impairment.

Gathoo and Wadekar (2010) had undertaken an elaborate enterprise to adapt science, history and geography lessons of primary classes of the Maharashtra State Board of Education. For the purpose of adaptation they had adapted the strategies put forth by Golladay (1951) and redesigned the lesson in terms of content, so as to use simple vocabulary and language structures; explain abstract concepts with practical examples; and present cluster concepts sequentially. Adaptation was done in terms of layout also to include more illustrations or visualized information, de-cluttered presentation using tables and bullet points and enlargement of font size. They had proved the effectiveness of their adapted lessons through triangulation of data. The first evidence was in the form of student's

achievement following implementation of the adapted lessons, where they demonstrated better performances in all the three subjects when compared with the control group. The second set of evidence came from informal observations during the process of instruction, where the adapted lessons made students more participative and actively involved in reading the written text and responding to teacher queries with lesser prompts and clues. It was found to be beneficial for the teachers also, requiring less time, effort, accessories and teaching material. The third set of evidence was generated in the form of teachers' views about the adapted text book material. Ninety-eight percent of the teachers found the adapted content appropriate and further expressed that it may make teaching easier and effective and promoting interest for self-learning among the students.

Reddy and Nair (2010) had carried out an experimental study with 14 learners with hearing impairment with English as medium of instruction at higher primary level by adapting textbook content in history and found that the experimental group of seven children who were exposed to the adapted textbook content performed significantly better than their peers in control group.

A similar study was undertaken by Siva Kumar and Vijetha (2009) with Telugu an south Indian language as the medium of instruction including 18

higher primary learners with hearing impairment. The control and experimental group of learners with nine students each, displayed comparable performances without any significant difference in the pre test both in Telugu and social science subjects. However in the post test the experimental group that was exposed to adapted content had significant advantage ($p < 0.00$) with a mean difference 30.24%.

Ultimately as age old wisdom suggests (Woodward & Lowell, 1964), if suitable textbooks are not available, teachers of learners with hearing impairment should prepare alternate or supplementary readers highlighting key ideas with visual material and efficient use of vocabulary and other language structures with clarity.

2.7.2.3 Impact on learners with exceptional abilities

Three empirical studies i.e. Olenchak (1990); Olenchak and Renzulli (1989); Reis et al. (1998), etc. focused on the effectiveness of curriculum modification designed as a part of a school wide enrichment programs.

Among these Olenchak (1989) initially had carried out a year long investigation of 1,698 elementary students (up to VI class). The research was qualitative in nature trying to study the impact of the enrichment program on student's creativity as well as students, teachers and

caregiver's attitudes towards instruction using qualitative methods like interviews, observations, logs and analysis of student's products.

The results indicated that the enrichment measures significantly increased creative productivity of not only exceptional learners, but generally in all learners in the school. It was also found that they were influenced to study out of interest, regardless of scores and grades.

Olenchak (1990) further extended his study to 1,935 middle school students. In this two year longitudinal study, he widened the scope of investigation to compare between the influence of variables like grade level, class room teachers and learning climate and instructional styles among others. Olenchak (1990) concluded that the enrichment programme was able to develop more positive attitudes towards learning among exceptional as well as other learners. He further added that the nature of teacher supports and freedom for students to select their areas of interest influenced the success considerably. Another empirical study carried out by Reis et al. (1998) involving 336 exceptional learners from II to VI grades in various school settings rural and urban, focused on comparing the effect of curriculum compacting for these learners over other learners in the same setups. In subjects like language, arts, mathematics they

reported that compacting curriculum do not have any adverse effect and the learning outcomes were similar in both the groups.

To sum up, it could be reported that adaptations and modifications made in the mainstream learning environment for exceptional learners had the potential to expand their benefits to other learners also. The advantageous influence of such curriculum modification was comprehensive extending its influence across learners from diverse linguistic, ethnic and socio-economic back grounds apart from academic abilities.

On the side lines of their major course of investigation, these studies also reported that several teachers were informally practicing curriculum modification as part of their everyday class room instruction. Empirical investigation into these practices will add to the strength of evidences.

To conclude, the review of relevant literature related to curriculum adaptation left an indelible impression about need for adaptation among the investigators, and equipped them with practical knowledge of effective strategies and techniques for adapting lessons for learners with hearing impairment.

CHAPTER 3

METHOD

3.1 Purpose and research design of the study

The present study employed a comparative experimental design to investigate the effectiveness of adapted self-learning lessons in enabling better understanding of social studies lessons among children with hearing impairment who are studying at secondary school level.

3.2 Participants

Purposive sampling technique was used to select the children with hearing impairment, who were studying at secondary school level including classes VIII, IX and X. Total of 168 children with hearing impairment were selected based on the following criteria:

- Moderate to profound hearing loss (60dB or above in the better ear).
- Adequate language level, especially in terms of reading skills.
- Presence of no other additional impairments.
- Telugu and Kannada as medium of instruction.
- Should not have prior exposure to the lessons in Geography, History, Civics and Economics, that have been selected for the study in Social Studies of classes VIII, IX and X either from the school or from any other source.

The children thus selected were stratified based on their grades of academic achievement and medium. Later, on random basis, they were assigned to two experimental groups which were to undergo exposure to textbook and adapted self-learning content, respectively. Participants in these two groups were matched for their previous class annual exam marks scored in social studies and language. Out of the 168 selected children, only 165 of them participated in the study as two others were absent from classes during the conduct of the experiment.

Table 3.1 provides details about the participants in the two groups for comparative treatment for the four social studies lessons, in Kannada and Telugu respectively.

Table 3.1: *Details of participants*

S. No.	Topic of the Lesson	Textbook Users	Users of Adapted Self-Learning Material	Grand Total
I	Kannada			
1.	¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ	5	5	
2.	PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ	4	4	
3.	§qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ	4	4	
4.	¨sÁgÀvÀzÀ d£À¸ÀASÉå	5	4	
	Total Population	18	17	**35**
II	Telugu			
5.	*sû'±µhµ lÉ¶¥A: sôSÐz0µ*	12	12	

6.	¶ªö±µÃq¸vÀ 17, 18 ¶¢ ¶¥h¸s'çvvÑ	13	13	
7.	¶pñy'«¸ö£À0µ, y'j±ÀµÀ¢¸lµ £¶pô¢¸vÀ Êplµ±¼0µA– C¶¢S¸¶¬¶m	20	20	
8.	¶pñyvÀ	20	20	
	Total Population	65	65	**130** **165**

3.3 Materials

3.3.1 Reviewed material

Social Studies textbooks of classes VIII, IX and X from Andhra Pradesh (Appendices I) and Karnataka State (Appendices II) Education Boards were reviewed to inspect the effectiveness of textbook lessons in aiding meaningful learning of social studies in children with hearing impairment.

Consequently, specific lessons which were similar across the two education boards were chosen that require adaptation for better learning.

3.3.2 Developed material

Two types of materials were developed in the process of this study.

3.3.2.1 Adapted self-learning material

From the social studies textbooks of classes VIII, IX and X from Andhra Pradesh and Karnataka State Education Boards, one lesson each from geography, history, civics and economics were selected for the purpose of adaptation. The details of the lessons are as follows: In Kannada **¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ** from geography, **PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ** from history, **§qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ** from civics and **¨sÁgÀvÀzÀ d£À¸ÀASÉå** from economics. In Telugu **sû'±µhµ lÉ¶¥A: sÔSÐz0µ ¶ª ö±µÃq¸vÀ** from geography, **17, 18 ¶¢ ¶¥h¸s'çvvÑ ¶pñy'«¸ öÉÀ0µ, y'j±ÀµÀ¢¸lµ É¶pô¢¸vÀ** from history, **Êplµ±'/40µA – C¶¢S¸¶¬¶m** from civics and **¶pñyvÀ** from economics. Self-learning materials were developed by applying principles of adaptation for modifying length, complexity and language. The materials were further made appealing by using spacious

layouts; attractive, large fonts, colourful and explanatory illustrations like pictures, maps, flow charts, etc. Highlights of important points, concise summary and tabulation of key information were added to enhance readability. (Appendices III & IV) The adapted self-learning material was compartmentalized for daily reading by students across specified number of days according to the length of the lesson, as detailed in the following table 3.2.

Table 3.2: *Scheduled lessons for self-learning*

S. No.	Topic of the Lesson	Number of days allocated for the lesson
I	**Kannada Lessons**	
1.	**¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ**	5 Days
2.	**¨sÁgÀvÀzÀ d£À¸ÀASÉå**	10 Days
3.	**PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ**	9 Days
4.	**§qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ**	7 Days
II	**Telugu Lessons**	
5.	sû'±µhµ lÉ¶¥A: sÔSÐz0µ ¶ªö±µÃq¸vÀ	5 Days
6.	¶pñyvÀ	9 Days
7.	**17, 18 ¶¢ ¶¥h¸s'çvvÑ** ¶pñy'«¸ö£À0µ, y'j±ÀµÀ¢¸lµ £¶pô¢¸vÀ	8 Days

8.	Êplμ±½0μA – C¶¢S, ¶¬¶m	6 Days

3.3.2.2 Test material

Test material for pre and post test were developed in order to investigate the effectiveness of self-learning adapted lessons in helping children with hearing impairment to understand social studies concepts. Each lesson had a pre and post test, and each of the tests contained 25 objective type items which in turn included 5 items each of fill in the blanks, multiple choice questions, true or false items, matching items, map work and/or identifying/ naming the pictures. On the whole, the test composition included knowledge and comprehension based items in the ratio of 40%: 60%, respectively. (Appendices III & IV)

Table 3.3: *Details of constituents of each test material*

S.	Cognitive	Nature of Test	No. of	Total	Marks	Weight-

No.	Domains of Testing	Items	Items	No. of Items		age %
1.	Knowledge	Multiple choice items	2	10	10	40
		Fill in the blanks	2			
		True/ False	2			
		Matching	2			
		Map/ Pictorial work	2			
2.	Comprehension	Multiple choice items	3	15	15	60
		Fill in the blanks	3			
		True/ False	3			
		Matching	3			
		Map/ Pictorial work	3			
	Total		25	25	25	100

The test material were prepared in the form of assessment sheets, and included simple directions for the respondents, and were spaciously laid out with large print and adequate space for filling in the answers. The objectivity of the test items were also ensured with effective and adequate number of distracters in multiple choices and matching tasks. Each item carried a score of one. Correct answers were awarded one score, while incorrect and no responses were awarded a score of zero.

3.4 Procedure of the study

The present study was conducted in two major phases of preparation and experimentation.

3.4.1 Phase I: Preparation

The first phase of preparation involved the following steps:

- **Step 1: *selection of lessons from geography, history, civics and economics of classes VIII, IX and X***

The lessons on **¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ** from geography, **PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ** from history, **§qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ** from civics and **¨sÁgÀvÀzÀ d£À¸ÀASÉå** from economics were selected with Kannada as medium of instruction from the textbooks of VIII, IX and X standards of Karnataka State Education Board. In Telugu sû'±µhµ lÉ¶¥A: sÔSÐzÐµ ¶ªö±µÃq¸vÀ from geography, **17, 18 ¶¢ ¶¥h¸s'çvvÑ ¶pñy'«¸ö£À0µ¸** y'j±ÀµÀ¢¸lµ £¶pô¢¸vÀ from history, Êplµ±'/40µA – C¶¢S¸¶¬¶m from civics and ¶pñyvÀ from economics were selected from textbooks of VIII, IX and X of Andhra Pradesh State Education Board. It was ensured that there were parallel lessons with similar content in both

textbooks of Andhra Pradesh and Karnataka State Boards of Education for identical classes.

- **Step 2:** ***Development of adapted self-learning material for children with hearing impairment to enhance learning***

Adapted Self-learning material was developed based on the content of the selected lessons provided in each textbook of Andhra Pradesh and Karnataka State Boards of Education. Accordingly the content of the lessons were divided into small concepts for each day and then they were adapted to include simple language with simplified sentences. The clarity of presentation was enhanced with use of bullet points, highlighting of important terms with different fonts like italics, bold, etc. The self-learning material were made interesting to children with hearing impairment with use of colourful illustrations like images, maps, etc.

- **Step 3:** ***Development of test materials***

The pre and post tests were constructed to include simple objective type items for assessments like- filling the blanks, choosing the correct answer, stating whether true or false, matching items, map work and identifying/ naming the pictures.

Previously blue prints were prepared to give proportionate weight-age to different aspects of each of the four lessons. Each test included a total of 25 questions of which 10 were knowledge-based and 15 were comprehension-based objective type of questions.

- **Step 4:** ***Validation of developed self-learning and test materials***

After the preparation of adapted self-learning material, and related test material, they were given to the experts for validation. Validation of Telugu and Kannada self-learning materials were done by five educational experts each who were fluent in Telugu and Kannada languages, respectively. The purpose of the research was explained to the experts and they were provided with printed copies of relevant adapted self- learning material with respective pre and post tests as well as the copies of original textbook lessons. Adapted lesson content and test items which had received consent of not less than 80% of the evaluators were retained and their suggestions for improvisation were incorporated.

- **Step 5:** ***Finalization of adapted self-learning material and test material***

The adapted self-learning materials thus prepared were printed in colour, sorted out as units for daily use by each individual student in Adapted self

learning material user group. In order to avoid discrepancies in distribution of the lessons, the textbook lessons were also photocopied and sorted out for daily use by individual students in Textbook user group. Individual sets of assessment sheets were printed for each participant.

3.4.2 Phase II: Experimentation

The second phase of experimentation involved the following steps:

- **Step 1:** ***Formation of comparative experimental groups***

  The children selected from the special secondary schools were stratified according to their ability and learning levels and then on random basis were assigned to two experimental groups of equal strength.

- **Step 2:** ***Conduct of pre test***

  Making use of the test material developed in the previous phase, pre testing was carried out together for children of both the experimental groups.

- **Step 3:** ***Distribution of adapted self-learning material and textbook content***

Packages of printed adapted self-learning material and textbook content for day-wise reading by individual students were distributed to respective teachers along with instructions for streamlined exposure.

- **Step 4:** ***Exposure to adapted self-learning material and textbook content***

  Secondary school children who were selected for the two comparative experimental groups were exposed to adapted self-learning material and textbook content respectively, for specified duration in segregated environments to avoid spill-over effect.

- **Step 5:** ***Conduct of post test***

  The experiment concluded with conduct of post test using materials developed for the purpose in both the groups.

- **Step 6:** ***Interchanged exposure of adapted self-learning material and textbook content***

  After the experimentation, in order to maintain ethical fairness of not denying any group of children exposure any advantageous treatment, both the experimental groups were alternately provided

exposure to textbook content and adapted self-learning material. However, there were no ensuring tests for evaluating their performance.

3.5 Data collection

The pre and post test were conducted using individual assessment sheets for students of an entire class simultaneously under the supervision of research officer and/or investigators. In between the pre and post tests, adapted self-learning, as well as textbook content were distributed to individual students through respective school teachers for streamlined exposure on daily basis for specified number of sessions. The students of the two groups for each lesson were made to read the lessons in calm secluded environments free of distraction following a systematic routine. As mentioned, both the groups were segregated in order to avoid spill-over effects. The learning materials were also distributed only during the scheduled reading time and collected back before they left the secluded environment. Following the pre and post tests, the assessment sheets were evaluated by the research officer and/or investigator/s according to the scoring criteria and the overall marks scored by each participant, as well as scores in each sub-section of the tests were separately compiled.

3.6 Data analysis

The scores thus obtained were analysed using SPSS version 21. Since the two groups were small in size and the data lacked normal distribution, non-parametrical measures like Mann-Whitney U Test and Wilcoxon Signed Ranks Test were used. The data were analyzed to compare between overall pre and post test performances between the two groups, and then the pre and post test performances within each group. The results of the analyses have been presented in the following chapter.

CHAPTER IV

RESULTS & DISCUSSION

The analyses of the data were carried out with view of verifying the following null hypotheses:

1. Children, who used adapted self-learning material, do not gain better comprehension than their peers who used existing textbooks in the following lessons in Kannada from Karnataka Education Board.

   i. ¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ (Transliteration: Bharathadha prakruthika lakshnagalu; Translation: Physical features of india)

   ii. PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ (Transliteration: Kranthi haagu rashtra prabhuthwagala udhaya; Translation: Revolution and raise of nation states)

   iii. §qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ (Transliteration: Badathana matthu hasivu; Translation: Poverty and hunger)

   iv. ¨sÁgÀvÀzÀ d£À¸ÀASÉå (Transliteration: Bharathada janasankhye; Translation: Population of India)

2. Children, who used adapted self-learning material, do not gain better comprehension than their peers who used existing textbooks

in the following lessons in Telugu from Andhra Pradesh Education Board.

i. sû¹±µhµ lÉ¶¥A: sÔSÐzOµ ¶ªö±µÃq¸vÀ (Transliteration: Bharatha desham bhowgolika swaroopalu; Translation:India- relief features)

ii. 17, 18 ¶¢ ¶¥h¸s¹çvvÑ ¶pñy¹«¸öEÀOµ, y¹j±ÀµÀ¢¸lµ £¶pô¢¸vÀ (Transliteration:17,18va shathabdalalo prajaswamika jathiyayavaada viplavaalu; Translation: Democratic and nationalist revolutions 17th and 18th centuries)

iii. Êplµ±¹/4OµA – C¶¢S¸ ¶¬¶m (Transliteration: Pedharikam-avagaahana; Translation: Understanding poverty)

iv. ¶pñyvÀ (Transliteration: Prajalu; Translation:The people)

4.1 Comparative analyses in groups with Kannada as medium of instruction

Initial analyses of data were carried out in the groups of children with hearing impairment with Kannada as medium of instruction in the above four lessons in sequential order.

4.1.1 Comparative performances in geography lesson

The subject matter considered for experimentation in geography was class X lesson on ¨**sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ** (Transliteration:

Bharathadha prakruthika lakshnagalu; Translation: Physical features of India). As mentioned in the chapter on method, both the experimental groups were exposed to adapted self-learning material and existing textbook content for a period of five days preceded and followed by pre and post tests. Descriptive comparison of the benefits derived in the users of the two types (i.e. textbook and adapted self learning material) of material was carried out through graphic representation of the pre and post test performances in both the groups separately. Details have been presented in figure 4.1(a) and 4.1 (b). The results derived from statistical comparison of the benefits in the users of textbook and adapted self learning material have been presented in tables 4.1 (a) and 4.1 (b).

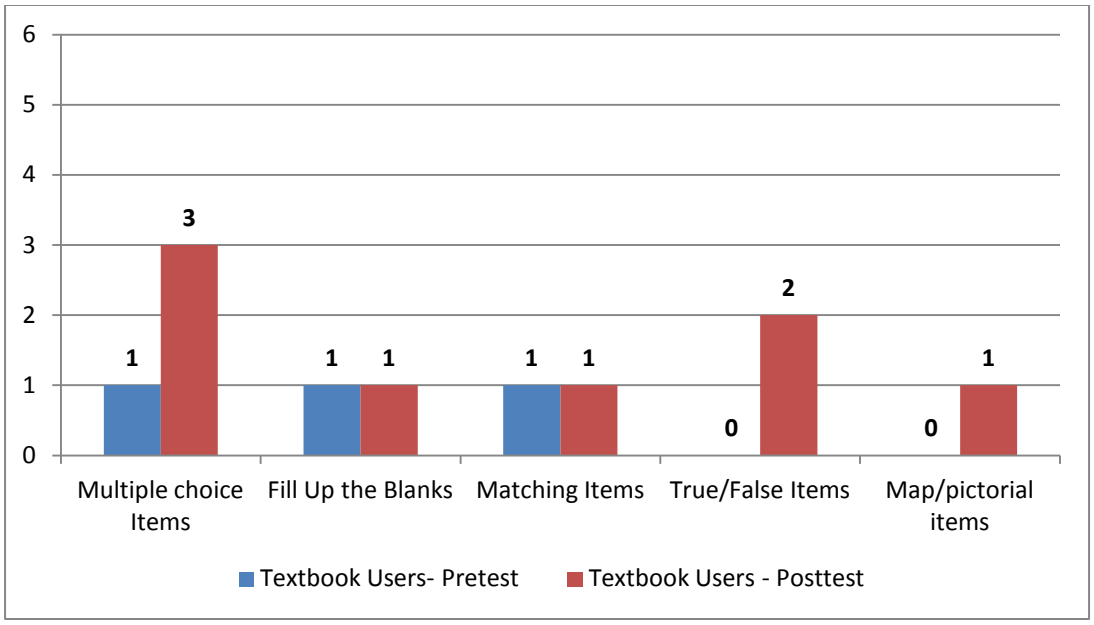

Figure 4.1(a): Comparison of performances in geography with Kannada as medium of instruction in textbook users group.

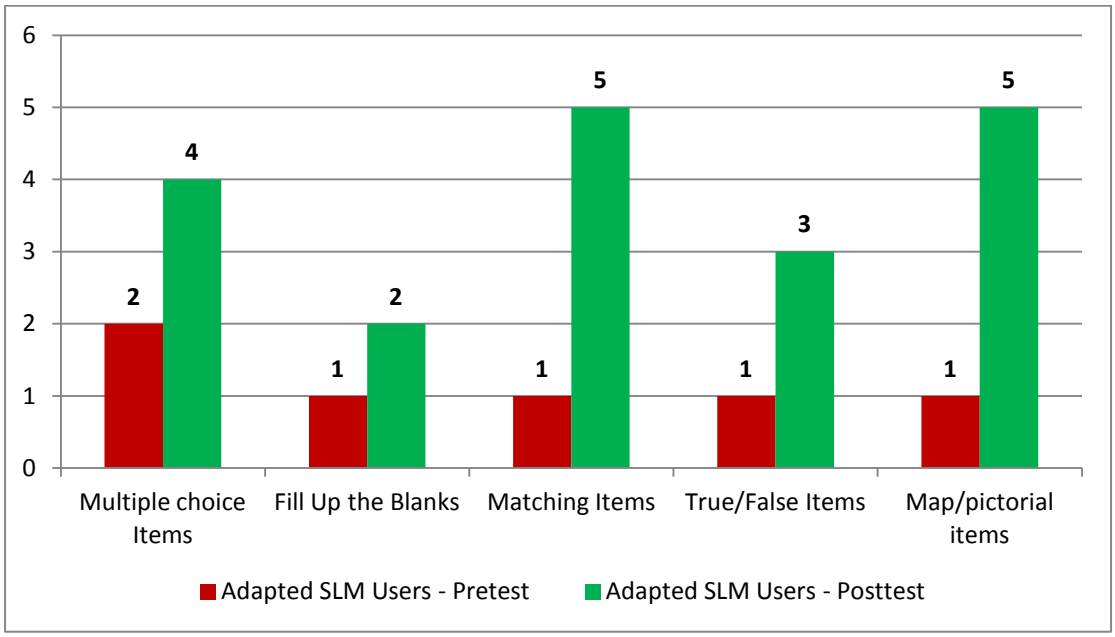

Figure 4.1(b): Comparison of performances in geography with Kannada as medium of instruction in adapted SLM users Group.

Table 4.1: *Comparison of performances, in geography lesson on physical features of India.*

(a). Performances of textbook users in geography lesson physical features of India.

S.No.	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	5	1.20	1.09	1.00
		Post	5	2.60	1.14	3.00
2.	Fill up the Blanks	Pre	5	0.80	0.44	1.00
		Post	5	0.60	0.54	1.00
3.	Match the Following	Pre	5	1.00	0.70	1.00
		Post	5	1.60	1.34	1.00
4.	True/ False	Pre	5	0.80	1.09	0.00
		Post	5	1.80	0.83	2.00
5.	Map/ Pictorial work	pre	5	0.60	0.89	0.00
		post	5	0.80	0.44	1.00
6.	Total	pre	5	4.40	2.30	4.00
		post	5	7.40	2.19	8.00

(b). Performances of adapted SLM users group in geography lesson physical features of India.

S.No.	Test Items	Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	5	1.60	0.54	2.00
		Post	5	4.00	0.00	4.00
2.	Fill up the Blanks	Pre	5	0.60	0.54	1.00
		Post		2.60	1.51	2.00
3.	Match the Following	Pre	5	0.80	0.83	1.00
		Post	5	3.80	1.64	5.00
4.	True/ False	Pre	5	1.20	0.44	1.00
		Post	5	3.60	0.89	3.00
5.	Map/ Pictorial work	pre	5	1.20	0.83	1.00
		post	5	4.80	0.44	5.00
6.	Total	pre	5	5.40	2.40	6.00
		post	5	18.80	1.92	19.00

The results in the figure 4.1 (a) and 4.1 (b) and tables 4.1(a) and 4.1 (b) highlight the overall positive impact of adapted self-learning material in inducing better comprehension and retention in class X learners in the lesson of geography. The median scores of textbook users was marginally lower than users of adapted self learning material in the pre test (4 Vs 6), but in the post test following use of the respective material, there is only nominal improvement by 4 scores in the formal group whereas in the latter group there is more than three-fold improvement by a score of 13 in the post test. So, results clearly reveal the effectiveness of adapted self-learning materials in bringing about meaningful learning related to the physical features of India. Further deliberation of performance in different types of test items, authenticates the effectiveness of adapted self learning materials in all types of test items – closed set and open ended as well as map work. In comparison, learners who read routine textbook content showed improvement only in test items involving chance factor like multiple choice items. Switlick (1997) suggest that children with hearing loss required thematic, tailor made instruction in early stages. But as the learners mature and move to higher grades, lessons have to become more structured. But still they need to be individualized to facilitate learning according to the individual language level and conveniences of pace and space. The adapted self learning material developed in this study is seen to

achieve this purpose, thus contributing to better learning. The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials. As the population (N = 5 in each group) was small and the data lacked normality, the comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.2.

Table 4.2: *Results of Mann- Whitney U test for comparison of performances in grade X geography with Kannada as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	5	0.745	> 0.05
Textbook Users	5		
Post Test			
Users of Adapted SLM	5	2.619	< 0.05
Textbook Users	5		

As per the results present in table 4.2, there is no significant difference between two groups in pre performance ($|Z| = 0.745$, $p > 0.05$). However they confirm the significant effect of adapted self-learning material over textbook material with statistical significance ($|Z| = 2.619$, $p < 0.05$). Further analyses were carried out with Wilcoxon Signed Ranks

Test to compare between the pre and post test performances in each of the experimental groups. The users of adapted self learning materials displayed significant advantage ($|Z| = 2.06$, $p < 0.05$) following the experiment. However, the advantage made by textbook users was not significant ($|Z| = 1.82$, $p > 0.05$).

4.1.2 Comparative performances in history

The subject matter considered for experimentation in history was class IX lesson on **¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ** (Transliteration: Kranthi haagu rashtra prabhuthwagala udhaya; Translation: Revolution and raise of nation states). As usual, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of ten days preceded and followed by pre and post tests. Initial deliberations had been made to compare between the differences in the gain in learning in the two groups of textbook users and users of adapted self-learning materials separately. Graphic representation of the descriptive comparison has been presented in figures 4.2(a) and 4.2(b). The statistical comparison of the benefits in the users of textbook and adapted self learning material were given in tables 4.3 (a) and 4.3 (b).

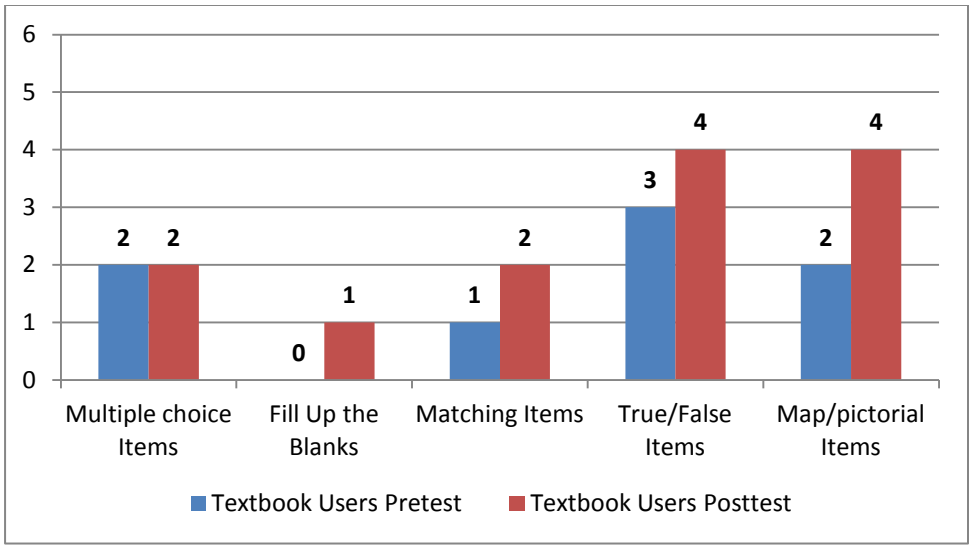

Figure 4.2 (a): Comparison of performances in history with Kannada as medium of instruction in textbook users group

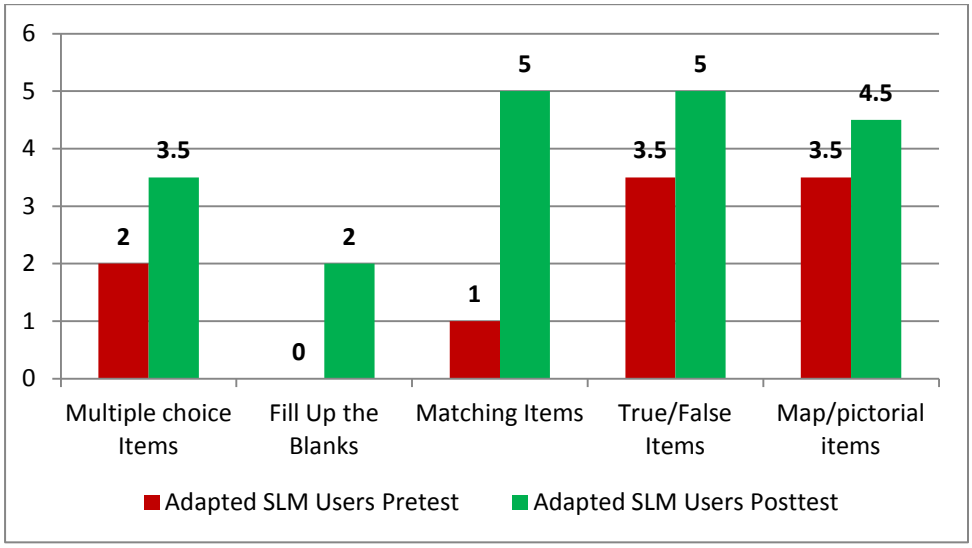

Figure 4.2 (b): Comparison of performances in history with Kannada as medium of instruction in adapted SLM users group

Table 4.3: *Comparison of performances in history lesson revolution and raise of nation states*

(a). Performances of textbook users in history lesson revolution and raise of nation states

S.No	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	5	2.20	0.83	2.00
		Post	5	2.20	1.09	2.00
2.	Fill up the Blanks	Pre	5	0.00	0.00	0.00
		Post	5	0.80	0.44	1.00
3.	Match the Following	Pre	5	1.40	1.14	1.00
		Post	5	2.00	0.70	2.00
4.	True/ False	Pre	5	2.80	1.48	3.00
		Post	5	3.20	1.30	4.00
5.	Map/ Pictorial work	pre	5	2.40	0.54	2.00
		post	5	3.80	1.30	4.00
6.	Total	pre	5	8.80	1.64	8.00
		post	5	12.00	2.54	13.00

(b). Performances of adapted SLM users in history lesson revolution and raise of nation states

S.No.	Test Items	Test	Adapted SLM User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	4	1.75	0.50	2.00
		Post	4	3.75	0.95	3.50
2.	Fill up the Blanks	Pre	4	0.00	0.00	0.00
		Post	4	2.00	0.00	2.00
3.	Match the Following	Pre	4	1.25	1.50	1.00
		Post	4	5.00	0.00	5.00
4.	True/ False	Pre	4	3.50	0.57	3.50
		Post	4	5.00	0.00	5.00
5.	Map/ Pictorial work	pre	4	3.50	0.57	3.50
		post	4	4.50	0.57	4.50
6.	Total	pre	4	10.00	1.15	10.00
		post	4	20.25	1.50	20.00

The data presented in figure 4.2 (a) and (b) and tables 4.3 (a) and 4.3 (b) highlights the overall positive impact of adapted self-learning materials in inducing better comprehension and retention in class IX learners in the subject of history. The textbook users have ranked only two median rank less (8 Vs 10) in their performance than adapted self learning material in the pre test, but in the post test textbook users improved by a median score of five, while the adapted self learning material users showed an improvement of 10 median scores in the post test. The positive impact had been evident in all types of test items both closed-set items like multiple choice and true or false, as well as open ended items like fill in the blanks. Zhao and Hoge (2005) say that social studies especially history involves complex concepts which may be difficult for children with hearing impairment to comprehend the concepts. They suggested that the adaptation process in the content with more visual information may help these children to overcome their difficulties and these may supplement effective teaching. In tune with their findings, the findings of the present study endorse the effectiveness of the developed adapted self learning materials enhancing in the learning process of children with hearing impairment. The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials through the comparison of post test performances

between the two groups. As the data lacked normality, the comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.4.

Table 4.4: *Results of Mann- Whitney U test for comparison of performances in grade IX history with Kannada as medium of instruction.*

Experimental Group	N	Z	p
Pre Test			
Users of Adapted SLM	4	1.257	> 0.05
Textbook Users	5		
Post Test			
Users of Adapted SLM	4	2.470	< 0.05
Textbook Users	5		

The results on table 4.4 further confirm the significant effect of adapted self-learning material over textbook material in their post test performances ($|Z| = 2.470$, $p < 0.05$). While, there was no significant difference between two groups in pre performance ($|Z| = 1.257$, $p > 0.05$). The pre and post test performances within the two groups had been compared using Wilcoxon Signed Rank Test. The users of adapted self learning material displayed significant advantage ($|Z| = 2.032$, $p < 0.05$) following the experiment, whereas advantage shown by textbook users was not significant ($|Z| = 1.826$, $p > 0.05$).

4.1.3 Comparative performances in civics

The subject matter considered for experimentation in civics was class VIII lesson on **§qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ** (Transliteration: Badathana mattu hasivu; Translation: Poverty and hunger). As mentioned in the chapter on method, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of nine days preceded and followed by pre and post tests. Graphic representation of the pre and post test performances in both the groups has been presented in figures 4.3(a) and 4.3(b). The statistical comparison of the benefits in the users of textbook and adapted self learning material are given in tables 4.5 (a) and 4.5 (b).

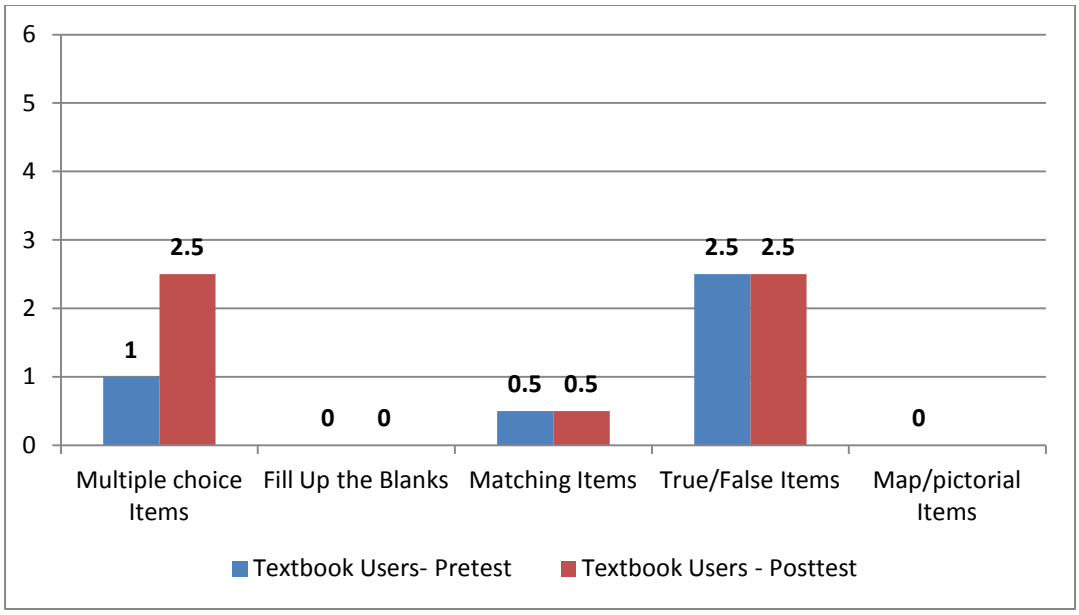

Figure 4.3(a): Comparison of performances in civics with Kannada as medium of instruction in textbook user group

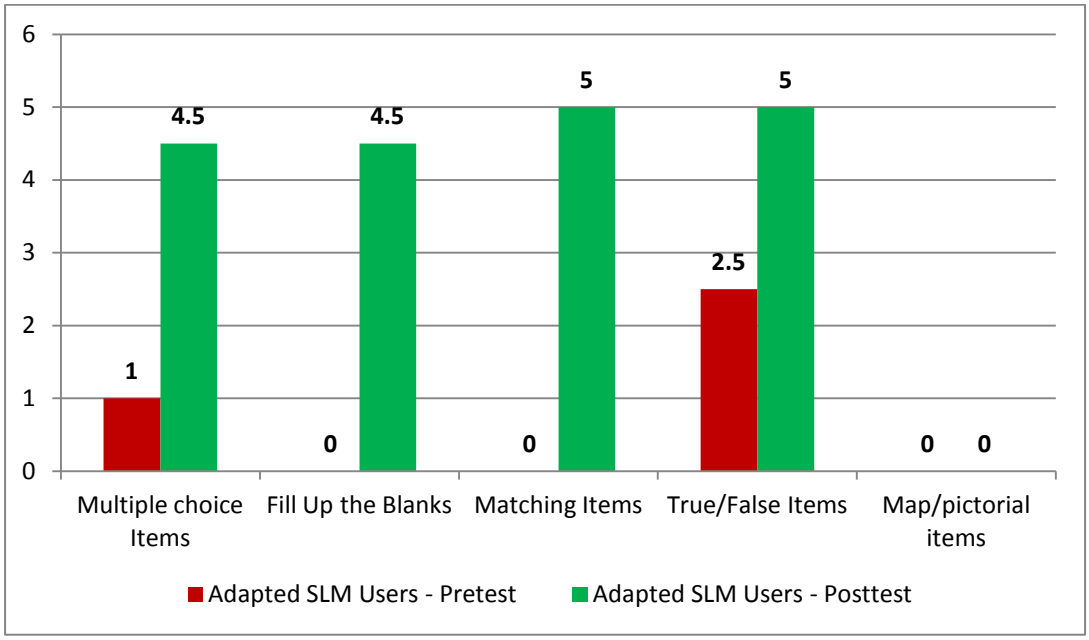

Figure 4.3(b): Comparison of performances in civics with Kannada as medium of instruction in adapted SLM user group

Table 4.5: *Comparison of performances in civics lesson poverty and hunger*

(a). Performances of textbook users in civics lesson poverty and hunger

S.No.	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	4	1.00	1.15	1.00
		Post	4	2.25	1.70	2.50
2.	Fill up the Blanks	Pre	4	0.00	0.00	0.00
		Post	4	0.25	0.50	0.00
3.	Match the Following	Pre	4	1.00	1.41	0.50
		Post	4	1.00	1.41	0.50
4.	True/ False	Pre	4	2.25	1.70	2.50
		Post	4	2.75	0.95	2.50
5.	Map/ Pictorial work	pre	4	0.00	0.00	0.00
		post	4	0.00	0.00	0.00
6.		pre	4	4.25	1.25	4.00
	Total	post	4	6.50	1.73	6.00

(b). Performances of adapted SLM user group in civics lesson poverty and hunger

S.No.	Test Items	Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	4	0.75	0.50	1.00
		Post	4	3.75	1.89	4.50
2.	Fill up the Blanks	Pre	4	0.00	0.00	0.00
		Post	4	4.50	0.57	4.50
3.	Match the Following	Pre	4	0.25	0.50	0.00
		Post	4	5.00	0.00	5.00
4.	True/ False	Pre	4	2.25	0.95	2.50
		Post	4	4.50	1.00	5.00
5.	Map/ Pictorial work	pre	4	0.00	0.00	0.00
		post	4	0.00	0.00	0.00
6.		pre	4	3.25	0.95	3.50
	Total	post	4	17.75	1.70	17.50

The data presented in tables 4.5 (a) and 4.5 (b) highlight the overall significant effect of adapted self-learning materials in inducing better comprehension and retention in class VIII learners in the subject of civics. While the textbook users have a marginal advantage of an aggregate median score of 0.5 (4 Vs 3.50) in the pre test, users of adapted self-learning materials surpass with an advantage of median score 11.5 in the post test. To be more specific, textbook users have made an improvement of two median score in the post test and they showed improvement only in closed set items which involve chance factor like true or false and multiple choices etc. whereas, users of adapted self-learning materials have improved by a median score of 14. The positive impact had been uniform in all types of objective test items like fill in the blanks and multiple choice, etc. Results clearly show the improvement made by the learners of adapted self learning material compared with the users of textbook. However, the printed learning materials, whether adapted or not, had not helped learners in picking up practical knowledge that was necessary to solve pictorial items. James and Brown (1998) suggested that modifications like simple content, attractive pictorial information, print size, etc in the learning content may be helpful for children with hearing impairment to perform better in their academics. All these qualities are fulfilled by the self learning material which was developed by the

researches in this study and is seen to achieve this purpose, thus contributing to better learning. The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials. As the data lacked normality, the comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.6.

Table 4.6: *Results of Mann- Whitney U test for comparison of performances in grade VIII civics with Kannada as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	4	1.084	> 0.05
Textbook Users	4		
Post Test			
Users of Adapted SLM	4	2.323	< 0.05
Textbook Users	4		

The results on table 4.6 further confirm the significant effect of adapted self-learning material over textbook material. There were no significant difference between the pre test performances of the two groups, where the users of textbooks had an advantage of 0.5 median score ($|Z| = 1.084$, $p = > 0.05$). Whereas in the post test, users of the adapted self-learning materials had an advantage of 11.5 median scores, which was

statistically significant at 0.05 level ($|Z|$ = 2.323). Comparison of pre and post test performances were made within the two groups using Wilcoxon Signed Ranks Test. The results indicated that the pre-post test differences were statistically insignificant in both users of adapted self learning materials ($|Z|$ = 1.841, $p > 0.05$) and textbook users ($|Z|$ = 1.890, $p > 0.05$).

4.1.4 Comparative performances in economics

The subject matter considered for experimentation in economics was class X lesson on **¨sÁgÀvÀzÀ d£À¸ÀASÉå** (Transliteration: Bharathadha janasankhye; Translation: Population of India). As mentioned in the chapter on method, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of seven days preceded and followed by pre and post tests. Graphic representation of the pre and post test performances in both the groups has been presented in figures 4.4(a) and 4.4(b). The statistical comparison of the benefits in the users of textbook and adapted self learning material are given in tables 4.7 (a) and 4.7 (b).

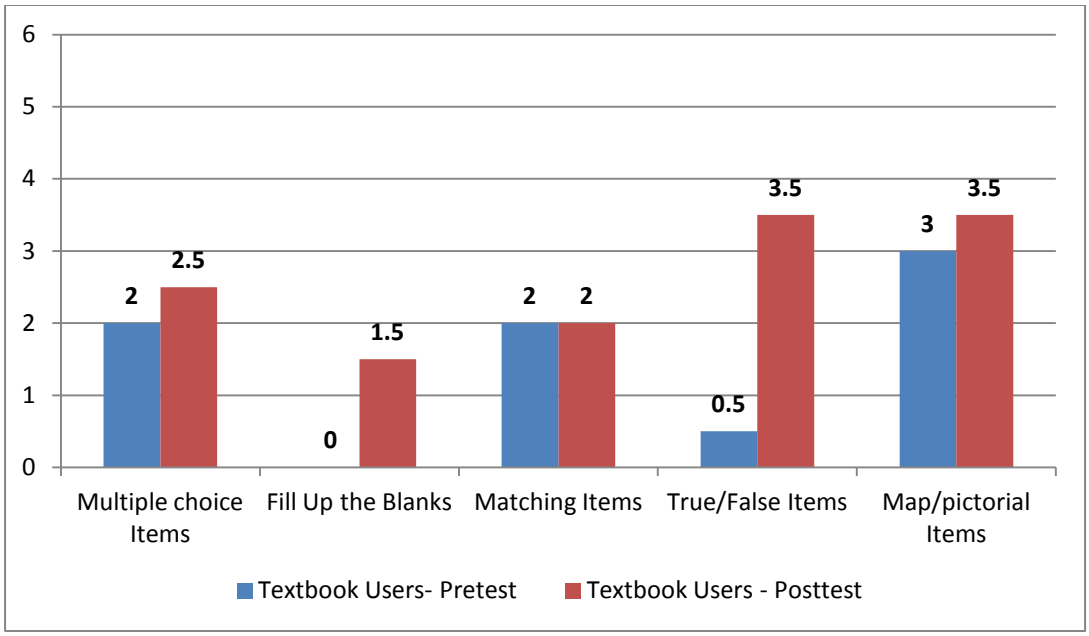

Figure 4.4(a): Comparison of performances in economics with Kannada as medium of instruction in textbook users group

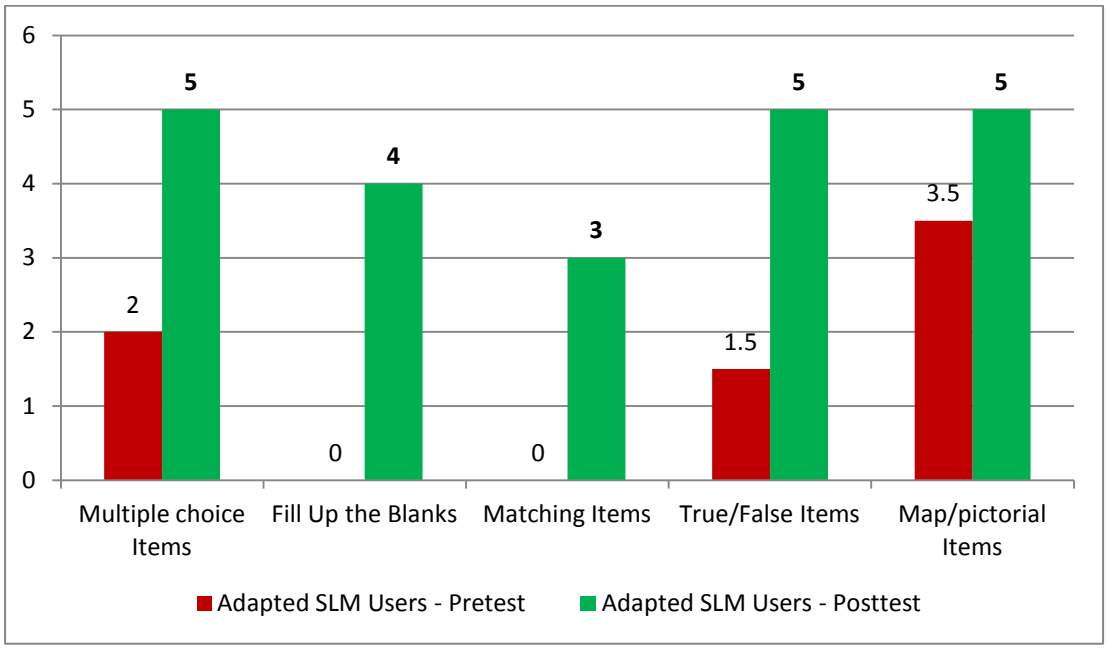

Figure 4.4(b): Comparison of performances in economics with Kannada as medium of instruction in adapted SLM users group

Table 4.7: *Comparison of performances in economics lesson population of India*

(a). Performances of textbook user group in economics lesson population of India

S.No.	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	4	1.75	0.50	2.00
		Post	4	2.25	0.95	2.50
2.	Fill up the Blanks	Pre	4	0.00	0.00	0.00
		Post	4	1.25	0.95	1.00
3.	Match the Following	Pre	4	1.75	1.25	2.00
		Post	4	2.25	0.50	2.00
4.	True/ False	Pre	4	1.25	1.89	0.50
		Post	4	3.25	0.95	3.50
5.	Map/ Pictorial work	pre	4	3.00	1.63	3.00
		post	4	3.50	0.57	3.50
6.		pre	4	7.50	1.29	7.50
	Total	post	4	12.5	1.91	12.00

(b). Performances of adapted SLM user group in economics lesson population of India

S.No.	Test Items	Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	4	1.75	0.50	2.00
		Post	4	4.50	1.00	5.00
2.	Fill up the Blanks	Pre	4	0.00	0.00	0.00
		Post	4	4.00	0.81	4.00
3.	Match the Following	Pre	4	0.00	0.00	0.00
		Post	4	3.50	1.00	3.00
4.	True/ False	Pre	4	1.75	0.95	1.50
		Post	4	5.00	0.00	5.00
5.	Map/ Pictorial work	pre	4	2.75	1.89	3.50
		post	4	4.75	0.50	5.00
6.		pre	4	6.25	2.21	7.00
	Total	post	4	21.75	1.89	22.50

The data presented in tables 4.7 (a) and 4.7 (b) highlight the overall positive impact of adapted self-learning materials in inducing better comprehension and retention in class X learners in the subject of economics. While the textbook users have a marginal advantage of an aggregate median score of 0.5 (7.5 Vs 7) in the pre test, users of adapted self-learning materials had a greater advantage of median score of 10.5 in the post test. To be more specific textbook users had improved by 4.5 median score in the post test, while the users of adapted self-learning materials have improved by a score of 15.5. The positive impact had been uniform in all types of objective test items. Fuchs et al. (1994) suggests that children with hearing impairment need accommodations and modifications in their learning content which will boost their academic performance and such modifications should suit their level and abilities so that they are easily accessible to the children. The adapted self learning material developed in present study seems to have achieved this purpose, thus contributing to better learning. The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials. As the data lacked normality, the comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.8.

Table 4.8: *Results of Mann- Whitney U test for comparison of performances in grade X economics with Kannada as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	4	0.744	> 0.05
Textbook Users	4		
Post Test			
Users of Adapted SLM	4	2.337	< 0.05
Textbook Users	4		

The results on table 4.8 further confirm the significant effect of adapted self-learning material over textbook material. They reveal that there is no significant difference between two groups in pre performance, ($|Z| = 0.744$, $p > 0.05$), while there is significant difference ($|Z| = 2.337$, $p < 0.05$) between pre and post test performances. Comparisons between pre and post test performances in each of the two experimental groups using Wilcoxon-Signed Rank Test indicated that the advantages following experiment were not significant among both users of adapted self learning materials ($|Z| = 1.857$, $p > 0.05$) and textbook users ($|Z| = 1.826$, $p > 0.05$).

4.2 Comparative analyses in groups with Telugu as medium of instruction

4.2.1 Comparative performances in geography

The subject matter considered for experimentation in geography was class X lesson on sû¹±µhµ lÉ¶¥A: sôSÐz0µ ¶ªö±µÃq¸vÀ (Transliteration: Bharatha desham bhowgolika swaroopalu; Translation:India-relief features). As mentioned in the method, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of five days preceded and followed by pre and post tests. Graphic representation of the pre and post test performances in both the groups has been presented in figures 4.5 (a) and (b). The statistical comparison of the benefits in the users of textbook and adapted self learning material has been given in tables 4.9 (a) and 4.9 (b).

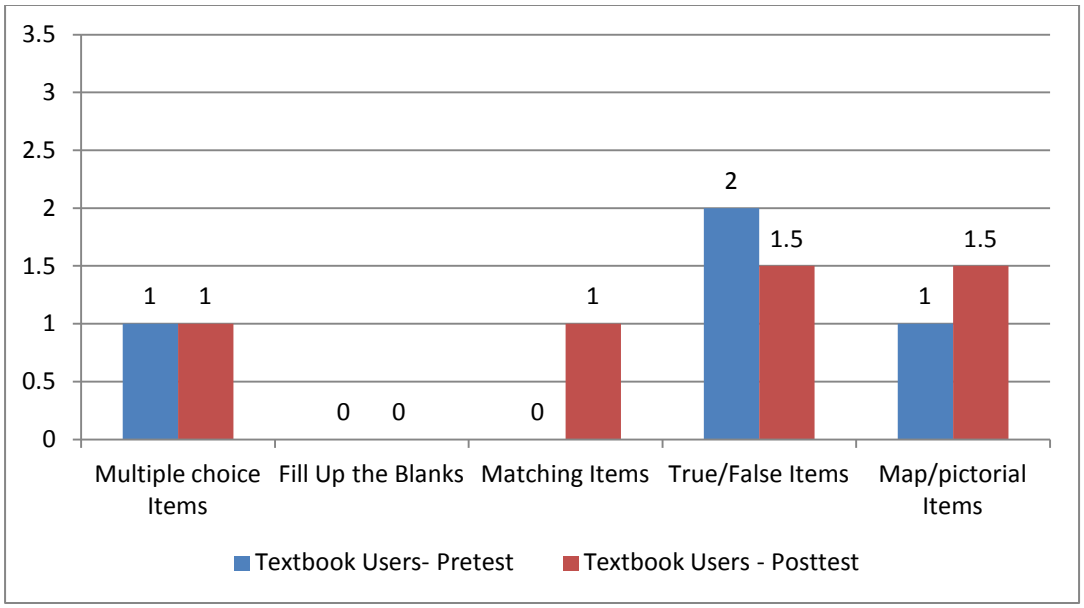

Figure 4.5(a): Comparison of performances in geography with Telugu as medium of instruction in textbook users group

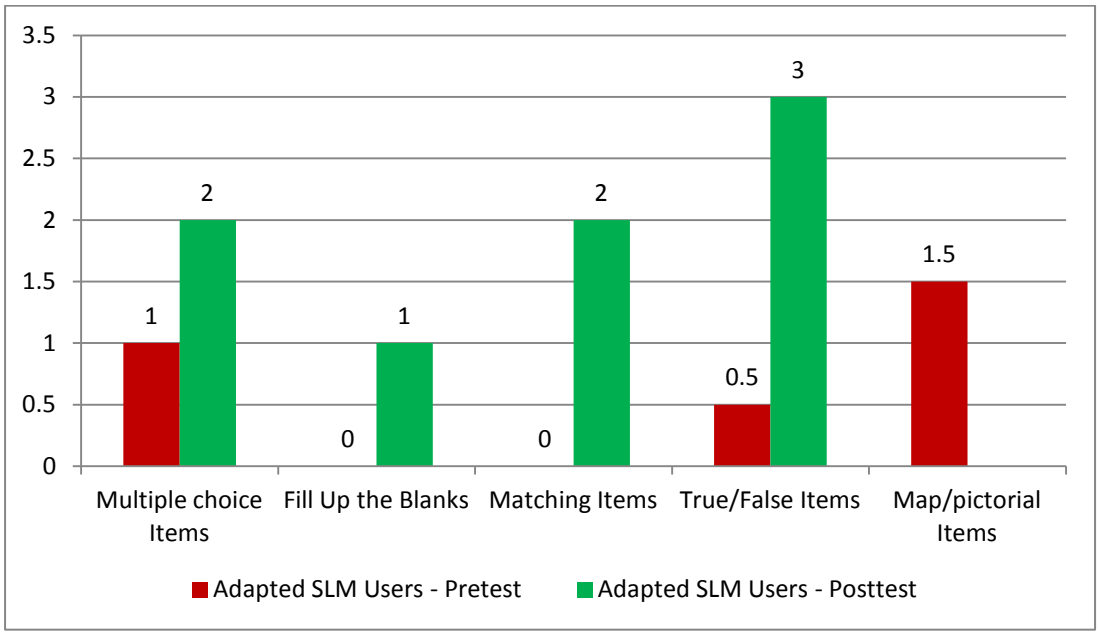

Figure 4.5(b): Comparison of performances in geography with Telugu as medium of instruction in adapted SLM users group

Table 4.9: *Comparison of performances in geography lesson India India-relief Features*

(a). Performances of textbook user group in geography lesson India-relief features

S.No.	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	12	1.08	0.66	1.00
		Post	12	1.08	0.79	1.00
2.	Fill up the	Pre	12	0.00	0.00	0.00
	Blanks	Post	12	0.08	0.28	0.00
3.	Match the	Pre	12	0.58	0.90	0.00
	Following	Post	12	1.50	1.08	1.00
4.	True/ False	Pre	12	1.50	1.44	2.00
		Post	12	1.75	1.05	1.50
5.	Map p/ Pictorial	pre	12	1.33	1.15	1.00
	Work	post	12	1.66	0.98	1.50
		pre	12	4.58	2.10	4.50
	Total	post	12	6.08	1.50	6.00

(b). Performances of adapted SLM user group in geography lesson India relief features

S.No.	Test Items	Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	12	1.25	0.96	1.00
		Post	12	1.50	0.67	2.00
2.	Fill up the	Pre	12	0.00	0.00	0.00
	Blanks	Post	12	1.00	0.60	1.00
3.	Match the	Pre	12	0.16	0.38	0.00
	Following	Post	12	2.08	1.62	2.00
4.	True/ False	Pre	12	1.25	1.54	0.50
		Post	12	2.83	1.02	3.00
5.	Map/ Pictorial	pre	12	1.50	0.79	1.50
	Work	post	12	3.00	1.80	3.00
6.		pre	12	3.91	1.08	4.00
	Total	post	12	10.66	2.99	10.50

The data presented in table 4.9 (a) and 4.9 (b) highlights the overall significant effect of adapted self-learning materials in inducing better comprehension and retention in class X learners in the lesson of geography. The positive impact had been more profound in closed-set items. While the textbook users have a marginal advantage of an aggregate median score of 0.5 (4.50 Vs 4) in the pre test, users of adapted self-learning materials surpass with an advantage of median score 4.5 in the post test. To be more specific, textbook users have improved by 1.5 score in the post test, while users of adapted self-learning materials have improved by a median score of 6.5. Moores and Martin (2006) say that educational curriculum needs modifications in content, process and environment which will help the students with hearing impairment to enrich their performances in their classrooms. Here the developed adapted self learning materials for children with hearing impairment, by helping to improve their previous performances, seem to have achieved this purpose. The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials. As the data lacked normality, the comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.10.

Table 4.10: *Results of Mann-Whitney U test for comparison of performances in grade X geography with Telugu as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	12	1.039	> 0.05
Textbook Users	12		
Post Test			
Users of Adapted SLM	12	3.740	< 0.05
Textbook Users	12		

The results on table 4.10 further confirm the significant effect of adapted self-learning material over textbook material. According to the results from Mann Whitney test there were no significant differences between the pre test performances of the two groups, ($|Z| = 1.039$, $p > 0.05$), but in the post test adapted self learning material users showed an improvement which is statistically significant with $|Z| = 3.740$ ($p < 0.05$). Further analyses were carried out with Wilcoxon Signed Ranks Test to compare between the pre and post test performances in each of the experimental groups. The users of adapted self learning materials displayed significant advantage ($|Z| = 3.066$; $p < 0.05$) following the experiment. However, the advantage made by textbook users was minimal and insignificant ($|Z| = 1.616$; $p > 0.05$).

4.2.2 Comparative performances in history

The subject matter considered for experimentation in history was class IX lesson on **17, 18 ¶¢ ¶¥h¸s¹çvvÑ ¶pñy¹«¸ö£Àoµ, y¹j±ÀµÀ¢¸lµ £¶pô¢¸vÀ** (Transliteration:17,18va shathabdalalo prajaswamika jathiyayavaada viplavaalu; Translation: Democratic and nationalist revolutions 17^{th} and 18^{th} centuries). As mentioned under the method, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of nine days preceded and followed by pre and post tests. Graphic representation of the pre and post test performances in both the groups has been presented in figures 4.6 (a) and 4.6 (b). The statistical comparison of the benefits in the users of textbook and adapted self learning material have been given in tables 4.11 (a) and (b).

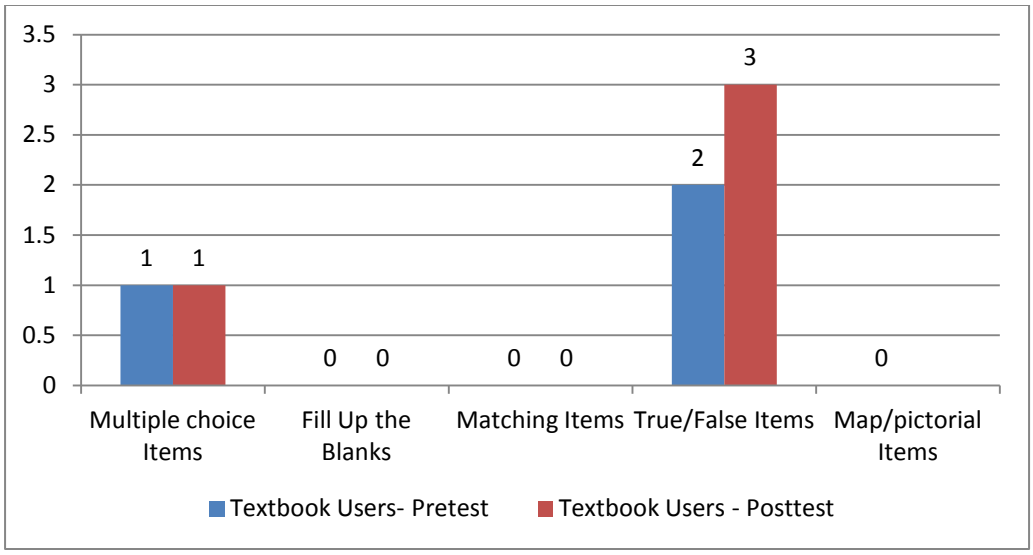

Figure 4.6 (a): Comparison of performances in history with Telugu as medium of instruction in textbook users group

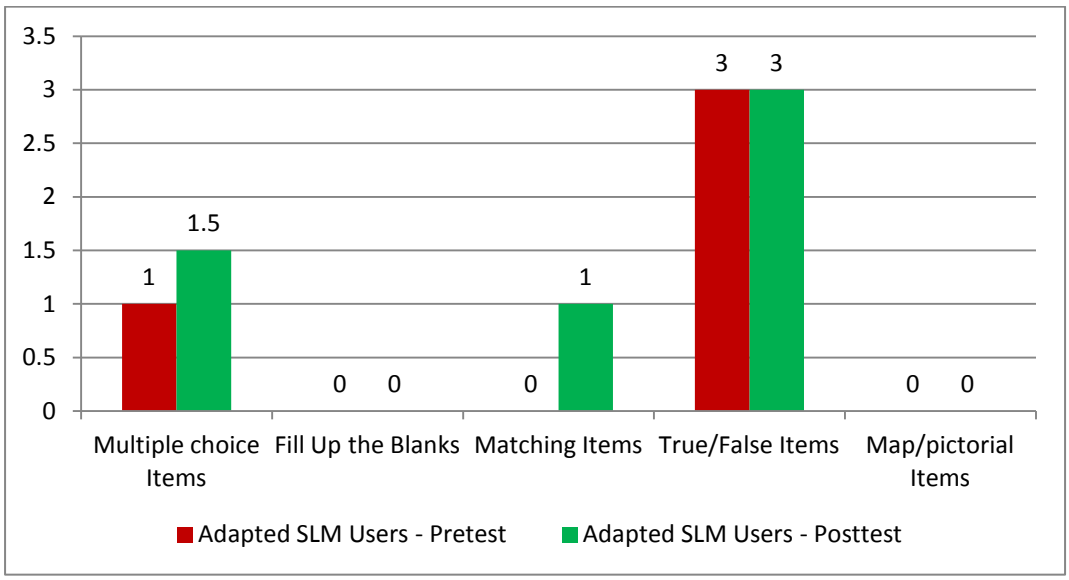

Figure 4.6 (b): Comparison of performances in history with Telugu as medium of instruction in adapted SLM users group

Table 4.11: *Comparison of performances in history lesson democratic and nationalist revolutions 17th and 18th centuries*

(a). Performances of textbook users in history lesson democratic and nationalist revolutions 17th and 18th centuries

S.No.	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	20	0.95	0.75	1.00
		Post	20	1.10	0.91	1.00
2.	Fill up the Blanks	Pre	20	0.00	0.00	0.00
		Post	20	0.00	0.00	0.00
3.	Match the Following	Pre	20	0.20	0.52	0.00
		Post	20	0.70	1.08	0.00
4.	True/ False	Pre	20	1.95	1.19	2.00
		Post	20	3.10	0.96	3.00
5.	Map/ Pictorial Work	pre	20	0.00	0.00	0.00
		post	20	0.00	0.00	0.00
6.	Total	pre	20	3.10	1.20	3.00
		post	20	4.85	1.22	4.50

(b). Performances of adapted SLM users group in history lesson democratic and nationalist revolutions 17th and 18th centuries

S.No.	Test Items	Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	20	1.10	0.85	1.00
		Post	20	1.90	1.33	1.50
2.	Fill up the Blanks	Pre	20	0.00	0.00	0.00
		Post	20	0.15	0.36	0.00
3.	Match the Following	Pre	20	0.45	0.82	0.00
		Post	20	1.70	1.65	1.00
4.	True/ False	Pre	20	2.65	1.08	3.00
		Post	20	2.90	1.25	3.00
5.	Map/ Pictorial Work	pre	20	0.05	0.22	0.00
		post	20	0.60	0.82	0.00
6.	Total	pre	20	4.25	1.37	4.00
		post	20	7.45	2.48	6.00

The data presented in table 4.11(a) and (b) highlight the overall significant effect of adapted self-learning materials in inducing better comprehension and retention in class IX learners in the subject of history. The learning outcomes had been better in closed-set objective test items. The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials. As the data lacked normality, the comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.12.

Table 4.12: *Results of Mann Whitney U test comparison of performances in grade IX history with Telugu as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	20	1.039	> 0.05
Textbook Users	20		
Post Test			
Users of Adapted SLM	20	3.448	< 0.01
Textbook Users	20		

There was no significant difference between two groups in pre performance ($p > 0.05$) with the textbook users having a median score of 1 (3 Vs 4) less than adapted self learning material users in the pre test. However, in the post test, textbook users had improved by a median score

of 1; while the adapted self learning material users showed an improvement by a median score two in the post test which was significant at 0.01 level. Witt and Elliott (1985) report that activeness of adaptation is important and the instructed material should be appealing and appropriate for the children. The developed self learning materials have proved to be active and helpful in the present study. They seem to achieve the purpose of better comprehension.

The results obtained from Wilcoxon Signed Ranks Test also reveal that there is an equivalent efficiency of both adapted self learning materials, as well as textbook materials. Both the former ($|Z| = 3.843$, $p < 0.05$) and latter groups ($|Z| = 3.324$, $p < 0.05$) had gained significant advantage following the exposure to the respective test materials.

4.2.3 Comparative performances in civics

The subject matter considered for experimentation in civics was class VIII lesson on Êplµ±¼0µA – C¶¢S¸¶¬¶m (Transliteration: Pedharikam-avagaahana; Translation: Understanding poverty). As mentioned in the method, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of eight days preceded and followed by pre and post tests. Graphic representation of the pre and post test performances in both the groups have been presented in figures 4.7(a) and 4.7 (b). The statistical comparison of the benefits in the users of textbook and adapted self learning material were given in tables 4.13 (a) and 4.13 (b).

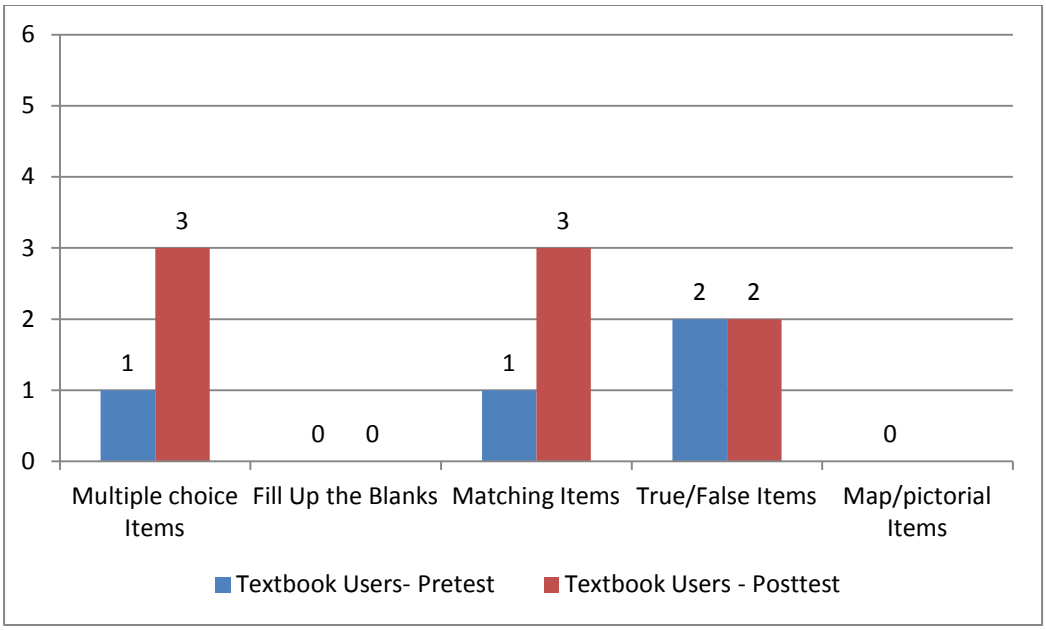

Figure 4.7 (a): Comparison of performances in civics with Telugu as medium of instruction in textbook users group

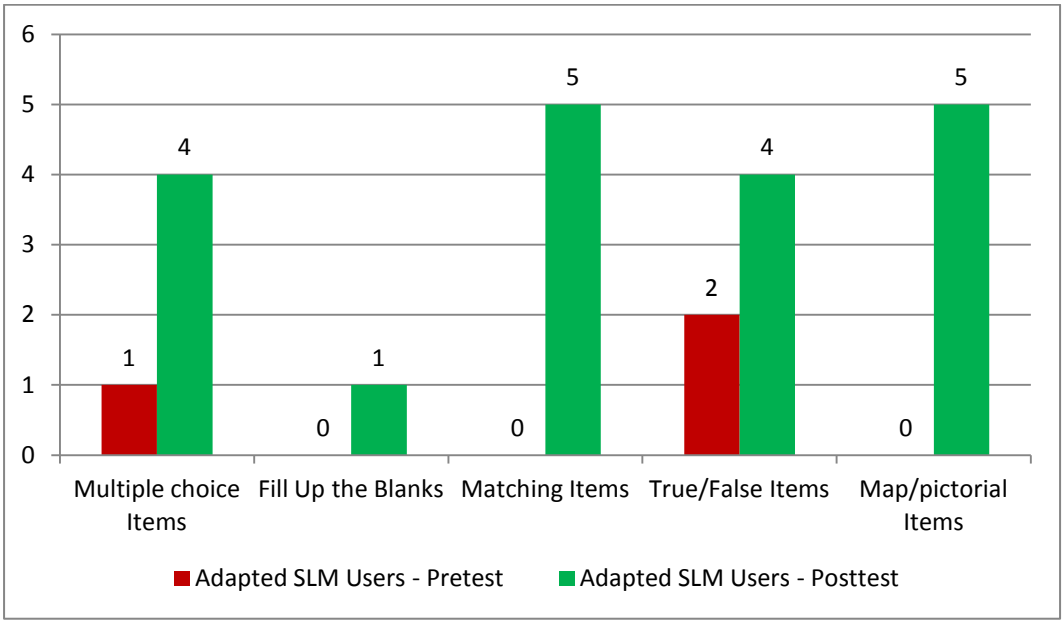

Figure 4.7 (b): Comparison of performances in civics with Telugu as medium of instruction in adapted SLM users group

Table 4.13: *Comparison of performances in civics lesson understanding poverty*

(a). Performances of textbook users in civics lesson understanding poverty

S.No.	Test Items	Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	13	0.92	1.11	1.00
		Post	13	2.69	0.85	3.00
2.	Fill up the	Pre	13	0.00	0.00	0.00
	Blanks	Post	13	0.00	0.00	0.00
3.	Match the	Pre	13	1.15	1.40	1.00
	Following	Post	13	3.38	1.26	3.00
4.	True/ False	Pre	13	1.53	1.45	2.00
		Post	13	2.07	0.86	2.00
5.	Map/ Pictorial	pre	13	0.00	0.00	0.00
	Work	post	13	0.46	0.87	0.00
6.		pre	13	3.53	2.18	4.00
	Total	post	13	8.46	1.71	9.00

(b). Performances of adapted SLM users group in civics lesson understanding poverty

	Test Items	Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	13	0.69	0.85	1.00
		Post	13	3.76	0.59	4.00
2.	Fill up the	Pre	13	0.00	0.00	0.00
	Blanks	Post	13	0.92	0.75	1.00
3.	Match the	Pre	13	0.69	1.18	0.00
	Following	Post	13	5.00	0.00	5.00
4.	True/ False	Pre	13	2.00	1.73	2.00
		Post	13	4.15	0.55	4.00
5.	Map/ Pictorial	pre	13	0.00	0.00	0.00
	Work	post	13	4.38	1.04	5.00
6.		pre	13	3.38	2.84	3.00
	Total	post	13	18.23	1.30	18.00

The data presented in table 4.13 (a) and 4.13 (b) highlight the overall significant effect of adapted self-learning material in inducing better comprehension and retention in class VIII learners in the subject of civics. As the data lacked normality, the statistical comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.14.

Table 4.14: *Results of Mann Whitney U test for comparison of performances in grade VIII civics with Telugu as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	13	0.104	> 0.05
Textbook Users	13		
Post Test			
Users of Adapted SLM	13	4.368	< 0.05
Textbook Users	13		

There is no significant difference between two groups in their pre performance with $|Z| = 0.104$ ($p > 0.05$). While the textbook users have a marginal advantage of an aggregate median score of 1(4 Vs 3) in the pre test, users of adapted self-learning materials surpass with an advantage of 9 in the post test. To be more specific, textbook users have made an improvement of 5 ranks in the post test, while users of adapted self-

learning materials have improved by 15 ranks. The positive impact had been uniform in all types of objective test items.

Golladay (1951) suggest that curricular content should be clear and simple to comprehend the concepts and include attractive illustrations, maps, etc to draw the attention of students and it should match the learning levels of students with hearing impairment. The developed adapted material in the present study fulfills all these qualifications and seems to have achieved better learning.

The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials. The results on table 4.14 further confirm the positive impact of adapted self-learning material over textbook material, as adaptive self learning material have resulted in significantly better post performances in comparison to textbooks ($|Z| = 4.368$, $p < 0.05$). Wilcoxon Signed Rank Test was used to compare between the pre and post test performances within each of the experimental groups. The results showed that both the two experimental groups i.e. users of adapted self learning materials ($|Z| = 3.204$, $p < 0.05$), as well as textbook users ($|Z| = 3.070$, $p < 0.05$) had made significant advantages following intervention.

4.2.4 Comparative performances in economics

The subject matter considered for experimentation in economics was class X lesson on ¶pñyvÀ (Transliteration: Prajalu; Translation:The people).

As mentioned in the method, both the experimental groups were exposed to adapted self-learning material or existing textbook content for a period of seven days preceded and followed by pre and post tests. Graphic representation of the pre and post test performances in both the groups has been presented in figures 4.8 (a) and 4.8 (b). The statistical comparison of the benefits in the users of textbook and adapted self learning material were given in tables 4.15 (a) and 4.15 (b).

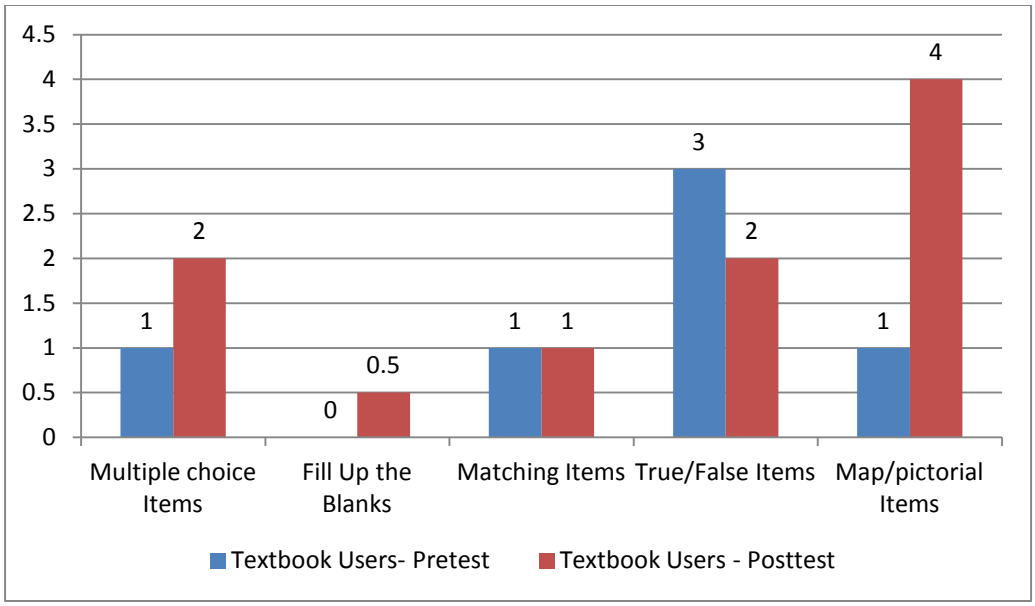

Figure 4.8 (a): Comparison of performances in economics with Telugu as medium of instruction in textbook users group

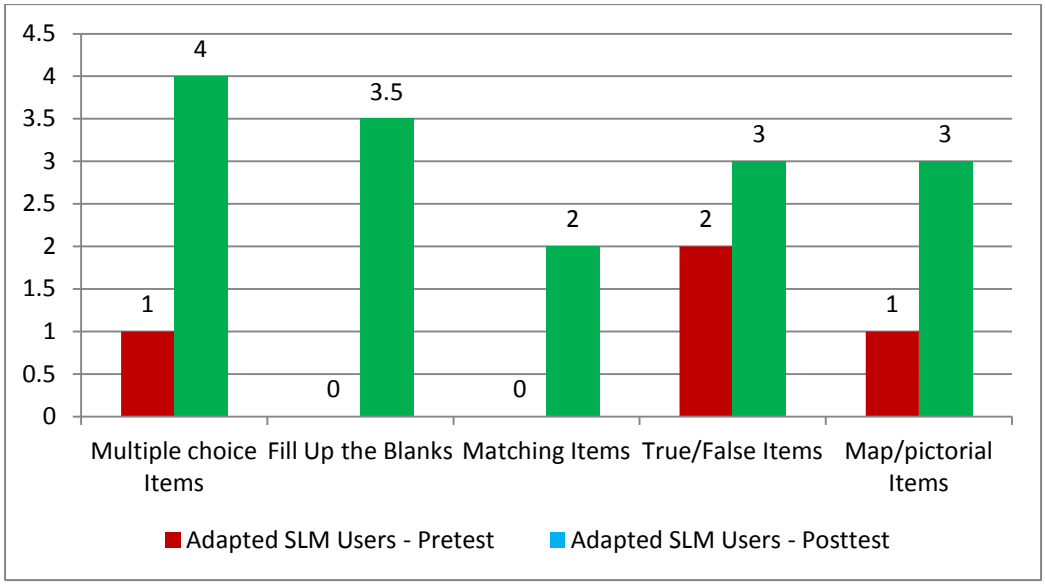

Figure 4.8 (b): Comparison of performances in economics with Telugu as medium of instruction in adapted SLM users group

Table 4.15: *Comparison of performances in economics lesson the people*

(a). Performances of textbook users in economics lesson the people

Test Items		Test	Textbook User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	20	1.05	0.94	1.00
		Post	20	1.75	0.96	2.00
2.	Fill up the Blanks	Pre	20	0.30	0.47	0.00
		Post	20	0.90	1.29	0.50
3.	Match the Following	Pre	20	1.20	1.05	1.00
		Post	20	1.35	1.38	1.00
4.	True/ False	Pre	20	2.45	0.99	3.00
		Post	20	1.65	0.67	2.00
5.	Map	pre	20	1.35	1.30	1.00
		post	20	3.45	1.66	4.00
6.	Total	pre	20	6.35	2.32	6.00
		post	20	9.05	3.13	8.00

(b). Performances of adapted SLM users group in economics lesson the people

Test Items		Test	Adapted Self Learning Material User Group			
			N	Mean	Standard Deviation	Median
1.	Multiple Choice	Pre	20	1.05	0.75	1.00
		Post	20	3.75	0.85	4.00
2.	Fill up the Blanks	Pre	20	0.65	1.08	0.00
		Post	20	3.40	1.23	3.50
3.	Match the Following	Pre	20	0.60	0.88	0.00
		Post	20	2.45	1.57	2.00
4.	True/ False	Pre	20	2.25	0.71	2.00
		Post	20	2.95	1.19	3.00
5.	Map	pre	20	1.40	1.56	1.00
		post	20	3.20	1.57	3.00
6.	Total	pre	20	6.15	2.62	5.50
		post	20	15.80	2.48	16.00

The data presented in tables 4.15 (a) and 4.15 (b) highlights the overall significant effect of adapted self-learning materials in inducing better comprehension and retention in class X learners in the subject of economics. As the data lacked normality, the statistical comparison of the performances in the two groups was made using Mann-Whitney U test and the results have been presented in the following table 4.16. There is no significant difference between pre test performance, with $|Z| = 0.423$. ($p > 0.05$). The scores of textbook users and the users of adapted self learning material were almost similar in the pre test with users of adapted self learning material having a median score of 0.5 (6 Vs 5.50) less than textbook users. Textbook users have made an improvement of two median scores in the post test; while users of adapted self-learning materials have improved by median score 11.5. The significant effect had been uniform in all types of objective test items. Squires (2001) say that the curricular content needs to be modified and it should include simple language vocabulary and sentences, ample support of visual organisations, legible print, deletion of extra information, etc are helpful to progress in their academics. These modifications will help to draw their attention and retain their concentration. Adapted self learning materials developed in the present study fulfil all these qualities and they have been found to be

helpful in promoting the learning process in children with hearing impairment.

Table 4.16: *Results of Mann Whitney U test comparison of performances in grade X economics with Telugu as medium of instruction.*

Experimental Group	N	|Z|	p
Pre Test			
Users of Adapted SLM	20	0.423	> 0.05
Textbook Users	20		
Post Test			
Users of Adapted SLM	20	4.738	< 0.05
Textbook Users	20		

The data was further subjected to statistical treatment to confirm the advantage displayed on part of learners using adapted self-learning materials and the results have been presented in the above table 4.16. The results further confirm the positive impact of adapted self-learning material over textbook material. Further analyses were carried out with Wilcoxon Signed Ranks Test to compare between the pre and post test performances within each of the experimental groups. The results showed that use of both adapted self learning material ($|Z| = 3.935$, $p < 0.05$), as well as textbook content ($|Z| = 3.640$, $p < 0.05$) had resulted in significant improvement.

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4.3. Inferences:

The results discussed thus far lead to the following tentative conclusions:

- Null hypothesis (1- i) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 2.619$ and $p < 0.05$, than their peers who used textbook with reference to the geography lesson **¨sÁgÀvÀzÀ ¥ÁæPÀÈwPÀ ®PÀëtUÀ¼ÀÄ** (Transliteration: Bharathadha prakruthika lakshnagalu; Translation: Physical features of India) of grade X in Kannada. Thus, implying that adapted self learning material were more effective compared to textbook.
- Null hypothesis (1- ii) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 2.470$ and $p < 0.05$, than their peers who used textbook with reference to the history lesson **PÁæAw ºÁUÀÆ gÁµÀÖç ¥Àæ¨sÀÄvÀéUÀ¼À GzÀAiÀÄ** (Transliteration: Kranthi haagu rashtra prabhuthwagala udhaya; Translation: Revolution and raise of nation states) of grade IX in Kannada. Thus, implying that adapted self learning material were more effective compared to textbook.

- Null hypothesis (1- iii) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 2.323$ and $p < 0.05$, than their peers who used textbook with reference to the civics lesson **§qÀvÀ£À ªÀÄvÀÄÛ ºÀ¹ªÀÅ** (Transliteration:Badathana mattu hasivu; Translation: Poverty and hunger) of grade VIII in Kannada. Thus, implying that adapted self learning material were more effective compared to textbook.
- Null hypothesis (1- iv) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 2.337$and $p < 0.05$, than their peers who used textbook with reference to the economics lesson **¨sÁgÀvÀzÀ d£À¸ÀASÉå** (Transliteration: Bharathadha janasankhye; Translation: Population of India) of grade X in Kannada. Thus, implying that adapted self learning material were more effective compared to textbook.
- Null hypothesis (2- i) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 3.740$ and $p < 0.05$, than their peers who used textbook with reference to the geography lesson **sû'±µhµ lÉ¶¥A:**

sôSÐz0µ ¶ªö±µÃq¸vÀ (Transliteration: Bharatha desham bhowgolika swaroopalu; Translation:India-relief features) of grade X in Telugu. Thus, implying that adapted self learning material were more effective compared to textbook.

- Null hypothesis (2- ii) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test $|Z| = 3.448$ and $p < 0.05$, than their peers who used textbook with reference to the history lesson **17, 18 ¶¢** ¶¥h¸s'çvvÑ ¶pñy'«¸öEÀ0µ, y'j±ÀµÀ¢¸lµ £¶pô¢¸vÀ (Transliteration: 17,18va shathabdalalo prajaswamika jatiyayavaada viplavaalu; Translation: Democratic and nationalist revolutions 17th and 18th centuries) of grade IX in Telugu. Thus, implying that adapted self learning material were more effective compared to textbook.
- Null hypothesis (2- iii) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 4.368$ and $p < 0.05$ than their peers who used textbook with reference to the civics lesson Êplµ±'/40µA – C¶¢S¸¶¬¶m (Transliteration: Pedharikam- avagaahana;

Translation: Understanding Poverty) of grade VIII in Telugu. Thus, implying that adapted self learning material were more effective compared to textbook.

- Null hypothesis (2- iv) is rejected because users of adapted self learning materials gained significantly better comprehension in the post test with $|Z| = 4.738$ and $p < 0.05$, than their peers who used textbook with reference to the economics lesson ¶pñyvÀ (Transliteration: Prajalu; Translation:The people) of grade X in Telugu. Thus, implying that adapted self learning material were more effective compared to textbook.

Ultimately, the adapted self learning materials developed for the social studies lessons in geography, history, civics and economics with Kannada and Telugu as medium of instruction were found to exert all round, positive impact on promoting learning in children with hearing impairment.

CHAPTER V

SUMMARY & CONCLUSION

According to Rachel McKee and Eileen Smith (2003), regular educators of children with hearing impairment face difficulties when using the same textbook as that of the typically hearing children. Teachers evade making adaptations because it is very time consuming and they may lack adequate knowledge or skills to do. So, therefore the present study was an attempt to develop adapted self-learning lessons which can be used by the teachers as readymade base models for adapting the lessons. Not many endeavours have been conducted in this regard for children with hearing impairment. Hence, the present study was undertaken in this direction.

Reisberg, (1990) says that adaptation technique is a useful technique. It would be worthwhile, if adapted lessons can be developed and disseminated at the wider level for the children with hearing impairment, so that teachers and caregivers can become familiar with adaptation techniques and are able to support the learning of children with hearing

impairment. Hence, it was considered imperative to develop adapted self learning material for children with hearing impairment.

5.1 Process of the study:

The present study employed a comparative experimental design to investigate the effectiveness of self-learning adapted lessons in enabling better understanding of social studies lessons among children with hearing impairment who are studying at secondary school level. Two special schools from Andhra Pradesh and two special schools from Karnataka were selected as the field for the study. For identifying participants for the study, purposive sampling technique was used to select the children with hearing impairment, who are studying at secondary school level including classes VIII, IX and X. A total of 168 children with hearing impairment fulfilling the following criteria: moderate to profound hearing loss; adequate language level, especially in terms of reading skills; presence of no other additional impairments; Telugu or Kannada as medium of instruction; and no prior exposure to the lessons in Geography, History, Civics and Economics were selected.

The children thus selected were stratified based on their grades and medium of instruction. Later, on random basis, children in each standard were assigned to two experimental groups which were to undergo exposure to textbook and adapted self-learning material. Participants in these two groups were matched for their previous class annual exam marks scored in social studies and language. Out of the 168 selected children, only 165 of them underwent the complete course of investigation, while others dropped out during the conduct of the experiment.

Social Studies textbooks of classes VIII, IX and X from Andhra Pradesh and Karnataka State Education Boards were reviewed to inspect the effectiveness of textbook lessons in aiding meaningful learning of social studies in children with hearing impairment. Consequently, specific lessons which were similar across the two education boards were chosen and adapted for better learning. Test material for pre and post tests were developed in order to investigate the effectiveness of adapted self-learning lessons in helping children with hearing impairment to understand social studies concepts. The test material included simple objective type items for assessment like filling the blanks, choosing the correct answer, stating whether true or false, matching items, map work and/ or identifying/ naming the pictures. Each test included a total of 25 questions of which 10

were knowledge based and 15 were comprehension-based objective type of questions.

Social Studies lessons of VIII, IX and X from Andhra Pradesh and Karnataka State Education Boards were selected for the study following review of relevant textbooks. Total eight lessons, i.e. four from Telugu and four lessons from Kannada were selected and adapted with a exposure ranging between minimum period of five days and a maximum period of 10 days. The pre and post tests were constructed following review of relevant textbooks. Previously blue prints were prepared to give proportionate weight-age to different aspects of each of the four lessons. After development of test material and adapted self learning material, these were validated by five educational experts each who were fluent in Telugu and Kannada languages, respectively. The investigation commenced with administration of pre test. Then the adapted self learning as well as the textbook materials for day-wise reading by individual students were distributed to the children through their respective teachers for specified duration in segregated environments to avoid spill-over effect. The experiment concluded with conduct of post test using materials developed for the purpose in both the groups. The raw data was analysed and results interpreted. After the experimentation, in order to maintain

ethical fairness of not denying any group of children exposure to any advantageous treatment, both the experimental groups were alternately provided exposure to textbook content and adapted self-learning material. However, there were no tests conducted to evaluate their performance.

5.2 Major findings of the study

- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the geography lesson of grade X in Kannada. Thus implying that adapted self learning material were more effective compared to textbook. The users of adapted self learning material users displayed significant advantage in the post test with $|Z| = 2.619$ ($p < 0.05$) following the experiment.
- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the history lesson of grade IX in Kannada. Thus implying that adapted self learning material were more effective compared to textbook. The users of adapted self learning material users displayed significant advantage in the post test with $|Z| = 2.470$ and ($p < 0.05$) following the experiment.

- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the civics lesson of grade VIII in Kannada. Thus implying that adapted self learning material were more effective compared to textbook. Adapted self learning material users displayed significant advantage in the post test with $|Z| = 2.323$ and ($p < 0.05$) following the experiment.
- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the economics lesson of grade X in Kannada. Thus implying that adapted self learning material were more effective compared to textbook. Adapted self learning material users displayed significant advantage in the post test with $|Z| = 2.337$ ($p < 0.05$) following the experiment.
- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the geography lesson of grade X in Telugu. Thus implying that adapted self learning material were more effective compared to textbook. Adapted self learning material users displayed significant advantage in the post test with $|Z| = 3.740$ ($p < 0.05$) following the experiment. .

- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the history lesson of grade IX in Telugu. Thus implying that adapted self learning material were more effective compared to textbook. Adapted self learning material users displayed significant advantage in the post test with $|Z| = 3.448$ ($p < 0.05$) following the experiment.
- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the civics lesson of grade VIII in Telugu. Thus implying that adapted self learning material were more effective compared to textbook. Adapted self learning material users displayed significant advantage in the post test with $|Z| = 3.448$ ($p < 0.05$) following the experiment.
- Users of adapted self learning material gained significantly better comprehension than their peers who used textbook with reference to the economics lesson of grade X in Telugu. Thus implying that adapted self learning material were more effective compared to textbook. Adapted self learning material users displayed significant advantage in the post test with $|Z| = 4.368$ ($p < 0.05$) following the experiment.

5.3 Limitations of the study

In the process of carrying out the present study, the investigators faced certain limitations which restrained the scope of the study.

- The present study was conducted only for selected grade of VIII, IX and X.
- The participants of the study were limited in number.
- The developed material was restricted to eight lessons.
- The study was undertaken only in Karnataka and Andhra Pradesh with Kannada and Telugu as medium of instruction.
- The period of experimentation restricted limited from five to 12 days only.

5.4 Delimitations of the study

In spite of the earlier mentioned limitations the study has scope for:

- Developing right attitude among teachers of children with hearing impairment towards adaptation technique and learning potentials of children with hearing impairment.
- Providing insight to teachers about means for comprehensive assessment using objective test items.

- Extending ready to use adapted self learning material which teachers and caregivers can use for teaching learning purposes.
- Providing teachers with adapted self learning material can serve as ready-reckoner for teachers to base their future adaptation endeavors.
- Serving as inspiration for future research and developmental work in this direction.

5.5 Recommendations:

5.5.1 With regard of the adapted self learning material developed through this study, the investigators suggest-

- Distribution to the teachers who need help in adapting lessons for their children with hearing impairment in Karnataka and Andhra Pradesh.
- Utilization as base models by the practitioners working in content adaptations of textbooks at various levels-material development, classroom instruction, etc in the country.

5.5.2 The investigators also recommended further research and developmental efforts to-

- Develop adapted lessons in other curricular areas like mathematics and science

- Develop adapted lessons in other medium of instruction.
- Develop adapted lessons for higher levels of education at post secondary level.
- Carry out similar experiments with larger samples of population with diverse backgrounds and special needs across the country.

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