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FORMAT FOR PROJECT REPORT

1. Title of the Project & ARF Project Number:

Title of the Project: Effect of Resource Materials on Impact of Inclusive Education on Children with Intellectual Disability (ID) and Learning Disabilities (LD)

ARF Project Number: 65

2. Principal investigator and co-investigator(s):

Principal Investigator: Dr. G. Malar – Post-Doctoral Fellow (formerly Reader in Special Education), AIISH

Co-investigators: Ms. S. Prathima – Speech Language Pathologist (formerly Itinerant Speech Therapist), AIISH & Mr. D. Gururaj – formerly Resource Coordinator, AIISH

3. Implementing institutions & other collaborating institutions: AIISH

4. Duration of project:

12 months (with intermittent breaks due to attrition of research assistants)

5. Date of approval/sanction of the project: September 2016

6. Date of the commencement of the project: January 2017

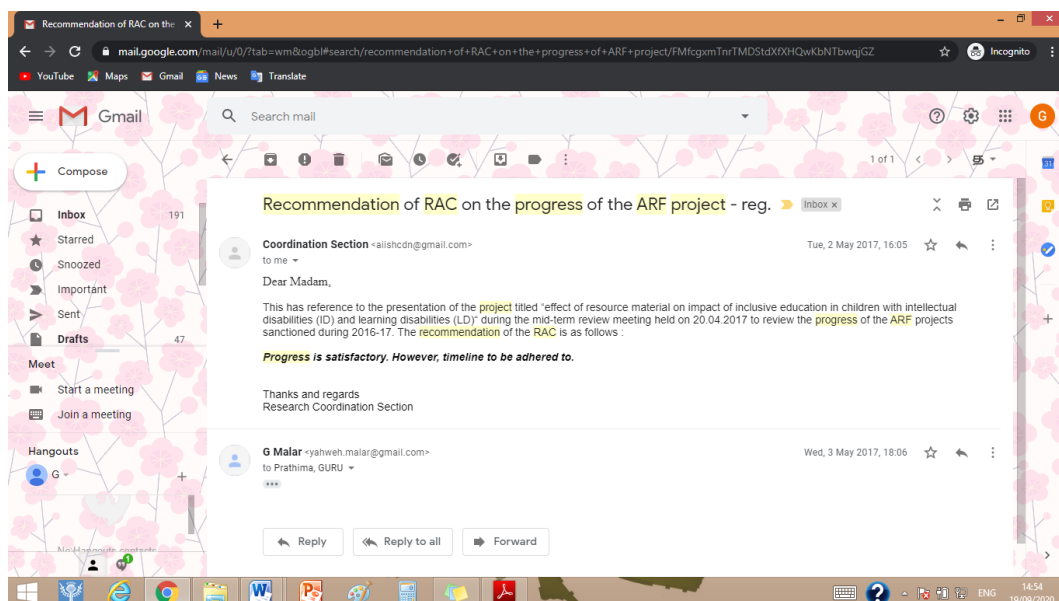
7. Date of completion: February 2019

8. Extension of project term, *if any citing references to OMs conveying such extension(s)*: Approval for extension of 2 months received vide SH/CDN/ARF-65/2018-19 dated 14.06.2018

9. Objectives Approved in the RAC Meeting: The aim of the study was to investigate the effect of resource materials on general school teachers' knowledge, attitude and practice for including children with ID and LD in mainstream classrooms and the resultant impact on their school performance. The subsequent specific objectives of the study were:

- To develop tools for collecting data on general teacher competence for facilitating inclusive education.
- To field test the tool for validity and reliability.
- To develop multimedia materials involving text, audio, video, graphics and animations to provide essential information as well as simulated practical orientation.
- To experiment with the resource materials to study the primary effect on general teacher competence, as well as secondary impact on school performance of learners with ID or LD.

10. Remarks Received during Mid-Term Review of Project Progress (*Copy of the remarks from coordination section with authenticated signature to be enclosed*): The review report was received through email and the snapshot of the mail follows –



11. Modifications of original objectives as approved during midterm review, if any, while implementing the project and reasons thereof (*Copy of the remarks of mid-term review from coordination section with authenticated signature to be enclosed*):

No modifications had been suggested during the midterm review

12. Research work flow in detail giving full details of experimental set up, methods adopted, data supported by necessary tables, charts, diagrams, photographs, videos and digitized documents, Appendices showing materials developed/adopted in the study, if unpublished, as and when applicable.

13. Detailed analysis of results indicating contributions made towards enhancing the status of knowledge in the subject.

14. Conclusions summarizing the achievements and indications of scope for future work.

The detailed report pertaining to items of serial numbers 12 to 14 has been presented herein after.

(The softcopies of the tools developed for data collection had been submitted as separate file in the CD containing first report, and research data and resource materials developed through this project had been submitted in separate CD and DVDs respectively)

SECTION I: INTRODUCTION

The scene of education for children with special needs arising out of disabilities such as communication disorders have been revolutionised in the past few decades, with their learning moving out of secure, sheltered environment to more demanding, mainstream learning environment. The phenomenal change has not only impacted specially-abled children but also their service providers. This section of the report focuses on the relevant developments in India and across the globe before stating the premise and purpose of the research project.

1.1 Evolution of Educational Habilitation for Children with Special Needs in India

Education is an essential for survival owing to the social change in the modern world. Education also provides opportunities for inclusion and upward social mobility of marginalized and disadvantaged groups such as specially-abled individuals in developing communities like India. Over the years, there has been a major change in the educational scene of the country, resulting in enhanced educational practice benefiting children with special needs. Until the 1970s, the official policy for children with special needs leaned towards 'segregation'. Most educators considered that children with physical, sensory, or cognitive disabilities were very different from or incompatible with typically developing children that they could not participate in the activities of a general school (Advani, 2002). Initially, in the pre-independence era, special schools for children with disabilities were setup by parents of these children or philanthropists. In post-independence India, central and state governments in the country took initiatives to set up model schools in every district headquarters, as well as provide support to voluntary organisations for the establishment of schools for children with hearing, intellectual or visual impairments.

The first official acknowledgement of education for children with special needs as an essential aspect of mainstream strategy was rendered by Prof. Kothari in his recommendations in the report of the Third Indian Education Commission 1966-68. This in turn triggered progressive movement towards mainstreaming and inclusion of children with special needs in the National Policies of Education in 1986 and 1992 (Committee for Review of NPE 1986, 1990; Department of Education, 1986; Department of Education, 1992). The government of India had expanded its efforts to realise these policy directives in the form of various programmes and schemes. They commenced with the centrally sponsored scheme of Integrated Education for Disabled (IED) in 1974-75, the main aim of which was to provide appropriate educational opportunities to children with disabilities in general schools, to

enable their retention, and encourage their achievement. However due to the lukewarm progress of the programme for over a decade, in the year 1987, the National Council of Educational Research and Training (NCERT) with the sponsorship of United Nations Children's Education Fund (UNICEF) undertook a trial Project Integrated Education for Disabled Children (PIED) to find out means for strengthening the integration of children with disabilities into general schools. The Integrated Education for Disabled Children (IEDC, 1992) scheme evolved as a consequence and later metamorphosed into the Inclusive Education for Disabled at Secondary Stage (IEDSS) in 2009 (Julka, 2014; Julka et al., 2014).

In most of these endeavours, preparation of general education teachers with necessary competence, as emphasised by evaluation of earlier programmes was one of the major focal areas. This very same aspect had been underlined by research evidences (Puri & Abraham, 2004; Yathiraj, 1994) as an essential criterion for meaningful and successful mainstreaming of children with special needs. Especially, the PIED and the IEDC 1992 endeavours incorporated a systematic 3-tiered mechanism for comprehensive training of all teachers in the mainstream educational context (Aggarwal, 2009). Currently they are found to have undergone restructuring in the contemporary inclusive education milieu. Ratta (2009) in a review report highlights the various constructive measures undertaken by the governments in India, especially through the *Sarva Shiksha Abhiyan* (SSA) scheme for promoting inclusive education. Sensitisation and training of general education teachers forms an integral aspect of these measures apart from other efforts for building up necessary resources and infrastructure.

1.2 Mainstream Teacher Preparedness for Inclusive Education around the World

To begin with, Villa et al. (1996) emphasise that elementary school teachers' attitude towards inclusive education is a crucial predictor of successful integration of students with

and without disabilities. An insightful understanding of the attitude is essential for designing and implementing school curriculum, as well as pre-service and in-service teacher training programmes. This in turn could have a significant impact on current and future educational policy, programme planning and funding decisions.

Experts working in advanced educational systems had all along been emphasising that understanding the capabilities and characteristics of general education teachers is an important prerequisite for promoting inclusive education (Larrivee, 1985). Barbara Larrivee had surveyed 118 primary school teachers on seven categories of 74 variables considered to be crucial in educating children with special needs arising out of LD in mainstream classrooms in the United States of America. Following collection of data employing 14 different tools and analysis of the same, she had reported that these children could survive and succeed in the mainstream learning environment on receiving appropriate attention and adequate support from their mainstream class teachers. But this was of course seldom available. Her corroborative longitudinal studies (Larrivee, 1981; 1982; 1986) substantiate the process-product relation between good teacher qualities with better mainstreaming outcomes. They further endorsed the fact that effective teaching for mainstreamed students with special needs ultimately resulted in better teaching for all students in the mainstream setting.

More recent reports from developed regions of the world, following the advent of inclusive policies that emphasise on the involvement and responsibility of the general education teacher, reveal slightly advantageous circumstances. They also underscore the fact that the most important factor that ensures successful inclusion of special education students is the attitude of the general education teachers regarding inclusion of these students in their classrooms (Barnatt & Kabzems, 1992). Attitude creates positive or negative opportunity and

behaviours, which in turn increase or limit the successful inclusion of students with disabilities in the learning environment.

Another notable in-depth foray was made by Chris Forlin from Western Australia through independent and collaborative research (Forlin, 1995; Forlin et al., 1996) in the early evolutionary stages of inclusive education. Their exercises addressed the issue of belief and practice among 230 teaching as well as 42 administrative educators who were involved in implementing inclusive education. The investigation involved comprehensive measures including both primary observations as well as secondary impressions for data collection. It was reported that educators were more for part-time integration than full-fledged inclusion. Further it was found that the acceptance levels was more for mild and less challenging disabilities in comparison to severe and complex conditions.

Johnson (1996) observed and analysed the attitude of general education teachers towards the placement of students with LD in their classrooms. Teachers who participated in this study were largely enthusiastic about taking part in the inclusive education process. However, they opined that reduced classroom strength will be more supportive to the progression. They further expressed concern about their inadequate competence for effective adaptation of teaching strategies for children with special needs, indicating need for in-service training. Other educational experts like Mastropieri and Scruggs (2004) also endorse the need for capacity building among general education teachers as a vital condition for successful inclusion of children with special needs.

Darling-Hammond (2000) following a cross-country survey of 50 states in the United States of America came to the conclusion that better trained teachers were more creative and innovative in meeting special educational challenges in general classrooms. Avramidis et al. (2000) ventured to study the attitude of general education teachers towards the inclusion of

children with special needs in mainstream schools in one local education authority in the south-west of England. The survey was conducted among 81 primary and secondary school teachers from south-west of England. The analysis revealed that teachers who have been implementing inclusive programmes, and therefore having active experience of inclusion, possess more positive attitude. Moreover, the findings also highlighted the importance of professional development in the formation of positive attitude towards inclusion. In particular, teachers with university-based professional development appeared to be more positive in their attitude and to be more confident in meeting the individualised educational programme (IEP) requirements of students with special educational needs. Thus the findings emphasise that both pre-service and in-service played a vital role in capacitating teachers to render useful support for inclusion.

1.3 Comparable Conditions in Asian Communities

As discussed hereinbefore, extensive studies from around the world allude to inadequacy among general education teachers for facilitating inclusive education of children with special needs. Similar evidences abound from the educational systems of developing communities in Asian countries as well. Much of the research reviewed shed light on awareness and attitude, and that too with regards to all disabilities in general.

To begin with more positive findings, Ali et al. (2006) studied the perceived attitude and knowledge of general and special education teachers of primary and secondary schools towards inclusive education in Malaysia. The results revealed that, in general, both the group of teachers possessed positive attitude towards inclusive education. They were of the opinion that inclusive education enhances social interaction and integrations among the students and thereby reduces the negative stereotypes on children with special needs. The findings also suggested that group effort between the general and the special education teachers is

important and that there should be clear guidelines on the implementation of inclusive education. The findings of the study revealed significant implications to the school authorities, teachers, and other stakeholders who were directly or indirectly involved in implementing inclusive education.

Around the same time Al-Zyoud (2006) had investigated teachers' attitude towards inclusive education in Jordan. Ninety teachers from seven schools, inclusive of both general and special education were considered as subjects for the study. Results generated using investigator-developed questionnaire to assess the teacher's preparedness and attitude towards inclusive education revealed that a majority of the teachers stressed for imminent changes in public schools in order to effectively meet the needs of students with disabilities. They explicitly stated the need for increased knowledge and skills that could professionally empower them to discharge their responsibilities towards implementing inclusive education.

Deng (2008) who investigated the attitude of primary school teachers in China reported that majority of the teacher-participants were for segregating children with special needs for the purpose of education, and these opinions were more conspicuous among teachers from rural regions. The report further adds that availability of resources and accumulation of experience were not found to influence their attitude. Nevertheless, Lai Hong An (2009) in the process of implementing and monitoring inclusive education process in Vietnam suggests that training of teachers and awareness creation among all other stakeholders is an imperative need for ensuring successful implementation of inclusive education. Circumstances and dispositions in India, a prominent player in the Asian region, reiterate much of these evidences. A closer overview of the reciprocations in the country to mobilisation of mainstreaming, and prevalent state of affairs have been featured hereinafter.

1.4 Teacher Competence for Inclusion of Children with Special Needs in India

Initiation of inclusive education drew both proactive and reactive efforts; from governmental as well as non-governmental agencies working at various levels and spheres in India. One of the fundamental features of inclusive education was the responsibility to be borne by mainstream school teachers. Contemporary research turned its focus on their preparedness for the task. Consequently, considerable evidences (Dharmaraj, 2000; Reddy, 2004; Sarojini, 2000; Selvakani, 2000) pointed to the incompetent knowledge, attitude and practice among general education teachers as a major hindrance to meaningful inclusion of children with special needs. Reddy (2004) carried out an inter-state survey of 527 general education teachers in the south Indian states of erstwhile undivided Andhra Pradesh and Tamil Nadu sponsored by Ministry of Social Justice and Empowerment, Government of India. He reported insufficient awareness, unenthusiastic attitude and ineffective practice among the participant teachers, and emphasised on the imminent need to set right these tendencies. The findings reinstate research evidences generated earlier by Dharmaraj et al. (2000).

Several studies have specifically reported about inclusion of children with communication disorders whose problems are often complex and obscure. AIISH, a pioneering institute in the field of communication disorders had spearheaded investigations in this front. Basavaraj et al. (2012) in a survey of 236 general education teachers from the south Indian states of Karnataka and Kerala had reported distorted perception about inclusive education and learning potential of children with communication disorders, as well as deficient capacities for their educational management in the mainstream learning environment. This evidence reiterated earlier findings of Sreedevi (2008) which critiqued teacher preparedness for managing diverse communication disorders in the inclusive educational scene. Similar evidences were reported specifically with respect to children with hearing impairment by research surveys undertaken by Gangadharan and Malar (2010), and

Kanaga Subramanyam et al. (2015). These studies carried out surveys in mainstream schools including children with hearing impairment. In all they covered 200 general education teachers from the south Indian city Mysuru and 78 contemporaries from rural environs around the city.

The above cited evidences led to the realisation that the teachers were relatively better prepared to brace up with cursory tasks like identification of disabilities in children and making necessary referrals. On the other hand, they were comparatively ill-prepared when it came to complex tasks like promoting constructive learning or managing challenging behaviours. Closer scrutiny of the findings of these studies also led to questions regarding the fallibility of the tools, particularly about the self-reported competence scales. The results from which indicated appreciable competence in the context of scarce knowledge, which is logically impractical (Gangadharan & Malar, 2010; Kanaga Subramanyam et al., 2015).

1.5 Measures to Upgrade Teacher Competence for Inclusive Education

Thus, research evidences from around the world draw attention to inadequate preparation of general education teachers to brace up for their multifarious roles as inclusive education service providers (McKenzie, 2009; Obiakor et al., 2010). The resonance is heard more loudly from developing parts of the world like Afro-Asian countries (Al-Zyoudi, 2006; Barnatt & Kabzems; 1992; Mukhopadhyay et al., 2009).

Most of the remedial efforts undertaken to rectify the lacunae are in their nascent stage taking form of informational orientation focusing on related development of knowledge and moulding of attitude. Usually these attend to more familiar and widely prevalent disabilities like sensory impairments for which rehabilitation strategies are fairly well evolved and established (Mishra & Nair, 2011; Vijetha & Nair, 2014).

Mary Dickens-Smith (1995) surveyed the change in the attitude towards inclusion among 100 general and 100 special education teachers working in the Chicago Public School System in Illinois in the United States of America before and after their participation in in-service training programme. Results showed that among both the groups of teachers a positive inclination towards mainstreaming was evident, thus confirming that training teachers was essential to the success of inclusion. Nevertheless, even in well-developed educational communities, such enhancement efforts have been reported to generate lukewarm responses. More so with reference to communication disorders seen in children with critical or complicated conditions like ID or LD (Carroll et al., 2003; Larrivee, 1981; National Research Centre on Learning Disabilities, 2007).

Thus, the above as well as other research evidences (Sujathamalini, 2002) point to the fact that there is a pressing need for concrete measures to prepare teachers serving in the mainstream settings of Indian education. These mobilisations have to be comprehensive promoting development of practical knowledge, positive attitude and proactive practice for coping with the challenges of inclusive education. There is also need for developing reliable tools to rationally assess such competence across-the-board as a prerequisite for effective redressal.

1.6 Need for the Study

The already overloaded general education teacher in the mainstream school/classroom has been entrusted with additional responsibility for ensuring meaningful inclusion of children with special needs. The responsibility encompasses a gamut of tasks such as identifying special educational needs in children, providing an enabling environment and individualising instruction and evaluation, along with coordination of necessary moral, material and monetary supports. However, pre-service efforts to prepare them for the

challenges have begun relatively in recent past, are scarcely spread, and minimal in quantity and quality wherever they are available. This implies need for meticulous in-service training. Towards this end, government/s in India at various levels mobilises efforts earlier through *Sarva Shiksha Abhiyan (SSA)* and *Rashtriya Madhyamik Shiksha Abhiyan (RMSA)* schemes, and currently through the integrated *Samagra Shiksha Abhiyan* programme. In spite of these arduous efforts, teachers are found to be largely exposed to theoretical information with minimal practical exposure. This has resulted in building up passive knowledge and flaccid attitude rather than active skills necessary for effective implementation of inclusive education in mainstream learning environment. The efforts are constrained due to paucity of expertise and facilities to carry out practical orientation and training across the country. This dearth of competence building is aggravated with scarcity of objective measures for appraising them. While there have been few valid measures for testing knowledge and rating attitude, reliable procedures to objectively observe practical skills are hardly found thus depriving endeavours to improve the situation with proper intervention.

Another notable aspect in the execution of successful inclusion is that most of the efforts are directed towards disabilities such as sensory impairments that are managed with comparative effectiveness with well evolved and established rehabilitation strategies. Teacher inadequacies compound when dealing with children with neuro-developmental disorders that directly challenge the potential for learning like intellectual disability (henceforth referred as ID), or which have more obscure implications like learning disabilities (henceforth referred as LD). Hence, there is an imperative need for developing comprehensive tools for realistic appraisal, as well as effective resource materials for imparting training to general education teachers in handling such challenging disorders in children.

Hence, the reported project was proposed to develop multimedia resource materials for providing practical orientation about facilitating inclusive education of children with special educational needs arising out of challenging constraints of ID and complex consequences of LD. It also addresses the foregoing requirement to develop and/or compile valid and reliable tools for appraising resultant augmentation of competence in general education teachers. Further probe of the impact of the resource materials on teachers' competence in terms of knowledge, attitude and practice, and consequent bearing on school performance in children with the specified communication disorders will help demonstrate fruition of the endeavour.

1.7 Aims and Objectives of the Research Project

The aim of this experimental study was to investigate the effect of resource materials for orienting general education teachers about management of children with either ID or LD in mainstream educational settings. This broad-based purpose entails the specific objectives of – developing discrete tools for collecting data on constituents of teachers' competence, that is, knowledge, attitude and practice of inclusive educational management of special-abilities; testing them for validity and reliability; developing multimedia materials involving text, audio-visual and graphic representations to provide essential information as well as demonstrate practical skills; and experimenting with the resource materials to study their effect on general education teacher-competence, in conjunction with the consequent school performance of children with either ID or LD.

SECTION II: REVIEW OF LITERATURE

Detailed review of relevant literature was a preliminary measure undertaken before the commencement of research activities. It was vital as a preparatory exercise for constructing

valid tools for data collection and developing useful multimedia resource materials. The review focused on research evidences regarding enhancing capabilities in general education teachers for facilitating inclusion of children with ID as well as children with LD. Excerpts of the same have been outlined in this section.

2.1 Intellectual Disability

From the special educational perspective, ID may be described as a condition where the intellectual functioning in children lags considerably behind that which is appropriate for their age. This condition may be accompanied with deficits in their adaptive behaviour. Such deficiencies occurring in the developmental phase of birth to 18 years may necessitate special educational training apart from clinical rehabilitation (Maanum, 2009; Neilsen, 2009; Nolet & McLaughlin, 2005).

2.1.1 Presence of Intellectual Disability in Children

Children may acquire ID due to diverse reasons. In some instances the disability may be congenital occurring due to conditions before birth such as hereditary conditions, genetic mutations, maternal infections and injuries, and complex syndromes among others. The disability may also happen due to injuries or instances like lack of oxygen or brain haemorrhage at the time of birth. Following birth, deficiencies such as malnutrition, psycho-social and cultural deprivations, diseases like encephalitis or neonatal jaundice, and damages to neural functioning due to injuries are important among a wide range of causes that may lead to ID in children (Greenwood et al., 1994; Heward, 1996).

Presence of ID in children in the growing span of birth to eighteen years of age adversely affects almost all areas of child development – communication, self-care, health and safety, social skills, home and community living, self-direction, functional academics,

leisure and preparation for occupation among others; thus necessitating special educational intervention (Schalock, et al., 1994). However, not all children with ID may face challenges in all these areas of living and livelihood skills, nor difficulties of the same intensity.

The nature and severity of ID are measured, defined and classified depending on diverse contextual implications of behavioural, cognitive and social domains. However, for the purpose of special educational habilitation, the condition can be classified as educable, trainable and profound disability. Educable children with ID may have intelligent quotient (IQ) ranging between 50–55 and 70. They can be instructed to acquire useful skills for self-care, self-direction, functional academics and gainful employment. Trainable children with ID may possess IQ ranging between 35–40 and 50–55. They can be trained for sufficient independence in self-care, home and community living skills; as well as for engagement in productive occupations under supervision. Severe and profound ID is associated with IQ of less than 35–40 and 20–25, respectively. Children with such minimal IQ may be constrained even in basic self-care and survival needs in spite of training. They may require caregiving supervision and/or supports through all ages (Brolin, 1995; Dever, 1990; Luckasson et al., 1992; Snell & Vorrhees, 2006).

2.1.2 Educational Habilitation for Children with Intellectual Disability

Special Educational Goals for children with ID are not homogeneous for the entire group. They have to be uniquely determined according to the nature and extent of their abilities and limitations, as well as further life needs. Consequently they may involve instruction and/or training in independent and community living skills, functional academics, and/or abilities for employability. Whatever the area or aspect of education, the focus should be on engaging the constrained abilities of these children in a profitable manner so as to enable optimal functional development. It should be ensured that the resultant learning

outcomes are meaningful and useful. Training in *independent and community living skills* focus on developing skills for personal maintenance and home management, homemaking and community living, vocational preparation, leisure engagement, and independent travel (Dever, 1989). Instruction in *functional academic skills* includes training in reading, writing and number skills that will be useful in everyday home, community and/or work environment (Clark, 1994). Preparation for *employability* involves developing ability for workplace communication and interaction, receptivity and compliance to norms and instructions, and group cohesiveness and cooperation among others (Scheef et al., 2019).

Special Educational Training Methods for children with ID more frequently adopt the approach of *applied behaviour analysis* (Alberto & Troutman, 1995; Schloss & Smith, 1994). Although there are several different kinds of teaching tactics involving behaviour analysis, most of them involve the following crucial steps. The process begins with precise definition and task analysis of the behaviour or skill to be learnt. Subsequently instruction is rendered in manageable steps. This is accompanied with direct and frequent measurement of the progress in behaviour manifestation and skill performance, and complemented with providing immediate and systematic feedback on the performance. Once, the desired behaviour is acquired or necessary skill mastered, gradually and progressively scaffold supports are withdrawn. Thus, the children under training are enabled to function independently with natural, incidental environmental antecedents as stimuli, and consequences as feedback. Finally efforts are made to foster the ability to maintain and generalise newly learnt skills to diverse contexts outside the learning environment (Heward, 1996; Kameenui & Simmons, 1990; Lovitt, 1995; Snell, 1993).

2.1.3 Inclusive Education of Children with Intellectual Disability

Although a few children with ID will require intensive individualised intervention, all of them will benefit from growing and learning along with their typically developing peers. Hence, it is recommended to place all children with ID in mainstream learning environment. Consequently according to the nature and intensity of their needs specialised support may be provided through resource teachers co-teaching in general classrooms, and/or part-time pull-out to resource centres or special schools.

It is generally considered that educable children with ID with extra help will be able to master standard academic skills up to primary level of education. This may be feasible in any mainstream learning environment provided necessary supplementary supports are made available from within or out of bounds. Later it will be profitable to focus on development of employability and vocational skills. Whereas, trainable children with moderate ID will require added impetus on developing communication, daily living and vocational skills along with rudimentary academic skills. This might require individualised or small group special educational intervention that can be accommodated through resource facilities in an inclusive learning environment. If such accommodations are not feasible they could be compensated with prior special educational preparation before mainstreaming followed by part-time special educational supports (Heward, 1996; Maanum, 2009; Smith & Hilton, 1994).

In the case of children with severe and profound ID the primary instruction might happen in a special educational environment. However, frequent and regular integration and interaction in the mainstream learning environment during lighter and less taxing learning activities could be arranged for. This will be helpful in fostering typical development and generalising learning. Further such exposure and experience will be helpful in promoting development of independent and integrated living skills (Heward, 1996; Maanum, 2009; Smith & Hilton, 1994).

2.2 Learning Disabilities

Learning disabilities are neurodevelopmental disorders where in spite of average or above-average intelligence, the ability for reading, writing, spelling, computation, recalling, reasoning and/or organising information, and executing tasks may be affected. Consequent manifestations may be diverse in nature and hence it is indicated in plural terms as disabilities. Depending on the nature of manifestation the condition present in individual child may be labelled as – *auditory processing dysfunction* in case of problems in listening comprehension; *language-based learning disability* in case of problems in oral expression; *dyslexia* in case of difficulty with oral reading and reading comprehension; *dysgraphia* in case of difficulty with written expression; *dyscalculia* in case of difficulties in mathematical reasoning and computation; and *dyspraxia* in case of difficulties in organised execution of motor tasks. An exclusive specification employed by experts in demarcating LD is that the difficulties in learning and related skills should not be consequent of any other significant sensory, motor or cognitive disability; or social-cultural and other environmental deprivations (Hewards, 1996; Maanum, 2009; Pierangelo & Giuliani, 2008; Reynolds, 1992).

2.2.1 Presence of Learning Disabilities in Children

Various experts attribute the occurrence of LD to causes such as minimal damage or dysfunction in the central nervous system, biochemical imbalance in the physique, and emotional disturbances to the psyche. A range of environmental factors like deficient or deviant child rearing practice, inferior or imperfect instructional procedure, and severe critical surveillance along with lack of motivating supports may also contribute to the condition. Nevertheless, none of these causative conditions are yet to be conclusively proved (Fletcher et al., 2006; Hewards, 1996; Pierangelo & Giuliani, 2008).

The characteristic traits of LD, as explained earlier, affected receptive and expressive verbal communication, executive functioning, and academic skills in reading, writing and arithmetic. A significant consequence originating from these deficiencies is the discrepancy between intellectual ability and academic attainment in the affected children. These apart, many children with LD are also found to exhibit other traits such as – problems in attention and concentration, hyperactivity, inappropriate behaviours, and social inadequacies. The presence of these traits and consequences are diagnosed employing diverse measures for intellectual ability, norm-referenced academic tests, process tests for psycho-linguistic ability and visual-motor execution, reading inventories, physiological assessment for health, appraisal of interpersonal interaction, ecological assessment of physical aspects of the domestic and learning environmental conditions, and educational history among others (Heward, 1996; Mercer, 1992).

2.2.2 Educational Habilitation of Children Learning Disabilities

Interventional Approach for LD primarily involves a diagnostic-prescriptive course which implies that the instructional intervention is prescribed according to the particular diagnostic traits found to be present in the specific child. This approach in turn involves two major models in its overall framework. They are the process model for ability training and the task-analysis model for skill training.

Depending on the perceptual, verbal and/or executional nature of the problems faced by the child, *ability training* may focus either on stimulating or remediating development of psycholinguistic, perceptual, and/or perceptual-motor abilities. Frequently multisensory techniques involving visual-auditory-kinaesthetic-tactile (VAKT) inputs are made use of in the process. *Skill training* on the other hand begins with precise description of the skills that are to be taught. Consequently complex skills are analysed and broken down into specific

smaller tasks. Then these skills are imparted through direct teaching methods, interspersed with frequent measurement of progress in skill-attainment followed by prompt feedback. Several specialist methods such as precision teaching and direct instruction have been developed by experts for such skill training (Becker, 1992; Fletcher et al., 2006; Hewards, 1996; Pierangelo & Giuliani, 2008; Potts et al., 1993; Weisberg, 1994; Yssekdyke & Algozzine, 2006).

Apart from training in foundational abilities and fundamental skills, rehabilitative or remedial intervention for LD also incorporate *learning strategies instruction*. These task-specific strategies extend training in the convergent application of the primary abilities and skills in the process of executing complex academic tasks such reading, writing and computations. Along with instruction employing learning strategies, combined application of content enhancements is found to be effective in educational habilitation pertaining to LD. *Content enhancements* include a wide range of techniques that help children recognise, organise, comprehend, and retain critical curriculum content. These could be in the form of colour codes, graphic organisers and visual displays, study guides and guided notes, mnemonic devices, interactive computer-assisted instruction. Peer mediation in the form of collaborative learning and/or supplementary tutoring supplementing teacher intervention may also compliment the remedial measures. Besides these technical aspects of rehabilitative intervention and remedial instruction, all expert pioneers as well as practitioners in the field unanimously endorse an essential requisite. That is, helping children with LD remain positively focused on the learning task in an encouraging atmosphere. This enables accomplishment of successful outcomes overcoming complex and concealed obstacles that children with LD encounter (Case et al., 1992; Crank & Bulgren, 1993; Fletcher et al., 2006; Hewards, 1996; Hudson et al., 1993; Miller et al., 1994; Pierangelo & Giuliani, 2008; Wood et al., 1993; Yssekdyke & Algozzine, 2006).

2.2.3 Inclusive Education of Children Learning Disabilities

Special educational needs of most of the children with LD can be accommodated in the mainstream learning environment, with supplementary supports. In case of mild deficiencies or deviances, the supports could be in the form of consultancy extended by special education teachers to general education teachers. They could confer about strategies for adapting instruction to suit variant learning styles displayed by children with LD. If the special educational needs are more drastic, then the children could be pulled out for part-time individualised and specialised instruction to overcome specific skill deficits. Such supplementary or remedial supports along with adapted assessment procedures may help the children perform and progress satisfactorily in the academic mainstream (Chmiliar, 2009; Heward, 1996).

In very rare instances, especially in case of lapses in early identification and timely intervention, children may face problems of incompatibility in mainstream learning environment. With resultant acute deficits in progressive classes/ stages it may be difficult to meet the curricular demands of mainstream schooling. In such cases, it is recommended to pursue curricular learning through non-formal educational streams such as open schooling. The non-conventional curricular options along with flexible time pace and evaluation formats are very helpful to children with LD. Even in the event of pursuing such alternate streams of education, it is recommended that the children continue attending mainstream learning environment at least for part of the school day. This would facilitate favourable personal and social skill development (Fletcher et al., 2006; LDA, 1993; Maanum, 2009; Pierangelo & Giuliani, 2008).

The review of related research evidences point to two impending necessities. One for developing consistently effective and reliable resource materials for widespread training of

general education teachers dealing with children with communication disorders like ID or LD. The other is the prerequisite need for evolving fool-proof measures for accurate appraisal of their competence for the same.

SECTION III: METHOD

This section of the report elaborates on the purpose of the research project and further elucidates the process of execution including – selection of participants, preparation of necessary tools for data collection and resource materials for competence-building in teacher-participants, and the procedure undertaken in carrying out the investigation.

3.1 Research Design

An experimental research design involving control and experimental groups was adopted for the study. The focus was on investigating the effect of the independent variable of orientation provided using resource materials developed in the course of the research. The effect of this variable was gauged against the primary dependent variable of participant-teachers' competence in terms of knowledge, attitude and practice; and consequent secondary outcome in the form of academic, social and behavioural performance of children with either ID or LD. The design and process of the research were construed taking into consideration guidance provided in relevant literature (Salkind, 2010, 2017)

3.2 Purpose

The reported research project was undertaken with the purpose of investigating whether multimedia resource materials were effective in enriching knowledge, enthusing attitude and enhancing practice among mainstream school teachers. It further explored

whether the improved competence in teachers enabled them in constructive management of children with ID as well as LD in the mainstream learning environment. This was through deliberation of the nature of impact on school performance of children with the two targeted disabilities. The process of accomplishing these targets in turn incorporated the following protracted objectives:

- Constructing valid tools to collect data about general education teachers' competence to facilitate inclusive education such as –
 - Knowledge,
 - Attitude, and
 - Practice.

- Developing content and designing multimedia material involving textual information, graphical representation and video demonstration to impart general education teachers with –
 - Essential information,
 - Practical understanding, and
 - Simulated orientation – with regards to inclusive educational management of children with ID and children with LD.

- Experimenting with the above-mentioned resource materials to orient the teacher-participants and explore the –
 - Effect on general education teachers' competence in terms of knowledge, attitude and practice, and
 - Consequent impact on school performance of children with the specified special needs (arising from presence of either ID or LD) in the mainstream learning environment.

3.3 Process of Research Investigation

The process of investigation comprised three major stages with component steps as described:

3.3.1 Stage I: Planning and Preparation

- *Step 1:* Construction of three sets of tools for collecting data on teacher-participants' competence in terms of knowledge, attitude and practice regarding educational management of children with either ID or LD in mainstream learning environment.
- *Step 2:* Development of proforma for gathering information about special child-participants' school performance in terms of academic and social-behavioural performance in mainstream learning environment.
- *Step 3:* Development of three modules of resource material including multimedia components of textual information, graphical representations and video demonstrations (with due consent from participant-teachers, rehabilitators and children with special needs).
- *Step 4:* Bilingual rendering of the tools and materials in English and Kannada.
- *Step 5:* Validation and/or review of the tools and resource materials by experts.

3.3.2 Stage II: Data Collection and Orientation

- *Step 1:* Seeking permission from school authorities and consent of participants.

- **Step 2:** Survey of pre-orientation competence in terms of knowledge, attitude and practice among teacher-participants, and concurrent compilation of child-participants' academic and social-behavioural performance.
- **Step 3:** Theoretical orientation of all teacher-participants in the experimental group through hand-outs for self-learning, and practical multi-media demonstration to teachers from the experimental group selected for practical observation.
- **Step 4:** Repeat survey of post-orientation competence of all teacher-participants and concurrent compilation of child-participants' performance with same proformas and tools, following time interval recommended in research literature (Salkind, 2010).
- **Step 5:** Theoretical orientation of all teacher-participants in the control group through hand-outs for self-learning, and practical multi-media demonstration to all teachers of both control and experimental groups fulfilling ethical obligation of extending equal opportunities to beneficial exposure to all participants.

3.3.3 Stage III: Analysis and Reporting

- **Step 1:** Compilation and comparative statistical analysis of data collected on the pre and post-orientation status of knowledge, attitude and practice among teacher-participants, and consequent academic and social-behavioural performance of child-participants.
- **Step 2:** Preparation of report on the impact of the resource materials for orienting the teacher-participants in enhancing their knowledge, attitude and practice, and

consequent influence on academic and social-behavioural outcomes in children with specified special needs.

- **Step 3:** Follow up processing of the tools for data collection and resource material for teacher-orientation for publication and wide-spread use after receiving approval.

3.4 Participants

The research project employed the active involvement of two groups of participants, namely general education teachers engaged in mainstream schools and children with either ID or LD who were receiving educational services from them. Particulars of the two groups of participants are detailed in the following section.

3.4.1 Teacher-Participants

A total of 45 general education teachers participated in the initial pre-orientation process of the research. However during post-orientation phase of data collection only 36 were available while there was withdrawal of nine teachers (20%). Young adults aged between 21 to 40 years among the teacher-participants constituted a slender majority (58%), while the rest were mature adults aged between 41 to 60 years. The teacher-participants were also predominantly female (82%).

With regards to professional qualification in teacher education, 35% held diplomas, 38% had graduate degrees, and another 27% came with either post-graduation in education or other relevant professional qualifications. The bulk of the teacher-participants, that is 62%, were teaching in higher and/or lower primary levels, while 33% were teaching either in secondary or higher/senior secondary classes, a miniscule number of 4% were involved in

training children at pre-primary level. Concerning professional experience, 62% were with less than 10 years of experience, 22% had between 10 and 20 years of experience, while 16% were with 21 or more years of experience. These teacher-participants were sourced from four mainstream schools in the city of Mysuru, in the south-Indian state of Karnataka. All the four schools were affiliated to the Karnataka State Board of Education under which regional language Kannada and English were the two predominant languages employed as medium of instruction among five other national and/or neighbouring regional languages (KTBS, 2021).

Two schools each were assigned through stratified random sampling to control and experimental exposure ensuring that there was one school each with English and Kannada as medium of instruction in these pairs. Conveniently the categorisation of experimental and control groups were carried out on the basis of the fields of study, that is, entire schools rather than individual teachers. This was to avoid perception of preferential treatment towards peers of experimental group exposed to early orientation, as well as spill over of effect of orientation among peers of control group within a school.

Consequently the number of teacher-participants in the control and experimental groups were only equivalent rather than exact match. Of the total sample population, 58% were assigned to the experimental group with 36% teaching in Kannada medium schools and another 22% in English medium schools. Of the 42% forming the control group, 24% and 18% were teaching with Kannada and English as medium of instruction, respectively. Table 1 and Figure 1 present the overall make-up of sample population of teacher-participants, as well as the constitution of the control and experimental groups.

Table 1: *Details of teacher-participants*

Personal & Professional Attributes	Category-wise Distribution of Teacher-Participants			
	21 to 30 years N = 11	31 to 40 years N = 15	41 to 50 years N = 13	51 to 60 years N = 06
Age				

	(24.44%)	(33.33%)	(28.89%)	(13.33%)
Gender	Female N = 37 (82.22%)		Male N = 08 (17.78%)	
Professional Qualification	Diploma N = 16 (35.56%)	Graduation N = 17 (37.78%)	Post-Graduation/ Professional Degree N = 12 (26.67%)	
Level of Teaching	Pre-Primary N = 02 (4.44%)	Primary N = 28 (62.22%)	Secondary N = 15 (33.33%)	
Years of Work Experience	10 years or less N = 28 (62.22%)	11 to 20 years N = 10 (22.22%)	21 years & more N = 07 (15.56%)	

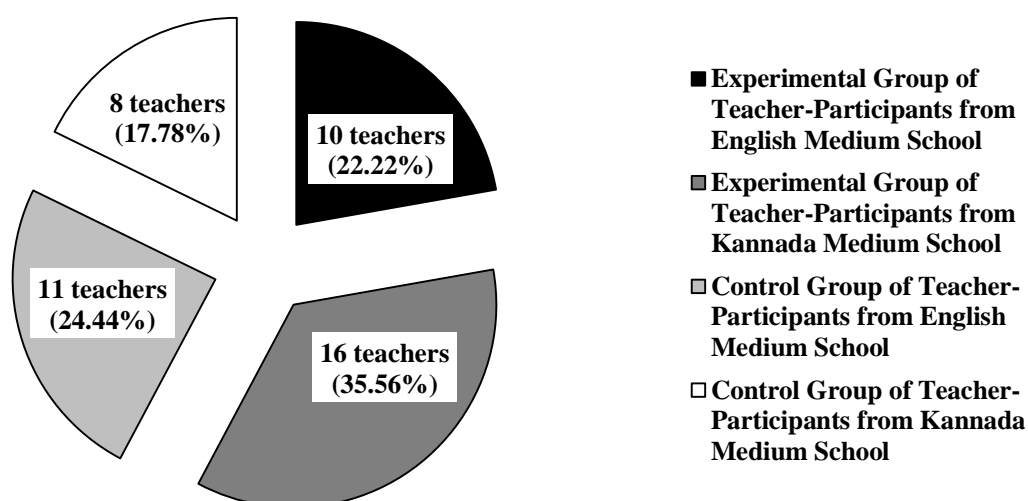


Figure 1: Composition of control and experimental groups of teacher-participants.

All the teacher-participants were involved in exercises related to testing and/or enriching knowledge and enhancing attitude for mainstream management of children with either ID or LD. From among them two teachers from each school, that is eight teachers in all, were chosen exclusively for participation in the practical procedures. They were observed and/or oriented for practical educational management of these children. Selection of these

teachers arose out of concurrent delegation by school authorities and willingness on part of the teacher-participants.

3.4.2 Child-Participants

Ninety-nine child-participants were covered under the ambit of this research study. Their participation was entailed in the form of non-invasive observation of their academic and social-behavioural performance in the mainstream learning environment. These 99 children were drawn through purposive sampling from the classes handled by the teacher-participants selected for the practical skill component of the investigation. They were placed in the primary classes from first standard to seventh standard. They had either ID or LD. Among these children 22% had been diagnosed with ID and 78% with LD. Apart from these 99 children, there were another 25 children with other disabilities receiving educational services from these selected teachers. However, they were not considered within the ambit of the core research.

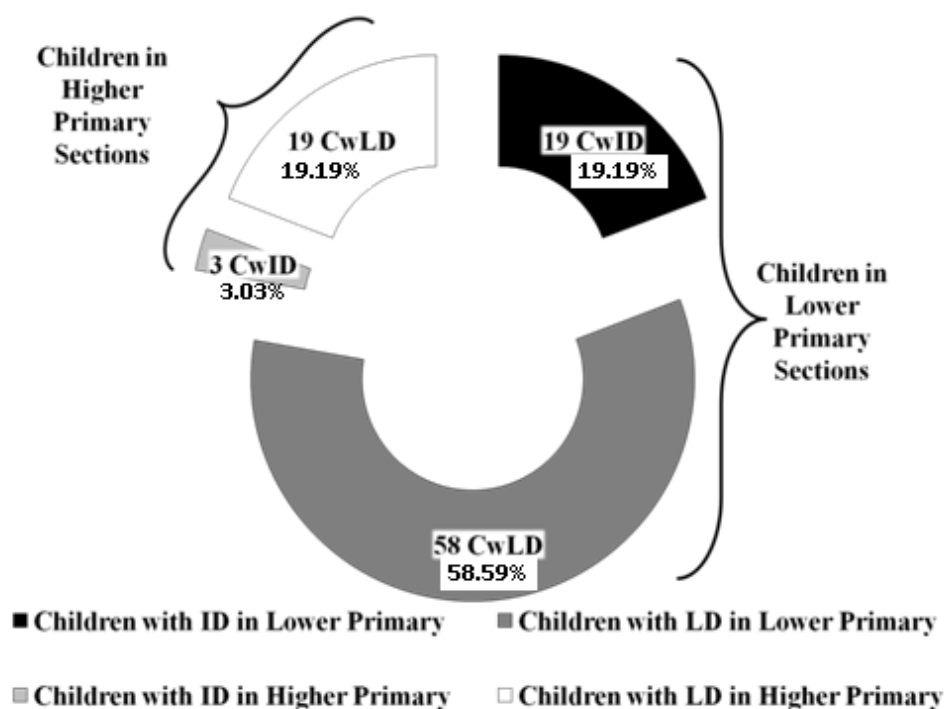


Figure 2: Details of child-participants.

3.5 Preparation of Tools and Materials

The preparatory activities of the research project were two-pronged involving construction of tools for data collection and developing resource materials for building teacher-competence.

3.5.1 Tools for Data Collection

The research process involved collection of data from two groups of participants – children with special needs and their teachers. The purpose and process of developing these tools have been described subsequently.

Tools for Collecting Data about Child-Participants: The data to be collected about children with either ID or LD were regarding their school performances in terms of academic attainment, as well as social-behavioural manifestations in the learning environment prior and following competence-building measures undertaken with their respective teachers. A proforma to record relevant data was drafted, particulars of which are detailed in Table 2.

Table 2: *Proforma for rating school performance of children with ID/LD*

Grading of Academic Performance	Rating of Social-Behavioural Performance
A+: 90% to 100%	A – Very good, appreciable and helpful behaviour
A: 80% to 90%	
B+: 70% to 80%	B – Good conducive and cooperative behaviour
B: 60% to 70%	
C+: 50% to 60%	C – Fairly satisfactory behaviour (with no major complaints)
C: 40% to 50%	
D+: 30% to 40%	D – Tolerable behaviour needing improvement
D: 20% to 30%	
E+: 10% to 20%	E – Disorganised and disruptive behaviour
E: 0% to 10%	

Tools for Collecting Data from Teacher-Participants: Three-pronged proforma constructed by the investigators was used to collect data on teacher-participants. This three-

pronged tool was utilised twice – before and after theoretical and practical orientation rendered to the targeted teachers to accrue data on the pre and post-orientation competence in terms of knowledge, attitude and practice. The first section consisted of 50 multiple-choice items to test the knowledge of the participant-teachers about management of children with either ID or LD in the mainstream learning environment. Of these, 20 test-items each were exclusively about each of the two afore-mentioned disabilities (that is, 40 disability-specific items), while 10 items were on general issues that concerned both the disabilities such as advantageous execution of educational rights and beneficial collaboration with caregivers, among others. Each correct answer carried score of ‘1’, while incorrect or no responses were scored ‘0’ thus with a possibility of a maximum score of ‘50’ and a minimum score of ‘0’.

The second section of the tool was a Likert rating scale with a total of 40 statements designed to ascertain the attitude of teacher-participants towards various issues related to management of children with either ID or LD in the mainstream learning environment. The compilation consisted of both positive and negative statements that were graded on five sequential perspectives ranging from strong agreement through agreement, inability to opine, disagreement to strong disagreement. The scores for the positive statements on these ratings were ‘5, 4, 3, 2 and 1’, respectively. Whereas for negative statements the scoring was vice-versa, resulting in a maximum possible score of ‘200’ and a minimum score of ‘40’.

Regarding their interpretation, scores of 1 and 2 for disagreement and strong disagreement out of maximum 5 will compare to 20% and 40%, respectively. Hence, overall aggregate rating of up to 40% may imply negative attitude. Aggregate rating upward of 61% up to 100% may signify positive attitude representing scores of 4 and 5 for agreement and strong agreement. In-between score of 3 out of 5 on the rating scale equals to 60%, so mean ratings upward of 41% up to 60% can be taken to represent indifferent or uncertain attitude. The first two sections of the tool including the knowledge test and attitudinal rating scale

were administered to all teacher-participants of both control and experimental groups in the form of questionnaires.

The third section was an observation schedule with two parallel versions involving 20 items each concerned with inclusive educational management of ID and LD. Of the constituents of these schedules, the first 10 items were concerned with mundane classroom routines like teacher getting acquainted with special needs of children, providing preferential seating, adopting suitable communicational strategies, and so on. The next 10 items were specifically related to the instructional process of imparting lesson, use of teaching-learning aids, and formative evaluation among others. The research staff and/or investigators carried out in-person observation of teacher behaviour and competence exhibited in the classroom in real time and noted their occurrences on a four-point frequency scale of – always, most of the time, rarely and never, which in turn were quantified with scores of ‘3, 2, 1 and 0’. This observation covered only two teachers from each of the four schools. Before and after teacher-orientation, each teacher was observed for not less than 5 sessions in classes with children of either of the targeted disabilities. In each session of observation, every teacher could possibly score a maximum of ‘60’ and minimum of ‘0’. All tools for data collection were bi-lingual incorporating concurrent English and Kannada items to enable ease of simultaneous administration among teacher-participants from both fields of schools with English and Kannada as medium of instruction.

3.5.2 Resource Materials for Strengthening Teacher-Competence

The resources developed to impart theoretical knowledge and build up practical potential in the teacher-participants comprised of multimedia materials. The base format was in the form of a movie. The movie comprised bilingual, concurrent presentation of subject matter in English and Kannada. The information was interspersed with ample illustrations

and video clippings to enable effective instruction in practical knowledge to the participant-teachers. There were three such movie-like multimedia presentations one each on educational management of children with ID, children with LD and the third on mobilising resources for their inclusive education. In all, they comprised of around 145 slides of information, embedded or interspersed with 30 video clippings and 25 graphic illustrations. These materials were to be blended with real time explanation by a professional presenter.

3.5.3 Validation of Tools and Materials

The tools for data collection were subjected to validation of adequacy of content, appropriateness of structure and aptness of language in the bi-lingual form of English and Kannada. The team of evaluators comprised of 10 rehabilitation experts in all, from the concerned fields of clinical psychology, speech-language pathology and special education. The expert groups of rehabilitators in turn comprised of three each from the two clinical disciplines of psychology and speech-language pathology, and four with pedagogical expertise in diverse communication disorders. All the experts held a minimum qualification of post-graduation in the respective field, and came with not less than five years of active service experience. Items that received 80% or more consent, that is, approval from eight or more experts were retained. Consequently, five items from the test of knowledge (out of the originally drafted 55 items) and one item each from the attitudinal scale and observation schedule for LD (out of the originally drafted 21 items) were removed. Further corrections and improvisations suggested by the evaluators towards restructuring the items to remove ambiguity and refine the language were promptly incorporated. The reliability of the tools was addressed by verifying the internal consistency between the constituent domains of knowledge, attitude and practice. A positive correlation coefficient of 90% or more assured the same. The multimedia materials were reviewed for lucidity and technical quality by experts at the Department of Material Development at AIISH.

SECTION IV: RESULTS

Analysis of the research data in the reported study was carried out at four levels – first to appraise the adequacy of existing knowledge, attitude and practice among general education teachers to manage special educational needs arising out of either ID or LD in the mainstream learning environment. Second, the effect of orientation using resource materials on the teacher-participants' competence was determined by comparing between the pre and post-orientation knowledge, attitude and practice of the control and experimental groups. Third, was to correlate the consequent secondary impact on the school performance of the child-participants with the either ID or LD. Fourth and final, was the analysis of interplay of other personal and professional traits of teacher-participants such as age, gender, professional qualification and experience. The ensuing results have been presented in this section of the report.

4.1 Prognostic Analysis

Initial raw data in the form of ratings or scores of teacher-participants' knowledge, attitude and practice, and academic and social-behavioural performance of child-participants were converted into percentage scores to enable ease and homogeneity in analysis. Following which the data was subjected to Shapiro-Wilk's test for normality evincing normal distribution of both sets of data concerning teacher and child-participants. Hence, it was decided to employ parametric tests of variance, that is, t-test for comparing pre and post-orientation competence/ performance in the both the groups of participants. Nevertheless, the investigators were restrained from using the paired-sample t-test as was required for discerning post-orientation transformation in knowledge and attitude of teacher-participants.

This was because of an inevitable circumstance that arose in the post-orientation phase, as few teachers present during pre-orientation data collection were not available post-orientation. Withdrawal of 20% of the teacher-participants occasioned employment of independent-sample t-test instead. The percentage scores of the pre and post-orientation competence of every participant-teacher were taken into consideration with reference to knowledge and attitude.

With regards to appraisal of practical performance, the pair of teachers selected in each of the school was duly followed up, that is, four teachers each in the control and experimental groups. Further with regard to practice, the total scores for individual sessions of each teacher had been accounted for. Each teacher was observed for five sessions each focusing exclusively on educational management of either children with either ID or LD, thus accounting for not less than 10 sessions for each teacher. The aggregate percentage score for each teacher was computed separately for instructional management of children with ID and children with LD. As there was one-to-one correspondence between the teachers it was possible to compute the gain scores for each of them by deducting the pre-orientation from the post-orientation competence scores. And the aggregate gain scores of the teacher-participants of the control and experimental groups were compared employing independent-sample t-test. Computation and analysis with gain scores ensured minimising influence of discrepancies in pre-orientation baseline competence among the teachers.

Apart from analysis of variance in pre and post-orientation competence of teacher-participants, the data was also scrutinised for consequent influence on school performances of child-participants. Pearson product-moment correlation between these variables was computed for the purpose. Besides these mainstay analyses, the data was also explored to discern the nature of interplay between diverse personal and professional attributes of

teacher-participants and their competence. The afore-said statistical measures of correlation and variance served useful in the process.

4.2 Prevalent Competence among General Education Teachers to Manage Children with Intellectual Disability or Learning Disabilities in Mainstream Learning Environment

The first step in data analysis involved appraisal of prevalent knowledge, attitude and practice of teacher-participants for inclusive management of special educational needs arising out of presence of either ID or LD in children. The aggregate competence of participants of both the control and experimental groups in these domains were computed in the form of percentage scores, that is, with a maximum possible total score of 100 in each domain. In the knowledge test, the 100% was divided into 40% each for sections on ID and LD and 20% for general information related to educational habilitation. Both the attitudinal rating scale and practical observation schedule equally divided the scores between sections on ID and LD with a maximum possible sub-total of 50% in each. Figure 3 displays and overview of the results.

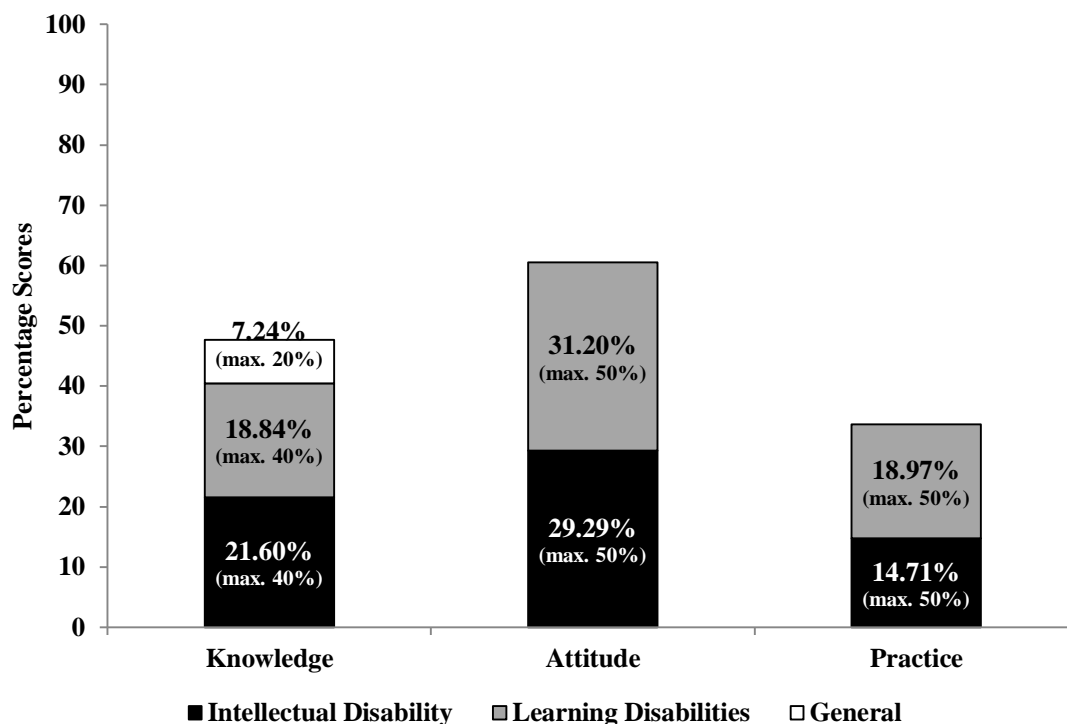


Figure 3: Preliminary pre-orientation competence among teacher-participants.

Results presented in Figure 3 reveal overall scores of 47.69% for knowledge, 60.49% for attitude and 33.45% for practice among the participant-teachers. These scores represent their moderated competence for managing special educational needs arising out of either ID or LD in the mainstream learning environment.

4.3 Effect of Orientation Using Multimedia Resource Materials on Competence of Teacher-Participants

The current study aspired to investigate the effect of resource materials developed to build general education teachers' capabilities for inclusive management of children with special needs arising out of either ID or LD. Consequently, three-pronged efforts were directed towards enriching their knowledge, endowing them with positive attitude and enhancing their practical skills. The outcome has been presented below.

4.3.1 Effect of Orientation Using Multimedia Resource Materials on Knowledge of Teacher-Participants

In order to gauge the impact of orientation provided to teacher-participants using the resource materials developed in the current study, the knowledge before and after orientation in terms of percentage scores were compared. As mentioned under the section on methods, due to unforeseen attrition of 20% of the teacher-participants in the post-orientation period, the number of teacher-participants both in the control and experimental groups did not tally between the two sequential timelines. This prevented computing the gain scores of individual teachers or employing paired-sample t-test for comparison. Hence, intragroup comparison of pre-post competence had been carried out using independent-sample t-test, facilitating intergroup comparison of apparent post-orientation transformation. The results of the analysis pertaining to knowledge scores are presented in Table 3.

Table 3: *Comparison of pre and post-orientation knowledge of teacher-participants*

Group	N	Mean % Score	Mean Difference	t-value	p-value
Overall Knowledge					
Experimental	Post: 17	66.47	14.55	5.36724	0.00001**
	Pre: 26	51.92			
Control	Post: 15	52.13	10.24	1.32273	0.097651
	Pre: 19	41.89			
Knowledge related to Inclusive Educational Management of Intellectual Disability					
Experimental	Post: 17	72.94	15.06	2.88089	0.003141**
	Pre: 26	57.88			
Control	Post: 15	56.67	7.99	0.97784	0.167745
	Pre: 19	48.68			
Knowledge related to Inclusive Educational Management of Learning Disabilities					
Experimental	Post: 17	65.59	13.86	4.68238	0.000015**
	Pre: 26	51.73			
Control	Post: 15	54.33	13.54	1.54338	0.66286
	Pre: 19	40.79			
Knowledge related to General Inclusive Management of Special Educational Needs					
Experimental	Post: 17	55.29	14.91	2.59428	0.006544**
	Pre: 26	40.38			
Control	Post: 15	38.67	8.14	0.97578	0.168247
	Pre: 19	30.53			

Note: *95% significance, **99% significance

The results in Table 3 evince significant improvement in overall knowledge by around 15% ($p < 0.01$) among the participant-teachers of the experimental group. Specifically, the gain in knowledge is found equivalently distributed for educational management of special needs arising both from ID and LD. Members of the control group have also displayed enhanced awareness in the post-orientation period even without being exposed to the orientation. But the advancement was statistically insignificant.

4.3.2 Effect of Orientation Using Multimedia Resource Materials on Attitude of Teacher-Participants

The pre-post comparison of attitudinal changes in the participant-teachers had been carried out similarly as with knowledge domain. The intragroup changes in pre-post status were examined with the use of independent-sample t-test separately in the control and experimental groups and the results have been displayed in Table 4 for consideration of perceptible intergroup variances.

Table 4: Comparison of pre and post-orientation attitude of teacher-participants

Group	N	Mean % Score	Mean Difference	t-value	p-value
Overall Attitude					
Experimental	Post: 17	68.91	9.26	4.93861	0.00050**
	Pre: 26	59.65			
Control	Post: 19	62.71	1.08	0.39294	0.69700
	Pre: 19	61.63			
Attitude related to Inclusive Educational Management of Intellectual Disability					
Experimental	Post: 17	77.35	19.16	7.76226	0.00001**
	Pre: 26	58.19			
Control	Post: 19	65.05	5.94	1.8036	0.08000
	Pre: 19	59.11			
Attitude related to Inclusive Educational Management of Learning Disabilities					
Experimental	Post: 17	60.47	-0.64	-0.29667	0.38411
	Pre: 26	61.12			
Control	Post: 19	60.37	-3.79	-1.19922	0.23800
	Pre: 19	64.16			

Note: *95% significance, **99% significance

The findings represented in Table 4 show that teacher-participants in the experimental group have undergone significant positive advancement in their overall attitude towards inclusive educational management of children with special needs, especially those with ID with a mean difference of 9.26% ($p < 0.01$) and 19.16% ($p < 0.01$), respectively following orientation. The teacher-participants in the control group have also displayed positive change but of insignificant magnitude in overall attitude (mean difference = 1.08%, $p > 0.05$) and attitude towards inclusive educational management of children with ID (mean difference = 5.94%, $p > 0.05$) sans orientation. However, with regards to attitude towards management of children with LD in the inclusive educational settings, it is disconcerting to note that both the groups of teacher-participants display regression. The attitude among the teacher-participants of the control group scores had reverted by 3.79%, while in the experimental group it is a negligible 0.64%, nevertheless a negative change. As assumed through informal post-orientation observation, regression could have been due to term-end rush and exhaustion faced by teachers. However, no empirical evidence could be generated to verify the causal factors, as investigators were unprepared to record this impromptu observation.

4.3.3 Effect of Orientation Using Multimedia Resource Materials on Practice of Teacher-Participants

In the case of practical observation of teacher-participants' classroom instruction, the aggregate gain scores of the four teacher-participants each from the control and experimental groups were computed by deducting the pre-orientation scores from the post-orientation scores. Following which independent-sample t-test was employed to compare between the post-orientation transformations between the groups. The results are presented in Table 5.

Table 5: *Comparison of pre and post-orientation practice of teacher-participants*

Group	N	Mean % of Gain Score	Mean Difference	t-value	p-value
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Overall Practice					
Experimental	4	9.45	18.21	3.18462	0.009482**
Control	4	-8.76			
Practice related to Inclusive Educational Management of Intellectual Disability					
Experimental	4	19.20	34.49	4.09131	0.00321**
Control	4	-15.29			
Practice related to Inclusive Educational Management of Learning Disabilities					
Experimental	4	2.82	8.02	0.91141	0.198609
Control	4	-5.20			

Note: *95% significance, **99% significance

The effect of orientation displayed in Table 5 endorses the overall significant positive outcome among the teacher-participants of the experimental group. The overall advancement in practical competence was evinced with a significant mean gain score of 9.45% for managing children with the two targeted communication disorders in mainstream learning environment. Among the two targeted disabilities, the gain is considerably significant for ID (19.20%) in comparison to LD (2.82%). On the contrast, there is noticeable drop in the practical competence of teacher-participants of the control group with an overall mean depreciation by -8.76%. The decline is relatively less in ability for instruction and classroom management of children with LD (-5.20%) than for children with ID (-15.29%). Comparing between the post-interventional transformation in practical competence of control and experimental groups, the overall aggregate advantage displayed by the four teachers of latter group is significant 18.21% ($p < 0.01$). The gain is of substantial magnitude for ID (mean difference = 34.49%, $p < 0.01$) than for LD (mean difference = 8.02%, $p > 0.05$).

4.4 Impact of Teacher-Participants' Transformation on Children with Special Needs

The tertiary level of data analysis explored the nature and extent of influence following post-orientation transformations in the teacher-participants on the school performance of the child-participants. For this purpose, the changes in performance of child-participants with either ID or LD following orientation of their teachers were recorded

separately for the academic and social-behavioural manifestations. These were deduced from the difference between pre-orientation and post-orientation grading and ratings. And in turn were correlated with the post-orientation transformation in competence of their respective teachers, both of the control and experimental groups, by computing the Pearson product-moment correlation coefficients. The results are presented in Table 6.

Table 6: *Correlation between post-orientation transformation in teacher-participants and performance of child-participants*

Nature of Disability in Children	Post-Orientation Transformation in Academic Attainment	Post-Orientation Transformation in Social Behaviours
Intellectual Disability	0.944**	0.639**
Learning Disabilities	0.453	0.394

Note: *95% significance, **99% significance

From the correlation coefficients presented in Table 6, it is evident that there is a positive correlation between transformation in teacher-competence and student-performance. The beneficial influence is considerable and significant on children with ID both in terms of academic performance ($r = 0.94$, $p < 0.01$) and social behaviour ($r = 0.64$, $p < 0.01$), while it is moderate and insignificant for LD ($r = 0.45$ and 0.39 for academic and social-behavioural performance, respectively, $p > 0.05$). Comparing between the impact on academic and social-behavioural performance, teachers seem to have added influence on the former compared to the latter.

4.5 Extrinsic Influences on Teacher-Participants' Competence

Supplemental to the core empirical analysis, the investigators further tried to discover the influence of other extrinsic factors on teacher-participants' knowledge and attitude, as these revelations shall be helpful in fine-tuning intervention programmes for general education teachers in future. The endeavour involved search for influential factors among the

personal and professional traits of the teacher-participants, namely, age, gender, educational qualification, duration and level of work experience. Among these age and work experience were quantified in terms of number of years, while levels of education and school engagement were assigned ordinal scales appropriate to hierarchy. With regards to educational qualification, diploma level training in education was assigned the least grade of '1', while professional training in education at bachelors level and masters level were assigned progressive grading of '2 and 3', respectively. Pertaining to level of teaching in school, teacher-participants engaged at pre-primary level were assigned a grade of '1', while those teaching in primary, higher-primary, secondary and higher/senior-secondary levels were assigned grades of '2, 3, 4 and 5', respectively.

As the ordinal ranks were thus assigned to equidistantly-graded attributes, Pearson product-moment correlation coefficient was computed for all quantifiable factors with knowledge and attitude scores of the participant-teachers, except for the qualitative factor of gender. The differential influence of gender was analysed employing independent-sample t-test. The results are presented in Table 7 and further elucidated in ensuing passages.

Table 7: *Correlation between personal and professional traits of teacher-participants with their knowledge and attitude*

Teacher-Participant Traits	Knowledge Scores	Attitudinal Rating
Age	0.106	0.017
Educational Qualification	0.253	-0.015
Duration of Work Experience	0.073	-0.043
Level of Instruction	0.199	0.164

Note: *95% significance, **99% significance

The probe into the influence of other factors apart from the experimental orientation divulged that increase in age; educational qualification and work experience positively influenced the knowledge of the teacher-participants for inclusive educational management. However, the effect was mixed for their attitude towards the same. Older teachers and those

teaching at higher levels of schooling, that is, at secondary and post-secondary levels displayed positive disposition; while those with enhanced educational qualifications and duration of work experience did not demonstrate positive inclinations. Nevertheless all correlation coefficients were minimal and statistically insignificant ($r = 0.25$ or less, $p > 0.05$).

Detailed presentation of outcomes of analysis for influence of gender on teacher-competence has been skipped, as the number of teacher-participants comprised a disproportionate 37 females against 8 males. The results including statistically negligible advantage of knowledge among female-teachers, and significantly better attitude among male-teachers (mean difference = 9.36, $t = 4.20$, $p < 0.01$) could not be authenticated due to this discrepancy in comparative group strength.

SECTION V: DISCUSSION

Abiding to the sequence of results presented in the previous section, the same have been expounded in this section.

5.1 Adequacy in Competence of General Education Teachers for Managing Special Needs Arising from Intellectual Disability or Learning Disabilities

Data presented in Figure 3 imply that general education teachers are not optimally prepared for managing special educational needs arising out of disabilities such as ID or LD. This fact is corroborated by teacher-participants' less than appreciable levels of knowledge (mean score of 48%), attitude (aggregate rating of 61%) and practice (mean score of 33%) with regards to ID and LD. Among these two disabilities, their knowledge about LD is relatively lower. With respect of attitudinal rating, as mentioned in the section on tool development, negative attitude was assigned a low score of '1 or 2' and indecisiveness the

middle-score of '3', while positive attitude scores of '4 or 5' according to their intensity. As per this interpretation, mean rating of zero to 40% imply negative attitude, 41% to 60% embody uncertain attitude, and scores upward of 61% to 100% exemplify positive attitude. Accordingly, the participant-teachers having prevailed over irresolution are on the threshold of assuming positive attitude towards inclusive education of children with either ID or LD. These lacunae in perception and perspective about special educational management in turn seem to severely impinge their classroom practice rendering instruction to these specially-abled children.

Many Indian studies (Basavaraj et al., 2012; Dharmaraj, 2000; Dharmaraj et al., 2000; Gangadharan & Malar, 2010; Reddy, 2004; Sarojini, 2000; Selvakani, 2000; Sreedevi, 2008; Kanaga Subramanyam et al., 2015; Sujathamalini, 2002) and similar research undertaken abroad (Ali et al., 2006; Al-Zyoudi, 2006; Deng, 2008; Lai Hong An, 2009; Mukhopadhyay et al., 2009) reiterate the imperative gaps to be filled in teacher-competence for facilitating fruitful inclusion of children with special educational needs in the educational mainstream. However, well-established educational communities in countries from the northern American and western European sphere present a more encouraging scene. As suggested by the studies dated early in the nascent stages of mainstreaming and inclusive education movement, careful observance had been followed by prompt measures for alleviation of the situation (Carroll et al., 2003; Forlin, 1995; Forlin et al., 1996; McKenzie, 2009; Obiakor et al., 2010; Villa et al., 1996). Thus, the initial lackadaisical involvement of general education teachers towards including children with special needs under their care has been reported to undergo positive alteration and advancement over the millennium. Such constructive developments should be emulated in developing inclusive educational milieu in countries like India.

5.2 Primary Effect of Experimental Orientation Using Multimedia Resource Materials among Teacher-Participants

Erstwhile experimental investigations and impact studies (Avramidis et al., 2000; Darling-Hammond, 2000; Dickens-Smith, 1995; Johnson, 1996) have convincingly affirmed the beneficial impact of pre-service and in-service training on general education teachers' competence for facilitating inclusive education. Sound understanding of special education needs in mainstream learning environment and consequent implications, sensitive disposition towards special educational needs in children and their implications, and sensible practice in engaging them advantageously are reported to be facilitated with inclusive education.

In the Indian context, the majority of research studies have been surveys to scrutinise the existing state of affairs (Basavaraj et al., 2012; Dharmaraj, 2000; Dharmaraj et al., 2000; Gangadharan & Malar, 2010; Kanaga Subramanyam et al., 2015; Reddy, 2004; Sarojini, 2000; Selvakani, 2000; Sujathamalini, 2002). However, few exertions to improve inclusive learning environment through enhancing teacher capacities reported favourable outcomes (Mishra & Nair, 2011; Sreedevi, 2008; Vijetha & Nair, 2014). Nevertheless these efforts were primarily concerned with enhancing knowledge and attitude of general education teachers, and adopted a cross-disability approach or dealt with uncomplicated conditions like sensory impairments.

In this context, the current research set on ground-breaking efforts to improve, motivate and mobilise general education teachers' competence for managing special educational needs arising out of the dually challenging ID with impaired intellectual as well as behavioural functions, and the obscured LD with complicated manifestations. As commended by social scientists, for advantageous mobilisation of behavioural transformation in humans as social beings, these endeavours had resulted in three-pronged accomplishment

(Médecins du Monde, 2011). The spadework commenced with enriching the knowledge for inclusive educational management, which in turn induced favourable attitude, and ultimately the combined impact of positive perception and perspective had resulted in beneficial practice. Figure 4 in corroboration with data from Tables 3, 4 and 5 bring to light the elementary effect of the orientation employing the multimedia resource materials on the teacher-participants' competence in terms of knowledge, attitude and practice.

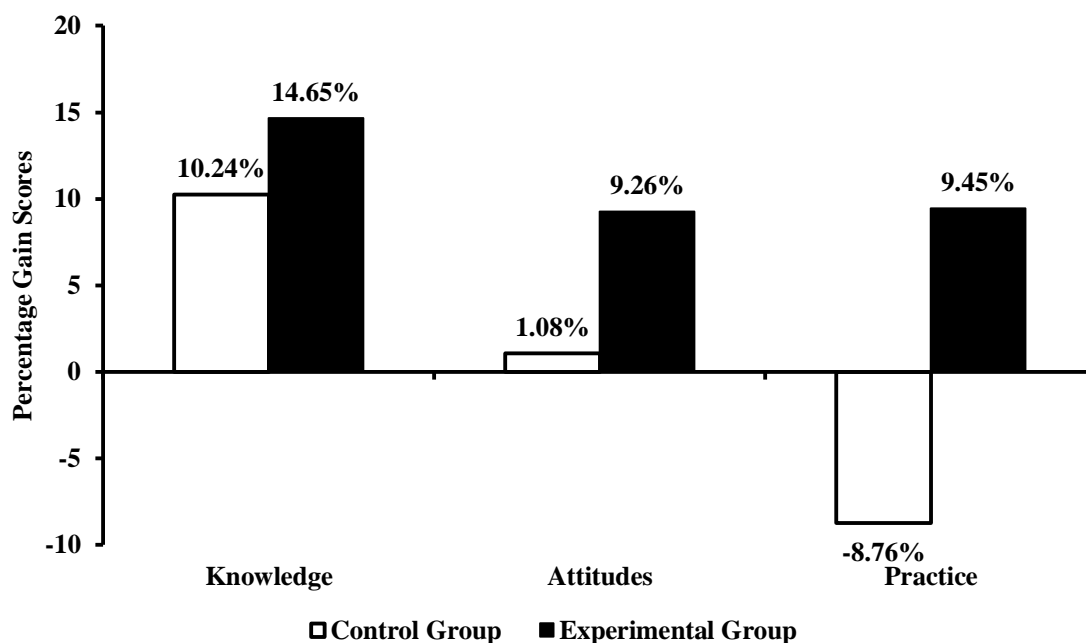


Figure 4: Comparative post-orientation transformation between teacher-participants of control and experimental groups

Teacher-participants of the experimental group had demonstrated significant positive transformation in their post-orientation knowledge for inclusive management of special educational needs of children with ID, as well as LD with a mean advantage of 4.41% ($p < 0.01$) over their control group peers. An unforeseen, but appreciable development in the process was that participant-teachers in the control group had also updated their knowledge (mean gain score = 10.24%) on comparable terms with those of the experimental group (mean gain score = 14.55%) even before being exposed to formal orientation in the core process of the research. This may have been a secondary consequence of the curiosity and

interest aroused by pre-orientation measures for appraising knowledge and attitude. The participant-teachers of the control group might have taken self-initiative to seek answers for the queries in the questionnaire that they were not able to answer. Palomino (2017) when reporting the results of survey among pre-service teachers, suggests that the wide-range of open sources of learning available online are very helpful to pre-service training of teachers, as well as continued in-service professional development. However, the statistical insignificance of the development might indicate that the positive fallout may have resulted from random efforts on part of a few of the control group participants rather than from a collective or comprehensive enterprise.

With regards to overall attitudinal perspective towards inclusion of specially-abled children, again teacher-participants from both the control and experimental groups had displayed positive developments. However, the latter group had a significant advantage with a mean difference of 8.18% ($p < 0.01$) in the gain scores. Members of the control group had displayed slightly enhanced positive attitude in the post-orientation phase. However, the gain made is minimal (mean gain score = 1.08%) compared to more than eight-fold advancement made by their peers in the experimental group (mean gain score = 9.26%). In spite of the overall positive perspective, the relapse in attitude towards inclusive educational management of LD amid the stressful academic year-end demands is noted with concern.

The advocates for incorporating information and communication technology in education are of the opinion that technology can supplement teacher but not substitute instruction directed by human interaction (Oproiu, 2015). Technology may supply information, but cannot supplant the humanistic exertions necessary for bringing about conviction of attitude and changes in behaviours. The experimental group's teacher-participants who benefitted from the personal orientation and/or training from the

investigators display the advantage gained as result in the form of increased knowledge and improved attitude as well practice.

With regards to practice in the post-orientation phase, the teacher-participants of the experimental group had surpassed the competence of those of the control group with a mean advantage of 18.21% ($p < 0.01$). However, the net advancement in competence by the former group is a mean gain score of 9.45%, while competence of the latter group had actually depreciated by -8.45%. Personal observations of post-orientation classroom procedures of teachers attribute the regression in performance to the term-end rush and exhaustion involved in completing portions, revising lessons and conducting evaluation.

5.3 Secondary Impact of Experimental Orientation on Children with Special Needs Resulting from Intellectual Disability or Learning Disabilities

The primary purpose of the reported experimental research project was to develop multimedia resource materials to enrich general education teachers' competence for inclusive educational management of children with either ID or LD. The consequent secondary target was enhanced academic as well as social-behavioural performance of these children in the mainstream learning environment. Attainment of this ultimate purpose was corroborated by correlating the post-orientation transformation in competence of the teacher-participants with the school performance of their respective wards with either ID or LD. As mentioned in the results section, school performance of children with the specified special needs was correlated with respective teachers from both the control and experimental groups.

The results presented in Table 5 confirm the enhanced positive, practical outcome in teachers for inclusive instruction in the mainstream learning environment. Teacher-capacities in terms of practical competence for meeting special educational needs arising out of presence of ID in children was considerably improved, and in turn significantly influenced

school performance of those children in terms of both academic attainment ($r = 0.94$, $p > 0.01$) as well as social-behavioural manifestations conducive to learning ($r = 0.64$, $p < 0.01$). The cascading influence of orientation with multimedia resource materials to improve teachers' competence ensued by learning outcomes in children with LD was also found to be positive but in lesser degrees both for academic attainment ($r = 0.45$, $p > 0.05$) and social-behavioural manifestations ($r = 0.39$, $p > 0.05$). This could also be indirectly ascribed to the fact that the preliminary abilities of children with LD in the pre-orientation phase were better compared to children with ID, thus the magnitude of advancement made in the post-orientation phase not being substantial in magnitude or significance.

In both cases of children with either ID or LD, the traditional tendency of instruction to emphasise on academic learning over affective development is highlighted with a comparative advantage of teacher influence on former. Right from the nascent stages of mainstreaming in the form of integration (Brophy & Evertson, 1974; Larrivee, 1985; Yathiraj, 1994) through its metamorphosis into inclusion (Kanaga Subramanyam et al., 2015; Mastropieri & Scruggs, 2004; Ratta, 2009) review and research ascertain general education teachers' competence as the crux of sustenance and success of specially-abled children. The findings of the current study add to the credence of this conviction with empirical evidence drawn from the field. It further endorses the fact that the accomplishment manifests in social-behavioural performance in the learning environment beyond just academic learning as ascertained long back by Larrivee (1986).

5.4 Extraneous Factors Influencing Teacher-Competence for Inclusive Education

External to the experiment with the multimedia resource materials developed through the reported research project, there were other customary factors that exerted habitual influence over the competence of general education teachers for inclusive educational

management. Reflective understanding of influence of such factors will help in refining future interventional measures to suit the participant-traits so as to derive better results. Following pointers gained through review of literature, influence of personal traits of the teacher-participants, namely, age and gender; and their professional attributes such as educational qualification, level of engagement at school (primary or secondary) and duration of work experience were taken into consideration for further probe. The results presented in Table 7 and ensuing paragraphs indicate that the four quantifiable factors of age, level of education, level service at school and work experience were positively correlated to the knowledge of the teacher-participants. That is teachers with more years in age and of work experience, as well as higher level of education and instructional service at school tended to be more aware about the special educational needs arising out of ID as well as LD and their implications for inclusive education. Even though these positive correlations were minimal and insignificant in potency, among the factors the level of educational qualification of the teacher-participants shared relatively better coefficient ($r = 0.25$, $p > 0.05$) with knowledge as predictable. However, the attitude of the teacher-participants did not benefit in the same manner from extended educational qualifications or work experience, as both have coincided with low attitude. Whereas attitude of teacher-participants augmented with age and engaged in higher classes in school were comparatively better. These correlations concerning attitude were of negligible magnitude and insignificant in nature. With regards to the qualitative attribute of gender, as stated earlier, discrepant distribution of sample size among male and female teacher-participants led to exception of the results. .

The findings about positive correlation of age and work experience with knowledge are in contrast, while that of educational qualification and level of school engagement agree with previous research findings of Palomino (2017), and Gangadharan and Malar (2010). Even though influence of gender on competence of teachers could not be endorsed through

this study, the eagerness for knowledge acquisition among females, while their male counterparts' intrepid attitude towards novel ventures are asserted by Eltahir, Al-Qatawneh, Al-Ramahi and Alsalhi (2019), and Tena, Almenara and Osuna (2016).

However, as Yalman, Basaran and Gönen (2016) suggest progressive contemporary developments in the social and technological front are easing out the variances influenced by demographic differences such as age and gender, and so do indicate the statistical insignificance of these findings. Developed communities have been able to achieve equitable competence among general and special education teachers overcoming demographic discrepancies much earlier (Harasymiw & Horne, 1975; Larrivee & Cook, 1979).

SECTION VI: SUMMARY AND CONCLUSIONS

The reported research project endeavoured to develop multimedia resource materials to upgrade knowledge, attitude and practice among general education teachers to manage special educational needs arising out of either ID or LD and investigate its primary impact on teacher-competence and secondary effect on children with special needs employing authentic tools developed for the purpose. This section summarises the findings from the research in terms of the informative evidences and their inferences, as well as implications for impending action.

6.1 Major Findings

The foremost findings derived from the research are as follows:

- To begin with the participant-teachers displayed insufficient competence in terms of knowledge (48%), attitude (60%) and practice (33%) for managing special educational needs arising out of either ID or LD in the mainstream learning environment. As

pedagogically, at least 70% competence is suggested as requisite to imply sufficiency (Salkind, 2017).

- Experimental orientation provided using the multimedia resource materials developed in the process of research were effective in their primary impact as evident from the significant and advantageous enrichment of knowledge (mean advancement= 14.55%, $p < 0.01$) and enhancement of attitude (mean advancement = 9.26%, $p < 0.01$) among teacher-participants of the experimental group over insignificant developments among those of the control group.
- The beneficial fortification of knowledge and attitude along with practical orientation among the selected teacher-participants of the experimental group in turn exerted positive influence on their educational practice. The significant mean gain score of 18.21% ($p < 0.01$) more than that of the control-group bears out the effect.
- Ultimately improved competence among the teacher-participants had been rewarded with better school performance in terms of academic attainment and social behaviours in both the children with ID (with positive correlation of about 94% for academic attainment and 64% for social-behaviours, and $p < 0.01$ for both) and children with LD (with positive correlation of about 45% for academic attainment and 39% for social-behaviours, and $p < 0.05$ for both).
- In all these developments, progressive outcomes were more intense in magnitude with regards to ID compared to that for LD, as evident from the following comparisons –
 - The gain in knowledge made by the teacher-participants of the experimental group following theoretical orientation was 1.2% more with respect to ID over that for LD, though the advancement gained in both regards were statistically significant.
 - In terms of attitude, teacher-participants of both control and experimental groups had displayed depreciation in attitude towards LD (-3.79% and -0.64%, respectively though

statistically insignificant) in the post-orientation phase in comparison to their positive transformation (5.94%, $p > 0.05$ and 19.16%, $p < 0.01$, respectively for control and experimental groups) observed in the case of ID.

- Difference of 26.47% in the mean advantage gained by the teacher-participants of the experimental group with regards to practical educational management pertaining to ID over that for LD.
- Statistically significant correlation of 49% more for academic attainment and 24% more for social behaviours in children with ID compared to children with LD.
- Personal traits such as age and gender, and professional attributes like educational qualification had insignificant influence over teacher-competence for inclusive management of special educational needs arising out of either ID or LD. Still increase in age and level of engagement in school seemed to be positively influencing both knowledge and attitude. However, higher level of educational qualification and more years of work experience were found to exert mixed influence, which was constructive for knowledge but converse for attitude. Female teacher-participants were better informed, while their male counterparts displayed more positive mind-set for inclusive educational management. Thus indicating need for closer focus on younger general education teachers rendering instructional services at primary level of schooling in future endeavours to improve teacher-competence.

6.2 Conclusions and Inferences

To conclude the multimedia resource materials were useful in advancing competences in teacher-participants of the experimental group in comparison to those of the control group. The advantage was both manifold in terms of knowledge, attitude and practice, and significant in magnitude. Nevertheless the overall gross competence of the experimental group's teacher-participants was still a moderate 66.47% in terms of knowledge, 68.91% in

terms of attitude, and further restrained 45% in terms of practice. Moreover the scale of gain displayed by teacher-participants was relatively better for inclusive educational management of ID over LD in all three areas of knowledge, attitude and practice. Compunctions considering these limited and skewed gains are consoled by conclusions drawn by pioneering research (Carroll, Forlin & Jobling, 2003). They allude that it takes time and effort in the form of regular, recurring update of knowledge and upgrading of practice to bring about stable and substantial changes in general education teachers' competence favouring and facilitating inclusive education. Especially, when concerning communication disorders like LD (National Research Centre on Learning Disabilities, 2007).

With regards to the ultimate benefits construed at the end by children with special educational needs arising from presence of either ID or LD, there were appreciable improvements both in terms of academic attainments, as well as social behaviours in the learning environment. Further they were relatively better pronounced for academic attainment compared to social behaviours, and substantially evinced in children with ID compared to those with LD.

6.3 Implications and Inadequacies

This research resulted in generating convincing evidences to confirm that general education teachers' competence for managing complex and compounding special educational needs could be improved through concerted and constructive efforts. This in turn brought about appreciable improvement in academic attainment and social behaviours in the mainstream learning environment among children having either ID or LD. The developmental work carried out in the process of the research has contributed an authentic tool for appraising knowledge, attitude and practice among general education teachers for

inclusive educational management and valuable multimedia resource materials for enhancing teacher-competence for managing special educational needs arising out of ID as well as LD.

These tools and materials could be put to expansive use in future efforts to upgrade general education teachers' competence for facilitating inclusive education of children with the said disabilities. However, for more productive results it is essential to strengthen components in the multimedia resource materials addressing educational management of children with LD, and behavioural management of children with special educational needs in mainstream learning environment.

6.4 Recommendations and Suggestions

It is recommended to undertake future research and developmental work to improve and reinforce the multimedia resource materials developed in this study in its components relating to LD and overall technical quality. Also similar efforts to develop resource materials focusing on other communication disorders and disabilities will contribute to more wide-ranging efforts to facilitate inclusive education in the country. Such developmental work will transpire into efforts of practical value when utilised in wide-spread pre and in-service training of general education teachers. This could be realised when they are made available for in-service teacher-training programmes conducted by the educational administrative authorities, as well as disseminated as open source resources via online.

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END

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16. S & T benefits accrued :

i. List of research publications with complete details: Nil

ii. Manpower trained on the project:

a. Research Scientists or Research Assistants: Three research assistants – Ms. M. Lakshmi, Mr. S. P. Pullanna & Ms. Shaik Gulab Jan

b. Other technical personnel trained: Forty-five general education teachers from mainstream schools in Mysuru

iii. Products developed, if any:

a. Tools including three bilingual (English and Kannada) proformas to assess general education teacher competence in terms of knowledge, attitude and practice to include children with either ID or LD in the mainstream learning environment.

b. Three episodes of multimedia resource materials for competence building in general education teachers to upgrade their knowledge, attitude and practice for inclusive educational management of children with either ID or LD.

iv. Patents taken, if any: Nil

v. Institutional/regional/national/international beneficiaries to be clearly indicated.

17. Abstract of the project for inclusion in the Annual report /Website (300 words, in the following format):

- i. Objectives: The reported ARF research project was undertaken with the aim of developing resource materials to improve general education teachers' knowledge, attitude and practice for including children with either ID or LD in mainstream learning environment. This broad-based purpose entailed the objectives of – developing valid and reliable tools for collecting data on teachers' competence for facilitating inclusive education; developing multimedia resource materials to provide essential information as well as demonstrate practical skills; and experimenting with the resource materials to study their impact on general education teacher-competence, in conjunction with the consequent school performance of children with either ID or LD under their tutelage.

- ii. Design: An experimental investigation was undertaken to probe the independent impact of the multimedia resource materials on the dependent outcomes in terms of competences of general educational teachers and school performance of children with ID and children with LD. Three episodes of multimedia resource materials were developed to build capacities in 45 general education teachers (26 initially from the experimental field of study and 19 after the post-orientation data collection from controlled field of study) to manage special educational needs in the mainstream learning environment. Previously a three-pronged tool was constructed to assess the pre-versus-post orientation status of the knowledge, attitude and practice of the teacher-participants. Another proforma was designed to record the consequent academic attainment and

social-behaviours of 99 children with either ID or LD in mainstream learning environment managed by these teachers.

iii. Results: The analysis of the data collected implied that initially prevalent knowledge (48%), attitude (60%) and practice (33%) for managing special educational needs arising out of either ID or LD in the mainstream learning environment were inadequate. The experimental orientation with the multimedia resource materials developed in the process of this study were effective in enhancing knowledge by 14.55% ($p < 0.01$), attitude by 9.26% ($p < 0.01$), and practical skills by 9.45% ($p < 0.01$). These advancements were corroborated by positive and significant developments in children with ID both in terms of academic attainment ($r = 0.944$, $p < 0.01$) as well as social-behaviours ($r = 0.639$, $p < 0.01$). Children LD also displayed corresponding positive but insignificant manifestations.

iv. Conclusions: The research endeavour resulted in developing useful tools for assessing competence and multimedia resource materials for building capacities in general education teachers for inclusive educational management of children with either ID or LD. This resulted in consequent gain in school performance of children with special needs. Yet, there is scope for further strengthening the materials on learning disability. Further research needs to be directed towards similar endeavours for other disabilities as well.

18. Copy of Ethical Committee report, if any (hardcopy enclosed with first submission).

19. Plagiarism report: appended.

Appendix: Screenshots of Turnitin Plagiarism Report

Effect of Resource Materials on Impact of Inclusive Education on Children with Intellectual Disability (ID) and Learning Disabilities (LD)		
ORIGINALITY REPORT		
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5	Salih Rakap, Louise Kaczmarek. "Teachers' attitudes towards inclusion in Turkey", European Journal of Special Needs Education, 2010 Publication	<1%
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