tamana

Project Entitled

THE ROLE OF VIRTUAL TRAINING AND SKILL DEVELOPMENT PROGRAMME FOR THE INTELLECTUALLY CHALLENGED AND AUTISTIC INDIVIDUALS IN STRENGTHENING THE STRENGTHS AND WEAKENING THE WEAKNESSES

STRENGTHEN THE STRENGTHS & WEAKEN THE WEAKNESS

Submitted to

Department of Empowerment of Persons with Disabilities (Divyangjan)
Ministry of Social Justice and Empowerment, Government of India

Submitted by
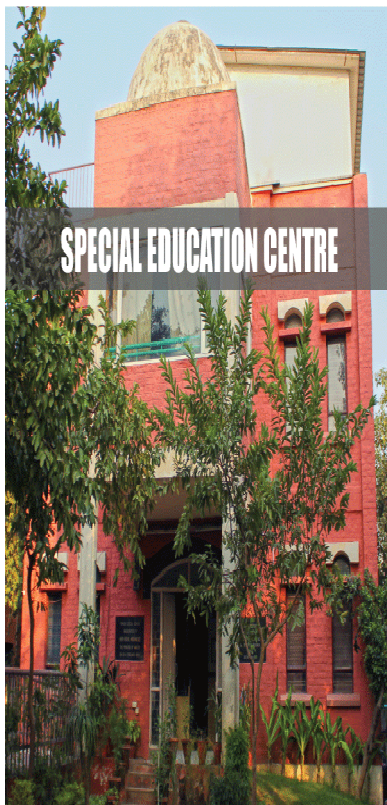**Principal Investigator**

Dr. G. Krishna Veni

Sr. Researcher
Cognitive Special Abilities Research Lab (CSARL)
Tamana

tamana

"**Tamana is a non-profit voluntary organization registered in March 1984, created solely with the purpose of helping the cause of individuals with developmental disabilities, autism and multiple disabilities.**"

SPECIAL EDUCATION CENTRE

SKILL DEVELOPMENT CENTRE

AUTISM CENTRE

The first branch of Tamana started in 1984 in a tent. The School was shifted to its present premises on 12th Feb. 1992. This school was inaugurated by Her Royal Highness Lady Diana. Centre caters to Children between age groups from 4-18 years, focusing on over all development of child depending on needs as well as potential. Functional academics are imparted with parallel intervention with allied therapies depending on the needs of the child.

Nai Disha is an institution that offers opportunities for young adults and adolescents to acquire dignity and self respect. Students are assessed for ability and interest and then trained in vocational skills that will lead to their gainful employment & integration.
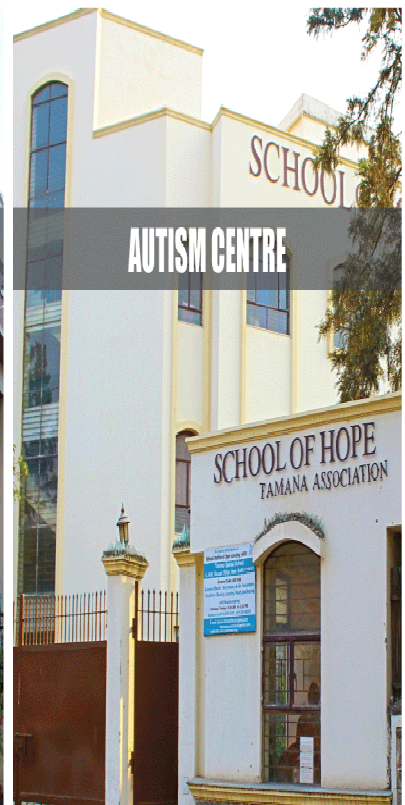
Tamana was the first institution to recognize Autism as a disability. In 1985 it started programs for autistic spectrum disorder. The Autism Center-School of Hope is India's first rehabilitation and research center for autistic individuals. It was inaugurated in 2003 by His Excellency, A. P. J. Abdul Kalam, former President of India.

TAMANA

DEDICATED TO YOUNG ADULTS WITH SPECIAL NEEDS AND THEIR PARENTS

Acknowledgements

I would like to take this opportunity to thank whose expertise and companionship had a major impact on my academic and personal growth during the progress towards the Research project – The Role of Virtual Training and Skill Development Programme for Intellectually Challenged and Autistic Individuals in strengthening the strengths and weakening the weaknesses". Very special thanks goes to my mentor Padma Shri and Padma Bhushan Awardee Dr. Shayama Chona, for sharing her immeasurable knowledge and wisdom, generosity, a great vision and belief in me. Thank you for giving me space and guidance for my academic and personal growth.

I cordially eulogize and record a deep sense of gratitude for Tamana Chona for her open conversations, sense of humor and valuable opinions during the entire project.

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Many thanks for senior director Ms. Usha Varma for their collaboration and support. I am indebted to Mr. Blessin Varkey, Director of Innovation & Technology at Tamana, who has been my constant companion and with whom I shared wonderful experiences of the research study. Special thanks to Ms. Anita Pandey principal at Tamana for their valuable inputs for the research project. Wonderful experience with the support of Ms. Meghna Singh, Psychologist.

I wish to express my sincere thanks to the children (my students) and families, special educators and colleagues of all institutes (School of hope, Tamana- Naidisha, Tamana) for showing a great patience and enthusiasm, encouragement and timely suggestions.

I would also be thankful for her precious support by Mr. S. Malaviya and Mr. Neeraj Yadav for their expertise.

It's an opportunity as well as privilege to extend my sincere thanks to the special educators Mr. Shamim Khan, Ms. Arvinder Kaur, Mr. Kamal Narayan, Ms. Vineeta tripati, Ms.

Yasmin Begum, Ms. Pranati raj, Ms. Suman, Ms.Anuradha, Mr. Murugesh, Mr. Anil, Ms. Neha, Ms. Kavita, and Mr. Karunakar.

I would like to sincerely thank the account department Ms.Rajee and Mr. Sunny for their consistent management of the finances of the research project. I would like to thank Ms.Rency and Ms. Manju madam for the support.

I would like to thank a wonderful person in my life Late Sujata who contributed valuable adivices related to this project. Donating time for a good cause is a greatest contribution. I would like extend my sincere thanks to the volunteers Ms.Neha Sharma, Ms.Shreya, Ms. Shruti, Mr.Hasan , Mr. Arjun, Mr. Shresth, Ms. Japleen, for their wonderful devotion of time. I would be thankful to Mr. Uttam singh for the maintenance of the devices.

I would like to thank my Inlaws for their encouragement and devotion. I would happy to thank my daughters Sree Kavya, Sree Divya and my husband in every high and low. Thank you to Delhi metro for the smooth ride.

My grateful devotion to "Iccha shakti, jnana shakti, kriya shakti Pradayini" Goddess Saraswati.

From
Dr. Krishna Veni Achary
Principal Investigator of the Research project

Team members

1. Dr. Shayama Chona, President Tamana
2. Dr. Krishnaveni Achary, Principal Investigator
3. Ms. Tamana Chona, PRT, DPS
4. Mr. BlessinVarkey, Director
5. Ms. Anita Pandey, Principal
6. Mr. Shamin Khan, Special Educator
7. Mr. Kamal Narayana Special Educator
8. Ms. Pranati Raj, Special Educator
9. Ms. Yasmin Begum, Special Educator
10. Ms. Vineeta, Special Educator
11. Ms. Anuradha Special Educator
12. Ms. Neha, Special Educator
13. Mr. Anil, Special Educator
14. Mr. Murugesh, Special Educator
15. Ms. Suman, Special Educator
16. Ms. Kavita, Special Educator
17. Mrs. Arvinder, Computer instructor
18. Ms. Meghna, Psychologist
19. Mr. Santosh Malviya, PA
20. Ms. Rajee, Sr. Accountant
21. Mr. Sunny, Accountant
22. Ms. Rency, Office staff
23. Ms. Munju, Office staff
24. Ms. Neha Sharma, Volunteer
25. Ms. Shreya, Volunteer
26. Mr. Hasan, Volunteer
27. Mr. Arjun, Volunteer
28. Mr. Shresth, Volunteer
29. Ms.Japleen, Volunteer
30. Mr. Uttam Singh

1.   **Dr. Shayama Chona**

Awarded Padma Shri and Padma Bhushan by the President of India, former Principal, Delhi Public School, RK Puram.

She is the only woman educationist in India to be bestowed with the prestigious Padma Shri and Padma Bhushan awards. She was the former Principal of Delhi Public School R.K. Puram, New Delhi - a world class institution. Her efforts to break the barriers of schools to include the poor and the handicapped are unprecedented. She has launched many initiatives to strengthen school teaching of STEM subjects: Science, Technology, Engineering and Mathematics which now also includes Arts and has moved from STEM to STEAM. She is a strong advocate of critical thinking and believed that it should be promoted since childhood by parents and teachers alike.

Dr. Chona has been serving as a member of over 99 Advisory Boards, Committees, and Educational Institutions and is the member of UNESCO. She has been associated with the Special Olympics, Concerned Action Now' and the Society for Human Development. She has been named in the Limca Book of Records 2007 as the woman who has received the highest number of awards.

She firmly believes and lives by the principle that "We also live in a wider world, a world in which we bear enormous responsibility". Dr.Chona has given concrete shape and direction to her transcendent principles, by setting up 3 centres for the intellectually challenged: 'Tamana Special Centre', Tamana'Nai Disha: Skill Development Centre' and the Tamana 'Autism Centre'. As their Founder-member, she has been working for the upliftment of the differently abled children since 1970, and celebrates humanity with the dictum, "Numberless are the world's wonders, but none more wonderful than man".

2.   Dr. G. Krishnaveni Achary

Senior Researcher,

MSC Human Development and Family Studies, Dip. Autism Spectrum Disorders,

Ph.D , Delhi University.

Experience: 7 years

She holds a doctoral degree in Social Science, from University of Delhi. She has more than five years of experience working with students who are mild, moderate to severe challenged individuals at Tamana. Her specialization is in one to one sessions with structured curriculum with students with Autism along with technological intervention. Her doctoral research focused on "Autistic children in India: An Insight". She worked as the principal investigator of NIOS research project. She also contributing as a Principal Investigator of the Research project sponsored by Ministry of Social Justice and Empowerment. Her research spans various aspects of designing curriculum, Individualized educational program and setting vocational based goals for the students with special needs. She works on Behavior modification of the students and in functional Academics of special students using animated videos, computer learning, Tablet based intervention. She works as a faculty of Teacher Training Centre, Tamana. Annually, she conducts workshops on Research methodologies and Statistics for beginners and SPSS training (Statistical Package of Social Sciences) at Lady Irwin College, University of Delhi. She has given guest lecturers in various CRE program on Autism. She attended various conferences and published papers in national and international journals. Her contribution for Cognitive special Abilities Research Lab (CSARL) drives to develop solutions for individuals with Autism and intellectually challenged. She is aiming at working towards understanding the requirement of the repetitive behaviors, reasons behind the deficits of theory of mind, different style of eye contact and receptive and expressive communication of the children with Autism.

3.   Ms. Tamana Chona

PRT, Delhi Public School
Experience: 19 Years

Tamana Chona was detected to be a victim of Cerebral Palsy at birth leading to Spasticity. She had delayed milestones and was trained to sit, stand and speak after aggressive physio-therapy and speech therapy. Her parents trained her in U.S.A. where she also joined a special school. Her eye sight had also been affected and she has corneal capacity which is to say that her vision is blurred due to spots on her cornea.

In spite of Tamana's mental and physical challenges Tamana is a success story. She is God's own creation – full of joy and confidence. She teaches us on day to day basis to "love all "and Love begets love", which she practices unknowingly and naturally. She is indeed a gift of God to this universe. She has successfully passed Class XII from National Open School and completed Diploma in Early Childhood Care and Education from Indira Gandhi National Open University.

Tamana Chona was awarded the prominent National Award by the Ministry of Social Justice and Empowerment, Government of India in 2015. She was also awarded Positive Health Award in 2011 & the award by The Smile Studio in 2016 by Dr Ekta Chadha, an Aesthetic Dental Surgeon of India. Tamana leads by example and is a role model for disability sector in our nation. She is a spokesperson for Inclusion and has advocated the cause on various National and International forums and platforms. She has been participating to create awareness and raising fund about Inclusion of the Disabled at the Airtel Delhi Half Marathon since the last 3 years. In 2016 she was the diamond champion and led the Tamana contingent of over 150 students, staff and well wishers.

Tamana was selected to represent Asia – Pacific as one of the Special Olympics, Inc. Sargent Shriver Global Messenger for 2002-2003. She was one of the twelve athletes from around the

world, who represented the Special Olympics movement for over two years. During March 13 – 17, 2002 Tamana attended her orientation and first assignment in Los Angeles, California. This a great honour for India as it was the first time that a Special Person from India was chosen for this prestigious international assignment. She has been recognized as an Ambassador for Peace by the Universal Peace Federation and the Inter-religious and International Federation for World peace.

4.   **Mr. Blessin Varkey**

Director of Innovation & Technology, Tamana.

Masters in Artificial Intelligence and Engineer in Computer Science

He led Tamana's research which works towards developing evidence-based technology solutions to resolve the barriers in education, rehabilitation and employment with the people with developmental challenges in India. R&D lab at Tamana has been a partner with Deakin University, Australia, IBM Research India, NIOS Research, MOSJE Research; University of Tampere & Microsoft India for various projects towards developing accessible solutions for individuals with developmental disabilities.

Blessing has been invited as a speaker on Accessibility and the developmentally disabled by *SIGACCESS-ACM*, USA, *Enabling Opportunities Summit* in Singapore, *Proyash* at Dhaka, Bangladesh, IIIT-D, SOIL among others. As a social innovator, his work was awarded by the NASSCOM foundation in 2015 for developing HOPE, a connect based application for individuals with developmental disabilities in its Social Innovation forum and has also been recognized by DEF & by JSPL Foundation in 2016.

5.   Ms. Anita Panday:

Qualification : M.A(Hindi) , Diploma MR , B.Ed (MR)

Experience: 17 years

Contribution:

10 yrs of experience as a special educator, vice- principal for about 3 yrs. Presently working as a principal for Tamana naidisha. She used to train students with intellectually challenged who are severe-mild. Rangoli competitions, flower arrangement, collage making and Rakhi making units were under her supervision. She also takes care of home visits of special students, counseling parents, management of disciplinary, maintenance of school, organized summer camps.

She is the initiator of taking NIOS classes for the OBE(open basic education).She manages hostel as hostel in charge. Her specialization is in Hindi and Maths. She also contributes in Diwali mela, special assemblies, fashion show, special Olympics, inter school competitions and many other different areas.

6.   Ms. Yasmeen Begum

Qualification: M.Ed (special) PGPC (Post graduate diploma in MR)

Experience: 10 years

<u>Contribution:</u>

She teaches NIOS secondary and sr. secondary students with special needs. Her specialization subjects are home science and E.V.S. she also deals with developmental I.E.Ps. Initially she also teaches Mathematics G.K, Moral Ethics, life skills, personal care and grooming, Home management, audio-visual sessions. She organizes excursions, and entertainment trips.

7.   Mr. Shamim Khan (Vice-Principal)

Qualification: M.Ed in Spl. Edu. (learning disability), PGPC in M.R

Experience: 8 years

<u>Contribution in TAMANA:</u>

He is assisting principal in managing her day to day activities- like cultural activities, time-table management, attendance management etc.   He supports in maintenance of the infrastructure of the school as an estate manager. Besides this he is also teaching in Sr. secondary NIOS subjects with specialization in teaching English, Mathematics. He also formulates I.E.P (as the goal of the special individual). He is as NIOS co-coordinator.

8.   Ms. Vineeta Tripathi

Qualification: M.A , B.Ed (spcl.edu. in M.R)

Experience: 8 years

<u>Contribution in TAMANA:</u>

She is a qualified special educator and the first special educator who commenced as an NIOS education with class 6th during 2009. Presently she takes sessions for the special students of sr. secondary. Her specialization is in Hindi and E.V.S. She teaches functional academics to the high functioning students with special needs. She deals the students of intellectually challenged who are moderate to mild.

9. **Ms. Rajee**
   B.Com, Senior Accountant
   Experience: 14 years

Deals with all Account related activities, maintenance of the records, maintain salaries of entire staff and release of funds.

10. **Ms. Meghna Singh**
    Qualification: Masters in Clinical Psychology, Diploma in guidance and counseling.
    Experience: 2 years

Contribution in TAMANA:

From past two years she is working with Tamana as counselor psychologist. She deals with new admissions by doing their intellectual and academic assessment. She does counseling of students with behavioral issues. She assisted Dr. Veni in the projects of bio compost making and solar lantern assembling unit. Also she handles a functional academic group of 10 students.

11. **Mr. Santosh Malviya**
    Post: Secretary to Dr. Shyama Chona
    Experience: 8years

Contribution:

He deals with mails, documents related to chairpersons. He also deals with administration related work, meeting agendas, co-ordination with ministry, Liaoning work, keeping coordination between school and government audiences and notifications.

12. **Ms. Arvinder Kaur**
    Qualification: **BSc., D.C.A, D.V.R**
    Experience: **11 years**

Contribution in TAMANA:

She deals with special students in teaching computer. She has wide experience dealing with mild, moderate special students and also students with autism. She teaches MS Office, HTML, Hour of code, SCRATCH software. She not only teaches but identifies a technique and formulates curriculum/ syllabus for the special student. She teaches data entry for NIOS secondary and Sr. secondary special students. She administers Tamana's Facebook page and updates website.

13.   **Ms. Anuradha Dutta**

Qualification: B.A , Diploma in Mental Retardation

Experience: 3 years

Contribution in TAMANA:

She as an Head Mistress use to co-ordinate all of the activities with all the staff members of school. She use to prepare separate ADL curriculum for male and female students of school. Also she look after the meal time and grooming skills of students of hostel and day scholars. She actively participates in life skill training programs as well as cooking sessions for hostel and school.

14.   **Mr. Kamal Narayan**

Qualification: M.A, Diploma in Vocational training

Experience: 14 Years

Contribution in TAMANA:

He deals with intellectually divyang with severe category. He put efforts among students especially in social skills like dairy making, binding and other related to vocational tasks. He teaches the severe category students about their grooming skills and maintains hygiene. He applied ABA techniques in special individuals aggression and hyperactivity management.

15.   Mr. Anil
Qualificaton : B.A, B.Ed (MR)
Experience : 9 years

Contribution in TAMANA:

He deals with intellectually divyang and Hostel Coordinator. He is 24 hours on duty fulfilling the responsibilities as an educator and takes care of the 40 students in the hostel at Tamana Naidisha.

16.   Mr. K. Murugesh

Qualification: B.A , Diploma in Special Education

Experience: 8 years

Contribution in TAMANA:

He deals with intellectually divyang with severe category. He put efforts among students especially in social skills such as to make them great Namaste, good morning to everyone. He teaches the severe category students about there grooming skills and maintain hygiene. He skill fully controls their aggression and hyperactivity. Mr. Murugesh also provides session on toilet training as well as table manners. He also conducts a session of compost making for students.

17.   **Ms. Kavita Rawat**

Qualification: **M.A, B.Ed**

Experience: **4 years**

Contribution in TAMANA:

As an educator she teaches art and craft to the special students. She deals severe to mild and moderate students of special needs. She contributes in while placing students in discipline in all cultural events. She also gives knowledge on healthy food by preparing breakfast along with special students and provide tips in that.

18.   **Ms. Neha**

Qualification: B.Ed (pursuing), certified NPTT

Experience: 4 years

Contribution in TAMANA:

Neha works as a special educator dealing with severe challenged; special children to mild and moderate individuals. She contributes as an assistant teacher and serves all range of students. She also assists special children in cultural program, outside events by taking them to venue. and also assists in organizing special assemblies.

19. Mr. Sunny:

Qualification: B.Com

Experience:4 years

Contribution in TAMANA:

He assists Senior Accountant in all Account related activities, maintenance of the records, maintain salaries of entire staff and release of funds

20. Ms. Pranati Raj

M.A (P.hD) Dip. M.R

Experience: 9 years

Contribution in TAMANA:

Pranati Raj is a committed special educator who works with special individuals in their educational curriculum and works towards their independent living.

VOLUNTEERS

21. **Ms. Shreya:**

Qualification: B.Tech in ECE from MAIT

Contribution in TAMANA:

She is a very talented and hard working girl. She helped in Data entry, prepared educational Videos and PPTs. Presently working with Accenture as associate software developer. She is soon will be going to University of Southern California for her higher education.

22. **Ms. Neha Sharma**

Qualification: Diploma In fashion technology

Contribution in Tamana

She volunteers for one year 4 months in training Compost activity for severely challenged individuals and also trained students in sorting skills.

23. **Mr. Arjun Kumar Garg**

MBA, Department of Management Studies

IIT Delhi

Contribution in Tamana

He volunteer for the research project and also trained students in sorting skills.

ABSTRACT

Integrating persons with disabilities in the economic mainstream can be possible by choosing vocational Training methods that have higher demand in the fast developing world. This research project was designed to understand "The role of virtual training and skill development program for the intellectually challenged and autistic individuals in strengthening the strengths and weakening the weaknesses" with respect to two different type of skill basedtraining programs. The Project I, "Virtual and Technology based Bio –fertilizer Manufacture Training Program (**BMT**) for Students with profoundly mentally challenged" includes training in manufacture of organic compost and Project II **SLAT** include training in manufacture process of Solar Lantern Units by students with intellectually challenged and autistic individuals. The participants of the present study are from "Tamana" NGO from New Delhi. There are 68 and 57 participants respectively in the Project-I BMT and Project-II SLAT who are categorized under the spectrum of Neuro- developmental disorders and with varying intelligence as well as social quotients. Theoretical and practical Training was provided to the participants on the respective projects by task analysis process for 14 months and evaluated three times, resulting term evaluation scores. The challenges faced by the intellectually challenged participants were practically resolved or alternatives practical techniques that are identified implemented and continued in the training process. Results from the analysis demonstrate that the skill based training had a greater impact on term II and term III evaluation scores that it can overcome the impact of dependent variable like I.Q, S.Q and chronological age. In the project SLAT, the participants could not achieve the target set as per the hypothesis of the research study. This is due to the fact that the special educators and parents were skeptical about the handling of electronic devises by intellectually challenged participants. The mean scores of evaluations for BMT and SLAT indicated significant increase in their performance scores in each Term. The Android based bio degradable sorting game and virtual reality content developed in this project could act as a catalyst to reach their full potential.

Integrating persons with disabilities in the economic mainstream can be possible by choosing vocational training methods that have higher demand in the fast-developing world. This research project was designed to understand "The role of virtual training and skill development program for the intellectually challenged and autistic individuals in strengthening the strengths and weakening the weaknesses" with respect to two different types of skill-based training projects. The Project I, "Virtual and Technology based Bio–fertilizer Manufacture Training

Program (BMT) for Students with profoundly mentally challenged" includes training in manufacture of organic compost and Project II SLAT include training in manufacture process of Solar Lantern Units by students with intellectually challenged and autistic individuals. The participants of the present study are from "Tamana" NGO in New Delhi. There are 68 and 57 participants respectively in the Project-I BMT and Project-II SLAT who are categorized under the spectrum of Neuro-developmental disorders and with varying intelligence as well as social quotients. Theoretical and practical training were provided to the participants on the respective projects by task analysis process for 14 months and evaluated three times, and recorded term evaluation scores as results. The difficulties faced by the intellectually challenged participants were practically resolved or alternative practical techniques (identified, implemented and continued in the training process) were imparted. Results from the analysis demonstrate that the skill-based training had a greater impact on term II and term III evaluation scores and it can overcome the impact of dependent variable like I.Q., S.Q. and chronological age. In the project SLAT, the participants could not achieve the target set as per the hypothesis of the research study. This is due to the fact that the special educators and parents were skeptical about the handling of electronic devices by intellectually challenged participants. The mean scores of evaluations for BMT and SLAT indicated significant increase in their performance scores in each term. The Android based Bio degradable sorting game and Virtual Reality content developed in this project could act as a catalyst to reach their full potential. A step forward in this direction would provide Naidisha (new direction) for young adults with intellectual challenges and neuro-developmental disabilities.

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CHAPTER 1: INTRODUCTION

1.0   PREFACE

Strength is generally defined as "the quality or state of being physically strong". But this is not a complete definition in human perspective. Strength is not only about the physical aspect but also covers internal or mental strength including self-confidence, interests, motivation, endurance, being logical, vigor of expression and others. As per Merrium Websters dictionary "Strength is also defined as the quality that allows someone to deal with problems in a determined and effective way". Weakness is considered as the other side of the coin and defined as lacking strength or a defect. But this is not a complete definition because every time we cannot consider "Weakness" in a negative form as in some cases weakness can also act as strength.

Strengths and weaknesses are depending on many physical and environmental factors. Intellectually disabled or challenged learn and develop more slowly than their counterparts. They are slower to learn academic as well as life skills. Intellectual disability does not mean they cannot learn. They possess the strength of learning along with the weakness of much slower rate and different style of learning. Thus, the process of inclusion is hindered during the course of education.

When it comes to the career prospective of the intellectually disabled the challenge doubles. In the survey conducted for disability population they mentioned that, "The challenge of integrating and including people with disabilities in the economic mainstream has not been met" (www.addc.org.au). When individuals with disability become young adults, if at all their training in vocation begins, they find it difficult to establish themselves in a better vocation in this competitive world. Successful employment options and career in the field of intellectual disability is very limited. Unemployment rate in disability sector is higher especially in the intellectual disabilities it is much higher when compared to others.

One of the national surveys conducted by the centre for social development and education, unemployment among people with intellectual disabilities is more than twice as high as for the general population (http://www.prnewswire.com/news-releases). Of the some 70 million persons with disabilities in India, only about 100,000 have succeeded in obtaining employment in industry (www.disabilitystatistics.org).

Vocation is considered as a trade or profession and defined as a strong feeling of suitability for a particular career or occupation. One of the key factors considered in selection of vocation is its suitability as well sustainability. Sustainability of a vocation is considered as very important as it decides the growth of young adults in the future career.

Unlike the traditional vocational training there is need of including the technical advancement in the training. There is an urgent need of introducing revolutionary ideas in the training provided for some of the vocations especially in the disability sector. In the present study that problem is addressed by introducing the vocations which have technological advancement and better career options in near future.

People with intellectual disabilities are not a homogeneous group. All do not have the same educational needs. An individual student's reasonable adjustment needs may vary depending on the requirements. The students with intellectual disabilities face challenges in understanding and require special training with repetitions to improve their practical knowledge and also training required for qualitative output. After certain training in communication, adaptive/daily living skills, cognitive, behavioural management and socialization skills the individuals with guidance were able to perform to certain extent. At this stage if they are not provided with the employment or not engaged in their routine chores, the problem behaviours might aggravate and may lead to lower self-esteem.

Young people with intellectual disabilities should participate in the same range of activities as their age appropriate peers. In this phase, the intellectually challenged might face difficulties to carry out their already learnt skills and capabilities. This might eventually lead to fading of their skills, losing their confidence and motivation towards learning new work skills. Studies found that these stages are common even among the typically developing young adults but the intellectually challenged individuals find it very difficult to cope up and sustain their normal daily life chores. Researchers Shearman F. and Sheehan C. in their research on vocational skills training for people with intellectual disabilities mentioned some of the important reasons of having employment.

Employment is most important because having a job is valued and enhances their social status. Employment becomes more important because that is what the majority of adults

do for a large portion of their day. Having a vocational training develops skills towards employment and career that makes them productive.

Thus, there is an immense need to conduct this study in order to provide training and skill development programmes for the young adults and their better and resourceful future. This type of training programs will help them in adapting to the employment challenges and gaining financial independence. Research has also proved that virtual education modules work better in the generalization process than conventional teaching methods so the present study was designed in such a way that importance was given to incorporate Virtual Training and Skill Development Programme.

This research is mainly targeting to develop a practical guide with virtual skill training programme intending to develop the skill and interest hidden in the individuals with intellectual disability.

There seems to be very limited study done on virtual skill training programme considering all type of severities and involving all categories of intellectual disabilities.

This study hopes to bridge this gap between the technological advancement in vocation and their reach for the intellectually disabled population. It is expected that the outcome of this study would feed into the knowledge base of Educational psychology, Sociology of education, Child development, Multimedia learning, Virtual reality, Information Technology as well as Artificial Intelligence.

The research project "**The role of virtual training and skill development programme for the intellectually challenged and autistic individuals in strengthening the strengths and weakening the weaknesses**" has two different type of skill training programmes. The project I "Virtual and Technology based Bio –fertilizer Manufacture Training Programme for Students with profoundly mentally challenged "**BMT** includes training in manufacture of organic compost and Project II **SLAT** included training in manufacture process of Solar Lantern Units by students with intellectually challenged and autistic individuals.

The study aims to understand the role of virtual training methods like development of an Android game instead of conventional methods in skill training/development programme for the intellectually challenged and autistic individuals.

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Understanding students present level and their likes and dislikes, challenges and strengths and recording them is one of the major steps in the methodology process. Sample exclusion or inclusion has significant role and while understanding the strength and weakness of the students plays vital role.

The major barriers that confront with inclusion of children with special needs are as follows:

Barriers Related to Time and Skills, Physical Barriers, Attitude and Communication. The researcher Krishnaveni N and Malaviya R. (2008) conducted the study on abilities of the differently abled and highlighted its relevance to the special education and it includes the strategies in handling different challenges. The same researchers in 2007 worked on inclusion and integration of the special individuals and its influence on their personality.

1.1   DEFINITION OF TERMS

- 2D (2-**Dimensional):** The '2D' stands for 2- Dimensional i.e. any shape with two dimensions. In computation, it is defined as a computer based generation of digital images – mostly from two- dimensional models (such as 2D geometric models, texts and digital images) and by techniques specific to them. '2D' is mainly used in applications which were originally developed by using painting or drawing techniques. In techniques such as typography, cartography, technical drawing, advertising, the two-dimensional image is not just a representation of the real world object but an independent artifact with added semantic value.

- **2D-Animation:** The Merriam-Webster defines Animation as a way of making a movie by using a series of drawings, computer graphics, or photographs of objects (such as puppets or models) that are slightly different from one another and that when viewed quickly one after another create the appearance of movement. An illusion of moving image(s) is made based on rapidly displaying a sequence of static images (that minimally differ from each other). The illusion is also thought to rely on the 1phi-phenomenon. 2D animation is created on the computer using 2D

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1 Phi-Phenomenon is the optical illusion of perceiving continuous motion between separate objects viewed

bitmap graphics or 2D vector graphics. 2D animation has many applications, including analog computer animation, Flash animation and PowerPoint animation.

- **Virtual reality** the computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors.

- **Solar lantern** A solar lamp also known as solar light or solar lantern, is a lighting system composed of an LED lamp, solar panels, battery, charge controller and there may also be an inverter. The lamp operates on electricity from batteries, charged through the use of solar photovoltaic panel.

- **Organic compost/ bio compost:** A mixture of decayed or decaying organic matter used to fertilize soil. Compost is usually made by gathering plant material, such as leaves, grass clippings, and vegetable peels, into a pile or bin and letting it decompose as a result of the action of aerobic bacteria, fungi, and other organism.

CHAPTER 2: LITERATURE REVIEW

2.0 INTRODUCTION

Review of literature was included to help the reader understand the existing literature that supports the present study. It is estimated that 1 to 10% of disabled population which is a challenge in democratic societies. Language is a powerful instrument to teach and analysis. (Addlakha R).

Further the literature review was segmented into five, namely;

2.1 VOCATIONAL SKILLS FOR INTELLECTUALLY CHALLENGED

Ahmad, W. (2012) mentioned that environmental, curricular, attitudinal and communication barriers are the major hindrances that interfere with the effective incorporation of inclusive education for the children with intellectual disability. In the present study, we also faced these are the major hindrances while training the participants.. Ahmad W. (2012) mentioned in his thesis that attitudinal difference can be made by showing different inclusion success stories of individuals with intellectual disabilities.

Grossman (1973) defined adaptive behaviour as "The effectiveness or degree with which the individual meets the standards of personal independence expected of his or her age and cultural group."As people grow their expectations also change which cause a change in the adaptive behaviours, basically adaptive behaviours vary with age. For example, lack of adaptive behaviour in infants and children with intellectual disabilities can be noticed through problem such as a lag in motor sensory skills and difficulty in speech. However for adolescents that may not be the case in adolescents. In the case of adolescents we can see the changes with the help of socializing patterns and communication skills.

Harrison F. and Oakland (2003) put forward that the limited development of life skills is its main defining feature. The researchers also emphasized on how these skills are important for the individuals with disabilities to live a socially responsible and safe life. As already explained, these skills are collectively referred to as adaptive behaviour. individuals with intellectual disabilities are likely to be severely impaired in terms of their usual functioning in coherence with their basic understanding and awareness of the world. Some of these individuals are also likely to have other problems such as

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Autism, they may be emotionally disturbed, may have self injurious behaviour, memory loss, epilepsy severe impairment in communicational skills and physical.

According to Frieman(2001) any person with severe intellectual disabilities, who also has an IQ of 20-35 on a standardized test are effected by three skill sets. The first set includes conceptual skills, namely; reading, numbers, money, time, and communication skills. The second set consists of social skills, this skill set help learners with severe intellectual disabilities in becoming more sociable. This skill set includes understanding and following social rules and customs; obeying laws; and detecting the motivations of others in order to avoid victimization and deception. The third skill set comprises of practical life skills, these skills are needed to perform all day to day activities. This skill set includes feeding, bathing, dressing, occupational skills, and navigational skills.

Harrison and Oakland (2003) focused on the fact that learners with severe intellectual disabilities can function effectively in very limited situations. The reason given for this conclusion was, because they do not have the required abilities to match up with the expectations and demands of others.

In this regard, as Aanes and Haagenson (1978) pointed out, that there are multiple situations in which the so called others are unable to meet the demands and expectations of the severely intellectually disabled, or the expectations and demands of other people on behalf of the individuals with severe intellectual disabilities. The phenomenon of expectation discrepancy irresponsible for the attitude that points out, learners with severe intellectual disabilities are more dependent than they are need to be.

2.2   TECHNOLOGY BASED INTERVENTION/VIRTUAL REALITY

The study was conducted by Panearai S. et al (2018) on intellectual disabilities with the home based intervention of Tablets and Virtual reality headsets on functional living skills. The results indicated that there were significant improvements compared to pre trials and individuals with intellectual disabilities found that virtual reality was fun, simple to use, and helped them in the generalization process.

Israel M., Carnahan, C. R., Snyder K.K., and Williamson P.(2012) conducted the study on virtual coaching and mentoring with the help of Skype and I-chat for the new teachers of students with significant disabilities.

Researcher Cohen and Matthew D. (1994) conducted a comparative study on the use of adaptive technology for students with and without disabilities. The researchers also emphasized on the use of computers, audio tapes for students who could not read but in reality the schools showed resistance in the purchase of such assistive technology.

2.3 TEACHER TRAINING METHODS FOR STRENGTHENING THE STRENGTHS

Krishna Veni Achary (mentioned as Achary K., 2009) in her doctoral thesis explained about the differential diagnosis of different disabilities. It is very necessary to understand the differential diagnosis between mental retardation/intellectually challenged, Down's syndrome, cerebral palsy and Autism while formulation the lesson plans.

Lang, Margaret, Fox and Lise (2004) conducted study on severe disabilities and instructional professionals. They have indicated that comprehensive plan and instructional innovation could lead to desired outcomes. Smith M.G. (2000) conducted study on severe disabilities and secondary teacher's perception towards inclusion.

Sharma, S., Srivastava, S., Achary, K.,et al (2016) worked on joint attention skills among the special individuals. They also worked on gesture based interaction with developmental disabilities and influence of technology in learning process. The study conducted by Sharma, S., Achary, K (2018) laid new foundation to socio technical aspiration and foundations for the technological challenges in Indian settings.

Challenges Faced by Learners with Severe Intellectual Disabilities in the Acquisition of Adaptive Behaviour: Insights from Teachers of Special Classes (Alfred C. Ncube). This study investigated adaptive behaviour of learners with severe intellectual disabilities with the view of trying to mirror their problems in the acquisition of adaptive behaviour. Respondents comprised teachers of learners with severe intellectual disabilities. The survey used a modified form of the critical incident technique. The purpose of the study was, therefore, to analyze the nature of some of the major problems experienced by learners with severe intellectual disabilities in developing adaptive behaviour. Initially, ten classrooms were randomly selected from two criterion-sampled special schools in Harare. Ten learners with severe intellectual disabilities were then randomly sampled from the ten criterion-sampled classrooms. The teachers of the ten learners were then used as units of analysis. The results of the

study indicated that learners with severe learning disabilities do indeed have problems in the acquisition of adaptive behavior most of which are related to unrealistic demands and expectations on the part of members of society without intellectual disabilities. Some of the areas in which learners in this study experienced difficulties included, demonstration of self-direction; acquisition of academic skills; verbal communication and grooming for girls. The significance of the results of this study lies in the realization that helping learners with severe intellectual disabilities involves an element of risk whose extent depends on the teacher's expertise and estimation of the learners' capabilities.

Teacher	Student
Teacher selects learning task	Student attends to instructions
Teacher presents skills and information needed for task	Student attends to directions
Teacher gives directions for task	Student performs task with supervision
Teacher monitors student performance and provides feedback	Student performs task independently
Teacher monitors student performance and gives feed back	Student performs task independently at later time
Teacher monitors student performance and gives feed back	student performs similar tasks

Figure 2.1 Step wise Analysis of teacher training methods for strengthening the strengths (Source)

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The flow chart represents five steps of teacher and student relation in a task analysis. The steps are as follows:

- ➢ Curricular choice
- ➢ Presentation
- ➢ Practice
- ➢ Mastery
- ➢ Application

The latter four steps aimed towards acquisition, maintenance and generalization.

Unidentified disabilities and sensory impairments limit the participation of the individuals from skills based learning.

Uneven development also identifies anxiety while performing the tasks. In order to achieve the tasks the author mentioned that maintenance of goals and strengthening approach positive solution focused approach and maintaining relevant terminology with daily schedules, structured approach, along with peer modeling and partnering method could be considered as a greater strengths while training skill based learning. (Marmar Mukhopadhyay).

Inter subjectivity: Awareness of one's *Self* as distinct from *Others*, and a preference as motivators (for actions and as stimuli for the elaboration of brain tissues) for the actions and responses of *Others* as people rather than as physical objects, underlies this approach. (DSE (ASD) Manual)

The result indicated that most of the adults with mild intellectual disability have moderate level functional skills while adults with moderate, sever and profound intellectual disability are in nonfunctional level. (Mini Mathew and P.S Sukumaran)

Politeness is one of the key areas that falls in the domain of pragmatics. (Vaishnava Narang)

Key points to be considered in Evaluation must include acceptance of curriculum by students, effective use of curriculum or if it needs special facilities for its proper implementation. (Yogendra K. Sharma and Madhulika Sharma)

Cognitive scientists recognize two aspects of rationality in instrumental and epistemic. The simplest definition of instrumental rationality is behaving in the world so that you

get exactly what you most want given the resources (physical and mental) available to you. Instrumental rationality includes optimization of the goal fulfillment. Epistemic rationality is theoretical. Mentioned by Keith E. Stanovich and Paula J. Stanovich (David D. Press and Robert J. Sternberg)

Planning of instruction is done by developing a blue print that provides direction and defines what needs to be included in the instruction (Keith Waugh C., Norman E. Groulund).

When lecturing on positive thinking we explore fear and where it originates, the impact of fear and low self esteem on study and then suggest steps to build self confidence. (Tom Burns and Sandra S. infields)

Corporate Social responsibility must also be competency driven, community driven and consumer driven. (Mentioned by Dipankar Gupta)

Kleinert H. L., Miracle S.A., Sheppard-Jones K. (2007) suggested steps to success in extracurricular activities with the students with moderate and severe disabilities.

The researcher Downin J. E., Eichinger J. and Williams L. J. (1997) revealed several concurring statements given by special educators and principals and discussed about discrepancies towards inclusive edification of severely challenged individuals.

Converged and diverged opinions were gathered on inclusion of severely challenged by researchers Carter E. W. and Hughes C. (2006) on special educators, paraprofessionals and administrators. They have agreed on many benefits of inclusion by giving instructional priorities in general educational class rooms at high schools.

Information on organic compost with the details was collected on these areas such as availability, the appearance of the product, cost of the product, marketing places and availability, nutritive quotient, support organizations(Indian Agriculture Research institute: Placement availability and Marketing strategies).

CHAPTER 3: METHODOLOGY

3.0   RESEARCH DESIGN

The work plan of the research began with the collection of the data on the well established techniques present in the both projects.

3.1   OBJECTIVES OF THE STUDY

The following objective will be examined:

- To highlight the strengths of the participants and identify the interests of intellectually challenged individuals
- To develop the frame work and implementation strategies for the developed training program.
- To establish a suitable technique of the training program as per the requirement of the user group or steps followed for the training program.
- To use the established work and as per the requirement convert the material into multi media and virtual training program.
- To understand the practical challenges faced during the training program and establish the techniques to overcome situation.

3.2   HYPOTHESIS OF THE STUDY

- ❖ By the end of the skill training program the Strengths of the intellectually challenged were identified and trained in the respective field.
- ❖ The weaknesses like challenging behaviors and practical problems occur during the course of learning were hand by individualized educational program at 30 percent level of achievement.
- ❖ There would be different type of challenges in the course of virtual training and skill development programe. But it is expected that after training in the course the young adults able to perform the skill at 60 percent of accuracy.

3.3   TOOLS OF THE STUDY

The tools used for the study include the *standard assessment tools* and *developed tools*.

Tools of the study

Table 3.1 table on BMT and SLAT programs

S. No	Project name	Psychological Tools	Raw Materials and Tools	Technical tools
1.	BMT	Binet intelligence scale, Vineland Social Maturity Scale	Earthen ports, Gloves, Spatula, packing material	Computer, Projector and Speaker
4.	SLAT	Binet intelligence scale, Vineland Social Maturity Scale	Solar Lantern Assembling Parts and compiler kits.	Technical Kit
5	BMT and SLAT	**Vocational Readiness Check list for persons with Intellectually Challenged**	Standard Assessment tool	Booklet form available at Psycho matrix

3.4 STANDARD ASSESSMENT TOOLS

To describe the demographic profile of the participants, general information was collected. In addition, standard psychological tools are used to study the social maturity of the students with special needs (Vineland Social Maturity test) and tests conducted on their Intelligent Quotient (IQ) using Binet Intelligence test.

Vocational Readiness Check list for persons with Intellectually Challenged - VRCI was used to understand their vocational readiness of the participants. This standard tool helped in better understand the capabilities of the participants.

3.5 DEVELOPED ASSESSMENT TOOLS

Structured observation check list was developed for organic compost. Structured observation checklist was developed solar lantern assessment tools. Both the tools were subjected to Reliability and Validity on the pilot trials.

3.6 FLOW CHART

The methodology was briefly described in the form of flow chart

Flow chart of the organic compost unit/Solar lantern assembling unit First level of implementation and its methodology

```
┌─────────────────────────────────┐
│  Setting the basic infrastructure │
└─────────────────────────────────┘
                │
                ▼
┌─────────────────────────────────┐
│  Train the trainer through        │
│  professionals                    │
└─────────────────────────────────┘
                │
                ▼
      Practical sessions were
      conducted for special
      educators and students during
      the presence of the experts.
                │
        ┌───────┴───────┐
        ▼               ▼
   First level      Higher rate of
   challenges       challenges
   were             were
   documented       highlighted
```
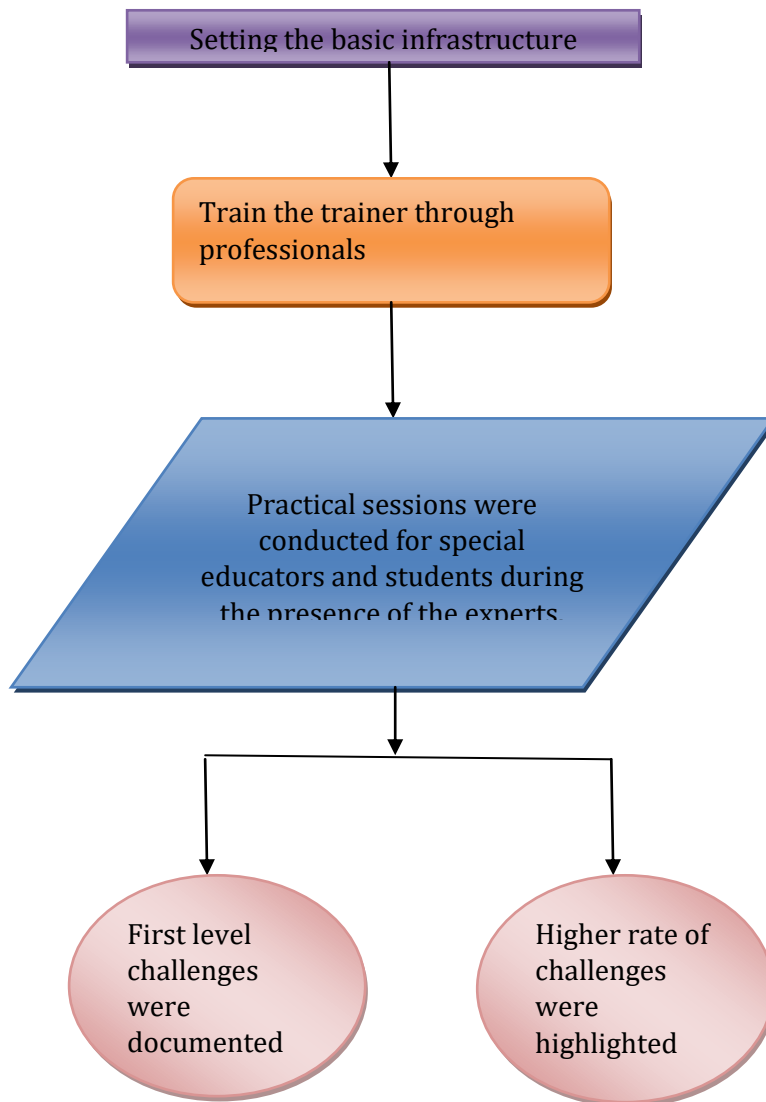
Figure 3.1 Flow chart of BMT and SLAT Level 1

Flow chart of the organic compost unit/Solar lantern assembling unit Second level of implementation and its methodology
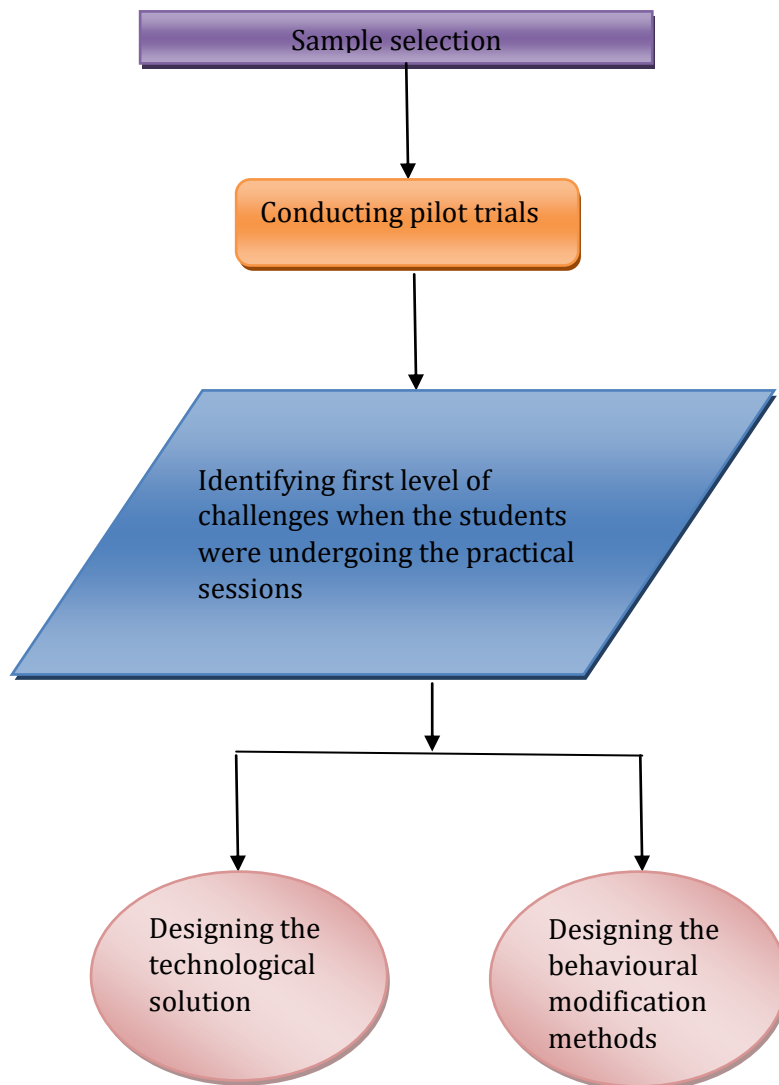
Figure 3.2 Flow chart on BMT and SLAT Level 2

Flow chart of the organic compost unit/Solar lantern assembling unit Third level of implementation and its methodology
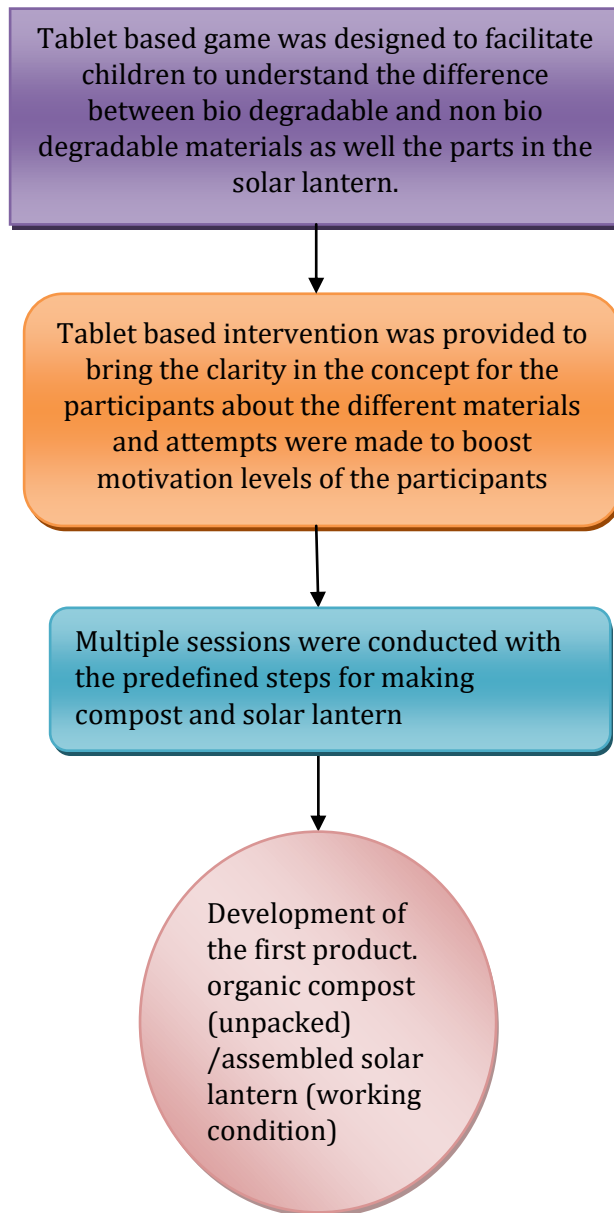
Figure 3.3 Flow chart on BMT and SLAT Level 3

3.7   STATISTICAL TECHNIQUES

Statistical Package for Social Sciences (SPSS) 19 version used to analyze the data. Independent variables for the present research proposal include Gender, chronological age, social age and intelligent quotient. Dependent variables include score achieved by the participants after the three term skill based training sessions for the participants. The questionnaire included in the entire data collection was not changed to understand the

learning rate and concept acquisition of the participants. The data in the present study was represented in three forms. They are

- Frequency tables which depict general information that is represented in the form of Demographic profile, in depth analysis on information on the term I, II and III evaluation scores were also done.

- The second form of data includes the understanding the relationship between independent and dependent variables. The statistical technique used to analyse this data includes Spearmen correlation coefficient.

- The third Statistical method used was to understand the mean differences between the scores achieved. This can be done by using one way Annova or t-test.

- The raw data was converted into percentages and binned under three levels of scoring process. Visual binning procedure is done to the percentages of evaluation score achieved by the participants to represent the data in an effective manner. Depending on the frequency distribution data was represented in the form of tables for easy understanding. The absentees and the participants with profoundly challenged who remained uninfluenced with the training process were also separately represented.

Reason for selecting Spearmen correlation coefficient BMT

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. The relationship between the independent and depend variables were understood by this technique. In general Pearson correlation is most widely used statistical method but in the present study the data is widely distributed so Spearman correlation coefficient was used instead of Pearson correlation.

In a monotonic relationship, the variables tend to change together, but not necessarily at a constant rate. The Spearman correlation coefficient is based on the ranked values for each variable rather than the raw data. Spearman correlation was often used to evaluate relationships involving ordinal variables.

The Pearson correlation evaluates the linear relationship between two continuous variables. The Spearman correlation coefficient is based on the ranked values for each variable rather than the raw data. Spearman correlation is often used to evaluate relationships involving ordinal variables.

CHAPTER 4: PROJECT I-BIOFERTILISER MANUFACTURE TRAINING (BMT)

Virtual and Technology based Bio –fertilizer Manufacture Training Programme for Students with profoundly mentally challenged

4.0   BRIEF DESCRIPTION OF THE PROJECT

The project was designed in such a way that the individual who get the virtual/technology as well as practical training can independently open a setup on his own (entrepreneur). The individual can manufacture the natural manure and market his/her product by packing it with the nutritive values of the product and with their brand name. The main goal of the present research study was at the end of the training program the individual was able to practically carry the steps that are included in manufacture of Organic compost. Ultimately, the young adults with intellectual disabilities were able gain income, self-confidence and can lead a respectful life.

After understanding the current literature and requirement of the study the procedure was framed. Extensive Investigation was done the different techniques used in the manufacture process of compost pit or natural fertilizer. Among the different procedures best possible technique was selected. Task analysis was done on the selected technique. An easy training procedure was framed and raw materials for the required process were collected.

Creating of the videos for the natural manure training programme that can be used as a virtual skill based training programme. Selection of the participants for the present study and conduct series of training classes to the young adults and provide the practical training.

Trainers identify the difficulties faced by the young adults individually and organize problem solving techniques.

Further, the researcher conduct the practical (test) to understand the level of the performance of the each student trained. The steps included are Scaling the performance of the students, identifying the problem area and improvising the required field. Technology used would be Development of game based training programme. After the initial trials researcher came to a conclusion that there was a need of game based training method to improvise the sorting abilities. Game was developed on

Android based Application and medium size Micromax tablets were used to train the participants of the study.

For practical training or on field experience was provided by giving them structure based training with predefined steps.

Materials required are Gloves, Earthen clay, lab coats and masks are purchased and established a open lab outside (under shade) and the in-depth details on training method was provided in "**Training Module for Virtual and Technology based Bio – fertilizer Manufacture Training Program for Students with profoundly mentally challenged**".

4.1 HYPOTHESIS OF THE STUDY

❖ By the end of the skill training program the Strengths of the intellectually challenged were identified and trained in the respective field.

❖ The weaknesses like challenging behaviors and practical problems occur during the course of learning were hand by individualized educational program at 30 percent level of achievement.

❖ There would be different type of challenges in the course of virtual training and skill development program. But it is expected that after training in the course the young adults able to perform the skill at 60 percent of accuracy.

4.2 DEMOGRAPHIC PROFILE OF THE PARTICIPANTS

4.2.1 Inclusive and exclusive criteria of the sample

To retain the confidentiality of the students the names were changed or first 3 letters of the name retained in the tables. 68 students were considered for the study.

The data collected trough structured observation check list was placed in tables in ANNEXURE I: Training module for the project I. The collected data was placed in cloud based topics and outline of the points are concluded which are implemented in the form of Action items.

4.2.2 Description of Participants

There are 68 participants in the study who are categorized under the spectrum of Neurodevelopmental disorders and with varying intelligent as well as social quotients.

The participants of the present study includes Mental retardation or Intellectual disabilities, Microcephalus, Autism, Cerebral Palsy, Down's Syndrome and Attention deficit hyperactive disorder.

Intellectual Disabilities ICD-10 Code Range F70-F79 is the medical classification lists by the World Health Organization (WHO) participants are under the study.

The challenged individuals of the present study were categorized according to the psychological report provided with the major morbidity. Some of the participants also accompany with some co-morbid associative disorders which influence their skill based learning process.

The present research was conducted at Tamana Naidisha- Vocational centre where the special students are provided with different skill based training. The participants of the present study majorly include special individuals with intellectual disabilities that is 60%. The other categories of distribution were mentioned in the Table respectively. The certificates provided for them included that they belong to the category of mental retardation which name will not be used further while discussing the identity of the sample. Instead of mental retardation the researcher use the terminology "Intellectually challenged or special individuals or students with special needs".

The disability certificates provided by the government organizations like National Institute of Mental Handicapped, All India Institute of Medical Science, government hospitals are considered as the basis of the referred problem. The distribution of the referred problem as per disability certificate is presented in Table 4.1 and Figure 4.1. The selected participants of the study belong to either of the following groups however the visually impaired students and completely hearing loss students are not included in the study. the participants were categorized into different referred problems in Table 4.1, the participants may also possess other associated problems like physical disability, communication challenges, eye hand coordination and fine motor dexterity, hearing related issues, Speech related issues, Obsessive Compulsive Disorder(OCD), combination of other Disability.

- Mild & Moderate mentally challenged students (MR).
- High functioning Autistic students and Students with Autism spectrum disorder (ASD).
- Physical disabilities.

- Cerebral Palsy (CP).

- Down syndrome (DS).

- Attention deficit hyperactive disorder.(co morbid)

- Mental Retardation/intellectually Challenged

- Microcephalus

Table 4.1 Categorization of the participants based on the referred problems

Referred Problem	Frequency	Percent
Mental Retardation(term not in use)/ Intellectually Challenged	41	60.3
Autism	4	5.9
Cerebral Palsy	8	11.8
Down's Syndrome	12	17.6
Microcephalus	2	2.9
Attention Deficit Hyperactive Disorder	1	1.5
Total	68	100.0
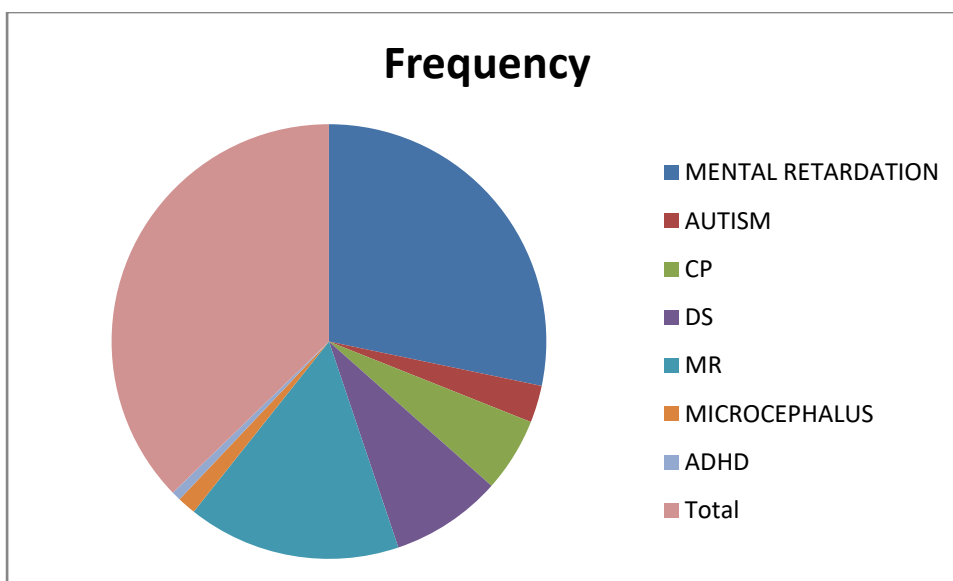
Figure 4.1 Frequency distribution of the participant Categorization based on the referred problems

4.2.3 Gender

There are 68 participants in the study who are intellectually challenged students and visit Tamana Special school for special education and therapeutic intervention. In the study, 23 are Female and 45 are Male which is 34% and 66% respectively.

4.2.4 Communication Abilities for the participants

Communication abilities of the participants play a key role in training them for any kind of skill based intervention. Having basic knowledge about this aspect helps the researcher or an educator to provide better teaching learning strategies and work potential of the participant or special students. "Receptive" was the term used to understand the capability of the special student to acquire knowledge by the instruction provided by the Researcher or Educator. "Expressive" was term used to indicate the capability of the special students to express the concepts acquired during the process of skill based training. The Expressive capability of the student plays a key role while conducting oral evaluations (term end assessments) with the special students after the skill based training program. The participants are receptive with simple words but nearly 75% of the participants are verbal but 22% have difficulties in communication verbally like stammering, mood initiative conversation or need initiative conversation and other different problems.

Table 4.2 Receptive abilities of the participants

S. No.	Categories	Frequency	Percent
1	Non Verbal	6	8.8
2	Semi Verbal	9	13.2
3	Verbal	53	78
4	Total	68	100

Table 4.3 Expressive abilities of the participants BMT

Expressive Abilities	Frequency	Percentage
Good	36	53
Average	23	33.8
Poor	9	13.2

4.2.5 Chronological age

The chronological age of the participants is determined by calculating their age considering for the year 2019. The maximum age of the participant is 46 and minimum age is around 17 years. The mean chronological age of the sample is 31.5 years calculated for the year 2019 with the Standard Deviation of the age includes (plus or minus) 6.27 years. The mean age of the participants is 27.5 and maximum number of the participants is with 23 years of age group. There is a wide range of the difference found between the social age and chronological age of the participants. The next part describes about the social age or social Quotient of the participants of the present study.

4.2.6 Social Quotient

The social quotient determines the overall capacity of the participant in their social behavior and capacity of understanding social norms. A standard questionnaire Vineland Social Maturity Scale was used by the psychologist to determine the social quotient of each participant. Brief details of the questionnaire were provided in the Annexure II. The Vineland Social Maturity Scale primarily measures eight categories which include the self-help skills in general, eating, dressing etc. It also measures locomotion, occupation, communication, self-direction, and socialization and all together is considered as social adaptation.

Depending on their social maturity, the participants have been categorized by the psychologist. The social quotient from Vineland Social Maturity Scale of the entire group ranges from 23 to 80. Low score of social quotient indicates the participants are with lesser percentage of social adaptation.

The mean social age[2] of the participants lies between 3 to 10 years. In the present study the raw scores of the participants were described to indicate the social quotient of the participants. The mean social quotient of the participants was 37.9 with the Standard Deviation 12.6. In the present study, the maximum percent of about 22% are between 10-11 years (social age). This group consists of participants from profound/severe to moderate.

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[2]Social ageencompasses both societal and technological changes succeeding the Information Age.

4.2.7 Intelligent Quotient

Intelligent quotient was determined by using standardized scale that is adopted and translated for Indian students. The Indian adaptation of Binet intelligent test (Mallin's intellectual scale for Indian Children - MISIC) is used to assess the cognitive ability of the participant students. The brief details of the Standard tool that is used to determine the Intelligent quotient (I.Q) scale was provided in the Annexure II.

The mean IQ score of the participants 39.4 with the Standard Deviation of 12.5 considering there is a huge variation in the score achieved. The minimum score is 19 determining profoundly challenged participants and maximum I.Q score was 86 considering participants including the wide range of distribution. One of the major reason for including some students above I.Q range includes lack of coordination abilities while performing skill based training.

4.3 DEVELOPMENT OF THE QUESTIONNAIRE

The questionnaire developed in three levels and general information about the participant along with structured observational checklist.

There were three aspects mainly included in the development of the questionnaire.

Aspect 1: General concepts on living and Non living things

Development of the questionnaire depends on practical challenges faced with the participants. Inclusion of some of the question on lining

While providing the training for the participants, the purpose of organic compost is better understood if the participants equip with the concept of living and nonliving. Once this concept is clear the reason for the requirement of the compost for plants possibly better understood.

Aspect 2: Knowledge about biodegradable and Non-biodegradable sorting

Aspect 2 consists of different question related to sorting capability pf the participant on biodegradable and non biodegradable items.

For example: potato peel, dry leaves, unused paper all come in the category of biodegradable and can be sorted in green Bin.

Plastic covers, wrappers, bottles come under the category of non biodegradable and can be placed in Blue Bin.

Aspect 3: Knowledge about Inclusion and exclusion of biodegradable productsfor Composting

For example wood and iron nails are biodegradable but they cannot be placed in compost because they take longer duration in degrading. Non vegetarian left outs of cooked and non cooked food like egg shells and bones also take longer duration for degrading. Some seeds and citrus peels also change the PH value of the compost which we desire. So these inclusions and exclusion are also explained by simple words.

The questionnaire providing knowledge on compost making is available in the ANNEXURE Training Module.

There were 68 participants who have been provided training in **Bio –fertilizer Manufacture Training Program.**

4.4 TRAINING SESSIONS AND TERM EVALUATION

The participants in the study, as mentioned in the demographic profile having lower memorization skills, generalization abilities and require repetitive practice of the training methods. As per the literature review, single teaching strategies cannot accomplish complete skill based training targets for intellectually challenged. Accordingly, the entire training was divided into three terms. In each term nearly ten training sessions were conducted followed by a term end evaluation. The same questionnaire was used for all the three terms. The questions were posed to the participants through interview method. Participants training session includes practical training as well as technology based intervention.

In-depth analysis on each item of the question was done to better understand the level of the participant and knowledge acquisition of the participant during the training process. Analysis of the data is done in three directions

  i.   Total score achieved by the participants in each term is calculated
 ii.   No concept and wrong answers were also analyzed to understand their learning capacity and process.
iii.   Difference between the scores achieved in three terms also understood to study the impact of practical training session provided for the participants.

4.5   RESULTS - FREQUENCY DISTRIBUTION

4.5.1   General concepts of living and Non living things

Participant's concepts on living and non living things act as key role in providing basic knowledge about plants. After the training the need of providing organic compost or "Khaad" was explained on practical training.

Question/items 3,4, 7and 8 has the responses indicating concepts on living and non living. (4X3=12) variation of reply in three trials have been gathered.

Computer, plants, fan, child, train, plant, car, trees, table, elephant mobile phone, birds are the options provided to understand the participant ability towards recognizing the understanding towards living and non living items. Non living items like mobile, computers are considered as living being by the majority of the sample. It was found from the study that some of the participants consider living items like plants and children as non living beings.

Table 4.4 Item wise description of living and Non Living things

Item Description	Term I		Term II		Term III	
	Right (%)	Wrong (%)	Right (%)	Wrong (%)	Right (%)	Wrong (%)
Computer	45.6	19	32	53	50	10
Plant	45.6	19.1	52	33	54	6
Fan	37	28	35	52	45	15
Child	53	13	42	38	54	7.4
Train	26	35	35	54	44	17
Plant	38	23	44	45	37	25
Car	41	19	34	28	48	11
Trees	35	22	32	51	53	7
Table	33	26	50	40	50	10
Elephant	44	20	35	54	48	10
Mobile	32	29	53	28	45	13
Birds	31	28	28	62	47	12

Approximately 20% of the participants were absent in Term-I and 20% of the subjects did not reply and they do not have the concept. Nearly 10% of participants were absent during Term-II evaluation. Nearly 37% of the participants are absent during Term-III evaluation as per the schedule of the research project. The reason for the absence of the participants could be that term III evaluation was conducted during the month of

January with extreme cold weather at New Delhi. During the participants are on leave during Term-III evaluation period. The response on topic 'Plant' is placed twice as the response of the participant considering it as non living and then their response towards "plants" being living were twice questioned as that particular answer as a greater value addition in the present research study.
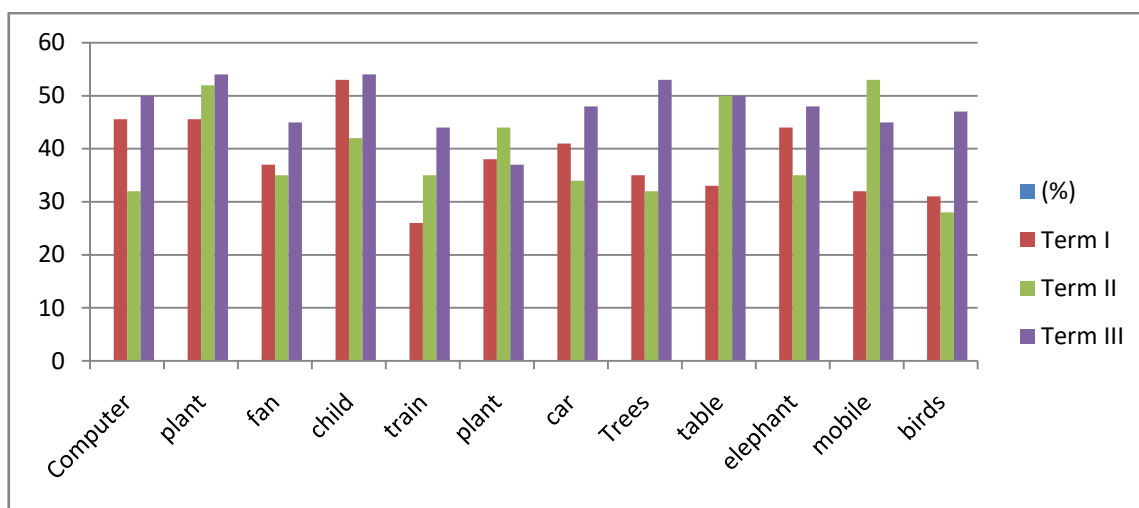
Figure 4.2 Percentage of Correct responses during three term evaluations

In the same questionnaire at level II, three basic questions on items 5 and 6 on "what need to placed in compost with correct response of dry leaves with option "C" and what should not be placed in compost" with multiple choice answers bricks with the option of "C".

Table 4.5 Table about responses on BMT

S.no	Type of response	What need to be placed in compost (%) Option "C" is correct Response			What should not be placed in compost (%) Option "C" is correct Response		
		Term I	Term II	Term III	Term I	Term II	Term III
1	A	4.4	8.8	2.9	2.9	13.2	4.4
2	B	4.4	13.2	4.4	8.8	14.7	2.9
3	C	36.8	48.5	44	26.5	33.8	45.6
4	No concept	35	19	10	41	28	10
5	Absent	19	10	36.8	19	10	36.8

The items 9 and 10 are to understand the participant concept on biodegradable with correct response (vegetable peels) with option "C" and (Dry leaves) with correct option "C".

Table 4.6 Table on correct and incorrect responses

S.no	Type of response	Concept of biodegradable (%) Option "C" is correct Response			Concept of biodegradable (%) Option "C" is correct Response		
		Term I	Term II	Term III	Term I	Term II	Term III
1	Correct response	22	42.6	29.4	33.8	44	34
2	Wrong response	19	17.6	7	12	17	12

The items 11 and 12 to understand the participant's preference on activities done in compost. Reply to any option is considered as correct response as it is the opinion-based response to understand the individual preference in compost training program. In this evaluation process, 2 of the participants did not respond to the item 11 and 5 participants behaved as if they did not understand the question.

4.5.2 Knowledge about biodegradable and Non-biodegradable sorting

The knowledge while responding and doing the activity practically also differed in the subjects. The overall knowledge about the **biodegradable and Non-biodegradable** sorting was done through practical training and game-based method.

Practicing both the sessions had shown the impact of the responses.
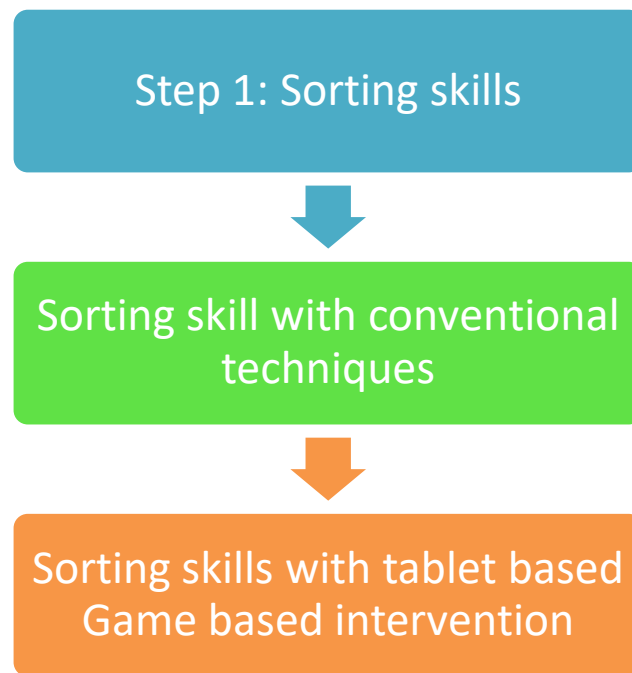
Figure 4.3 Steps of BMT

Table 4.7 Knowledge of biodegradable and non biodegradable

Item Description	Term I		Term II		Term III	
	Right (%)	Wrong (%)	Right (%)	Wrong (%)	Right (%)	Wrong (%)
Potato peel	26.5	23.5	45	23	42	16
Green polyethene	38	14	45	25	50	9
Water bottle	42	8	41	25	38	17
Dry leaves	29	23	47	23	31	28
Carrot peels	31	13	47	22	45	12
Plastic container	28	15	37	32	42	15
Blue bottle	37	6	47	20	52	7
Chocolate wrapper	40	6	41	26	43	16
Slice of bread	22	19	37	31	26	32
chips cover	34	35	37	31	34	22
Seeds	19	26	31	37	22	32
Wood	15	29	31	35	22	34
Iron nails	34	10	47	17	44	12

4.5.3 Knowledge about inclusion and exclusion of biodegradable products for Composting

The level IV questionnaire increases the complexity by making the participant to decide what need to be placed in compost even it is biodegradable. In each session researcher

provided training to the special student regarding the concepts of what goes to compost and what need not to be placed while making compost.

This knowledge enlightens them and provides information on the procedure of sorting as the second step of compost making. Providing knowledge about inclusion and exclusion of items among biodegradable products in Compost Making were also separately practiced.

Analysis of the results was conducted at three levels after periodically providing skill based intervention for the participants. The pre tests and pilot study were conducted during the development of the questionnaire before providing any training procedure to the participants. The results are not documented and analyzed because due to the severity and the students were never been training in this process, so naturally they were unaware about the basic information on organic compost. Due to this reason, qualitative inputs about the items that need to be included in the term end evaluation questionnaire were considered. These informal interviews with students with special needs gave immense understanding about their knowledge on different concepts and after structural interview method with 20 students the questionnaire was formulated considering the most basic question about the process of manufacture of Organic compost. The need of using compost was required to be generated in the minds of the special students so understanding towards living and non-living concepts of the surrounding like plants, trees, animals, train, computer and other aspects need to be cleared in the mind sets of the special students. Concept of biodegradable "Galtahai" and Non biodegradable "Nahigaltahai" was introduced among the students and level wise concepts were trained on weekly basis by practical experience in each session.

Different type of compost has different combinations. Initially this research considered Aerobic method of compost making on kind of composting where in the seeds, wood, iron nails, cooked food, egg shells, lemon peels are not allowed to place in compost.

But this procedure has been changed after the introduction of compost machine the variation in the procedure of manufacturing compost has been radically changed. Knowledge on different methods are been provided to the selected participants who has completed the level I and Level II by the end of Term II evaluation process. These different compost making methods and variation included in each method was trained to the participants who have cleared Level I and Level II of compost training process.

These selected participants were provided with the special training in the term III evaluation/examination.

Table 4.8 Knowledge in what need to be placed in compost

Item Description	Right Response (%)		
	Term I	Term II	Term III
Seeds	29	38	36
Wood	29	45	33
Iron nails	33	37	36
Cooked food biodegradable	20	32	31
Cooked food	34	38	42
Egg shells	48	67	57
Lemon peels	48	67	57

Understanding about biodegradable and non bio-degradable concept is introduced and training provided in sorting and separating them depending on variation. Level IV increases the complexity of the activity by training the participants on what are the things that takes longer duration for composting and also what are the things that can change the anaerobic degradation process of composting.

For example: Sliced wood acts as a brown by absorbing excess water released during the process of degradation of greens. Iron nails takes more than 14 months to complete degradation so they should not be placed in compost and need to sort out. Cooked food may lead to attract insects and increase the methane output so the decision of adding cooked food while making compost need to be taken critically by deciding the quantity and quality of the cooked food. Egg shells, onion, Lemon peels and cooked and uncooked non vegetarian food, died animals and seeds are decided not to be included in the compost making. The reason could be to deal with hygiene related issues.

Level IV stage is considered as the difficult aspect of training phase and these above-mentioned items are not physically included during the teaching/learning/training process of the participants.

The observational report and the challenges noted about the participant while performing during the training process were documented. Different strategies were followed by providing the individual differences in the group session depending on the requirement of the participant nature and concern. In detail information is provided in the Annexure.

4.6   RESULTS-MEAN AND STANDARD DEVIATION

Systematic approach was followed while providing the training to the special students. During this process term end evaluations were conducted among the participants to understand the rate of learning. Structured observational schedules were developed and implemented during the training sessions in order to understand the different challenges faced by the participants and Researchers/trainers. The psychologist plays a key role in documenting the issues related to this context and this information was attached in Annexure. This evaluation procedure includes the scoring of all the term end evaluation interviews conducted after certain number of training processes. The table 4.9 indicates mean, minimum and maximum scores achieved while giving term end evaluation. The right answers of the questions were given mark one and wrong answers were given value of zero. Some students who could not attend to the evaluation procedure mentioned as "AB/absent" and some of the students who were not in a capable position to understand the question posed were included in the category "No Concept". This was indicated separately and the students come under the category of "High profoundly Retarded cases". As per the training involved, whatever the situation of the participant, similar efforts were made to provide the training by simplifying the procedure, language and methods through holistic inclusion process.

The items included in the questionnaire were divided into three levels depending on the hierarchy of the difficulty of each level. Same items were included for all the three trials. The mean score of the level 2 of term I is represented in the table and from the table it is visible that mean score is reducing when the level is increasing indicating the knowledge towards this context is not clear among the participants. .

Term I includes first evaluation after providing more than 8 trainings session for the participants. The mean score for each evaluation:

Table 4.9 Term wise level wise mean, standard deviation of the score achieved by the participants

Categories T=Term; L=Level	Mean	Std. Deviation	Minimum	Maximum
T1L2	7.6	6.8	0	20
T1L3	3.9	4.3	0	13
T1L4	2.4	2.4	0	6
TERM 1	14	13.1	0	39
T2L2	8.8	5.2	0	19
T2L3	5.3	3.9	0	12
T2L4	3.2	2.4	0	7
TERM 2	14.1	8.4	0	27
T3L2	9.4	8	0	20
T3L3	4.9	4.4	0	13
T3L4	2.9	2.6	0	7
TERM3	17.3	14.5	0	40

Term I mean score was 14; Term III mean score was 17.3 with the standard deviation of 14.5 indicating the wide range of difference in the evaluation score indicating that the knowledge of the participants varies widely.

4.7 RESULTS-OVERALL SCORES ACHIEVED DURING THE EVALATION

The participants of the study after the training, examination was conducted and evaluation scores are achieved for term I, term II and term III. Cut points were placed for the students who scored their marks below 34, between 34 to 55, between 55 to 76 and Above 76. This method of dividing the scores into segments gives clear picture of the students who were falling under those categories.

Table 4.10 score and term wise division

CAREGORIES	FREQUENCY	PERCENTAGE
Term –I		
<34	37	54.4
34 to 55	6	8.8
55 to 76	15	22.1
76 and above	10	14.7
Term II		
< 34	24	35.3
34 to 45	17	25
45 to 56	17	25
Above 56	10	14.7
Term III		
<34	27	39.7
34 to 56	7	10.3
56 to 78	23	33.8
Above 78	11	16.2

The above table reflects the demarcation of percentage of students scored during term end evaluations. This table reflects overall improvisation in the learning process of Bio compost Manufacture training on a term wise basis. This data helps us to understand the cut point levels, excluding absentees.

Incorporation of teaching strategies by noting the challenges lead to improvisation in the learning process of Bio compost Manufacture training on a term wise basis.

Table 4.11 Cut point achievement score for the participants in BMT

CATEGORIES Cut point	FREQUENCY	PERCENTAGE
Term –I		
1	18	26.5
2	4	5.9
3	10	14.7
4	10	14.7
Absent	25	36.8
No concept	1	1.5
Term II		
1	12	17.6
2	17	25
3	17	25
4	10	14.7
Absent	7	10.3
No concept	5	7.4
Term III		
1	1	1.5
2	7	10.3
3	23	33.8
4	11	16.2
Absent	25	36.8
No concept	1	1.5

4.8   RESULTS-CORRELATIONS

The statistical methods like Pearson correlation, Spearmen Correlation and Chi square were used to understand the association between the variables of the study. For this purpose, the following independent and dependent variables are considered

- Independent variables: Gender, age, type of problem, IQ and SQ.
- Dependent variables: Term I, II and III evaluation score.
- Cross correlation between the independent and dependent variables were conducted.

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✦ Data analysis on the percentage of the marks achieved by the students

In the present research study, the hypothesis was mainly focused on overall understanding and skill proficiency of the participants at 60% level of accuracy. To determine this raw score was converted into percentages and the mean difference from Term I evaluation was compared with term II and III percentage evaluation scores. The outcome of the research achievement of the transformation of participants who are in emerging stage can be clearly shown through the scores represented in the tables.

Table 4.12 Analysis of the Results Spearmen correlation of independent and dependent variables BMT

S. No	Spearmen Correlation on dependent and independent variables	Correlation coefficient	Significance at one tailed/two tailed	P value	Level of significance
1	Term I Vs Intelligent quotient	.226	.064	p>0.05*	Slight association found
2	Term II Vs Intelligent quotient	.021	.865	p>0.05	No Association
3	Term III Vs Intelligent quotient	.092	.454	p>0.05	No Association
4	Term I Vs Chronological age	.241	.048	P<0.05**	Association found
5	Term II Vs Chronological age	.108	.380	p>0.05	No Association
6	Term III Vs Chronological age	.193	.114	p>0.05	No Association
7	Term I Vs Social age	.272	.048	P<0.05**	Association found
8	Term II Vs Social age	.034	.782	p>0.05	No Association
9	Term III Vs Social age	.091	.461	p>0.05	No Association

From the Table 4.12 it can be concluded that the term I represents the raw score achieved by the participant after the 8 -10 skill-based training procedures. Term I evaluation score and intelligent quotient of the participants was correlated and results showed that 0.064 indicating week association between two variables.

In general, the influence of intelligent quotient (I.Q), social age (S.Q) and chronological age (actual age in years) plays a significant role on learning process and performance of the individuals. This also similar to the special individuals indicating better I.Q means better performance. The table results indicates that the well-designed curriculum and motivation during training can influence the performance of the individuals inspite of their I.Q range and S.Q range.

> Well-designed curriculum and motivation during training can influence the performance of the individuals inspite of their I.Q and S.Q range

Table 4.13 Chi-square analysis with Gender Vs Term I, II and III Evaluation Report BMT

S. No	Chi-Square tests on dependent and independent variables (Pearson Chi-Square)	Correlation coefficient	Significance at one tailed/two tailed	P value	Level of significance
1	Term I Vs Gender	12.5	.859	p>0.05	No association found
2	Term II Vs Gender	23.2	.504	p>0.05	No Association
3	Term III Vs Gender	28.3	.341	p>0.05	No Association

Association of Intelligent quotient Vs Term/Evaluation scores

There was no association found between the Term II and III evaluation scores with intelligent quotient indicating that achievement scores are impendent with the overall intelligence they posses. One of the finding of the present study includes consistent training can increase the performance of the participant inspite of the overall IQ score

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of the participants. It is also very much necessary to state that the participants who are in moderate to mild cases learning was emerging. The sessions did not play any role while increasing the score during the evaluation process on the participants who are highly/ severely/profoundly challenged. In those cases, it can be suggested that the participants can get trained on certain simple tasks and perform that task under peer mate/ adult supervision.

Example related to the Compost Project: Sorting task including the ability to separate the green (biodegradable) into green bins. The easier step like repetitive task which includes task of making vegetable peels into smaller size with hands (pincer grasp). This require less decision making skills.

The task of mixing/ placing the smaller sized vegetables peels in the earthen parts with verbal or adult direction could be included.

Association of Chronological age Vs Term/Evaluation scores

The chronological age of the participants is the measure of the individual's age based on the calendar date on which he/she or born. In the present study the chronological age is calculated for the year 2019 and measured in years.

As per the law of learning in the mainstream individuals, the learning increases according to their chronological age. In case of special individuals, the learning is comparatively lower than other mainstream individuals. It mainly depends on the level of I.Q and S.Q Scores of the individuals. From the data Table 4.12, Spearmen correlation value is 0.241 with p value 0.048 ($p < 0.05$) indicating there is a strong association found between the Age and Term I scores indicating that the level of impact of their learning is directly influenced with age.

From the data it is evident that term I evaluation process has a influence on I.Q, S.Q and chronological age. The p values are less than 0.05 indicating significant association found in the dependent variables. However, term II and Term III evaluation scores did not depict any association with the I.Q, S.Q and chronological age. The skill based training had a greater impact on term II and term III evaluation scores that it can overcome the impact of dependent variable like I.Q, S.Q and chronological age. Fluid intelligence and learning can also be discussed while understanding about the issues.

4.9   CHALLENGES AND POSSIBLE SOLUTIONS

1. One of the biggest challenges is motivation and delay process of reaching mature state of the compost that is Greens to Organic compost.

2. In order to resolve that issue Green to Waste Compost Machine and its advantages are studied.

3. Reviewing different kind of machines that are available in the market and finding out the best one which is suitable for the present study.

Solution: The products of Sukhi Green to waste can help in manufacture natural compost in 2 days. This act as a motivational aspect of the special students or participants to actively participates in compost activity. The other challenges include sorting abilities improvisation. (game designed and developed).

CHAPTER 5: PROJECT II-SOLAR LANTERN ASSEMBLING TRAINING

Virtual training program on Solar lantern assembling unit SLAT (Solar lantern assembling Training)

5.0   BRIEF DESCRIPTION OF THE PROJECT

Solar lantern system is a solar energy-based system for operating lights for specified hours of operation per day. Solar lighting system has become a popular substitute for low voltage lighting from low efficiency, poor reliability and short life time exhibited by bulbs.

As per the objectives of the project, the students have to get trained in assembling Solar Lantern. This is achieved through a Virtual training (using Virtual Reality (VR) head set, video demonstration and circuit demonstration through power presentation) followed by a practical training. In the beginning, participants were habituated with the VR head set in three Phases as described in Sections 5.2 to 5.4. Next, the participants were introduced with basic electronic circuits and working with simple electronic devices. Details of a typical lesson plan are described in Section 5.4. The details of other lesson plans are presented in the Training Module (Refer Annexure). After this, the actual training was imparted and an evaluation is done based on developed questionnaire.

5.1   DEMOGRAPHIC PROFILE OF THE PARTICIPANTS

5.1.1   Description of Participants

There are 56 participants in the study who are categorized under the spectrum of Neuro-developmental disorders and with varying intelligent as well as social quotients.

The participants of the present study include Mental retardation or Intellectual disabilities, Microcephalus, Autism, Cerebral Palsy, Down's Syndrome and Attention deficit hyperactive disorder.

Intellectual Disabilities ICD-10 Code Range F70-F79 is the medical classification lists by the World Health Organization (WHO) participants are under the study.

The challenged individuals of the present study were categorized according to the psychological report provided with the major morbidity. Some of the participants also

accompany with some co-morbid associative disorders which influence their skill based learning process.

The present research was conducted at Tamana Naidisha- Vocational centre where the special students are provided with different skill-based training. The participants of the present study majorly include special individuals with intellectual disabilities that was 71%. The other categories of distribution were mentioned in the Table respectively. The certificates provided for them included that they belong to the category of mental retardation which name will not be used further while discussing the identity of the sample. Instead of mental retardation the researchers use the terminology "Intellectually challenged or special individuals or students with special needs".

The disability certificates provided by the government organizations like National Institute of Mental Handicapped, All India Institute of Medical Science, government hospitals are considered as the basis of the referred problem. The distribution of the referred problem as per disability certificate is presented in Table 5.1. The selected participants of the study belong to either of the following groups however the visually impaired students and completely hearing loss students are not included in the study. The participants were categorized into different referred problems in Table 5.1, the participants may also possess other associated problems like physical disability, communication challenges, eye hand coordination and fine motor dexterity, hearing related issues, Speech related issues, Obsessive Compulsive Disorder(OCD), combination of other Disability.

- Mild & Moderate mentally challenged students (MR)/ Mental Retardation/intellectually Challenged
- High functioning Autistic students and Students with Autism spectrum disorder (ASD).
- Physical disabilities.
- Cerebral Palsy (CP).
- Down syndrome (DS).
- Attention deficit hyperactive disorder.(co morbid)

Table 5.1 Categorization of the participants based on the referred problems

Referred Problem	Frequency	Percent
Mental Retardation	40	71.4
Autism	2	3.6
Cerebral Palsy	5	8.9
Down's Syndrome	6	10.7
Attention Deficit Hyperactive Disorder	3	5.4
Total	56	100.0

5.1.2 Gender

There are 56 participants in the study who are intellectually challenged students and visit Tamana Special school for special education and therapeutic intervention. In the study, 16 are Female and 40 are Male which is 28.6% and 71.4% respectively. The wide range of variation lies in the gender distribution because of the interest/willingness to participate in the solar lantern assembling activity and also because of the disability population gender distribution.

5.1.3 Communication Abilities

"Expressive" was term used to indicate the capability of the special students to express the concepts acquired during the process of skill based training. The Expressive capability of the student plays a key role while conducting oral evaluations (term end assessments) with the special students after the skill based training program. Nearly 10% of the participants have issues like stammering, prefer to be mute and other verbal related issues and remaining participants has an average level of communication with the usage of local language i.e. Hindi and some words in English. The researcher or an educator provided better teaching learning strategies while making them understand about the circuit system, parts of solar lantern and other aspects in step wise from simple to complex training procedure. Achary K (2017) worked on the role of communication and its receptive abilities on influence on understanding the question and concepts.

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5.1.4 Receptive Abilities

 "Receptive" was the term used to understand the capability of the special student to acquire knowledge by the instruction provided by the Researcher or Educator. Out of all the participants 57% are fully receptive that is able to understand simple instructions, following commands. Nearly 11% are low level receptive that means they are not able to follow instructions immediately but after training they are able to observe and imitate the tasks that are administered. The participants who are with average receptive capability are following instruction and also observing and imitating after two or three trials.

Table 5.2 Frequency and percent of receptive levels of participants (SALT)

S. no	Categories	Frequency	Percent
1	Completely receptive	32	57.1
2	Partially receptive	18	32.1
3	Receptive to simple Commands	6	10.7
4	Total	56	100.0

5.1.5 Chronological age

The chronological age of the participants is determined by calculating their age considering for the year 2019. The maximum age of the participant is 44 and minimum age is around 17 years. The mean chronological age of the sample is 26.5 years calculated for the year 2019 with the Standard Deviation of the age includes (plus or minus) 5.3 years. The maximum number of the participants came under 21 years of age group. The next part describes about the social age or social Quotient of the participants of the present study. The binned ages were represented in the table 5.3. The maximum number of participants fell under the age group of 23 to 29 years age group. Nearly 37% are between 17 to 22 years age group.

Table 5.3 Age wise division of participants (SLAT)

S.No	Categories	Frequency	Percent
1	Below 23 years	21	37.5
2	Below 29 years	22	39.3
3	Above 30 years	13	23.2
4	Total	56	100.0

5.1.6   Social Quotient

The social quotient determines the overall capacity of the participant in their social behavior and capacity of understanding social norms. A standard questionnaire Vineland Social Maturity Scale was used by the psychologist to determine the social quotient of each participant. Brief details of the questionnaire were provided in the Annexure II.   The Vineland Social Maturity Scale primarily measures eight categories which include the self-help skills in general, eating, dressing etc. It also measures locomotion, occupation, communication, self-direction, and socialization and all together is considered as social adaptation.

Depending on their social maturity, the participants have been categorized by the psychologist. The social quotient from Vineland Social Maturity Scale of the entire group ranges from 25 to 75. Low score of social quotient indicates the participants are with lesser percentage of social adaptation. This group consists of subjects from moderately challenged to Mild/borderline participants. In the present study the raw scores of the participants were described to indicate the social quotient of the participants. The mean social quotient of the participants was 50 with the Standard Deviation 10.47. The range is between 13-23 years of behavior.

5.1.7   Intelligent Quotient

Intelligent quotient was determined by using standardized scale that is adopted and translated for Indian students. The Indian adaptation of Binet intelligent test (Mallin's intellectual scale for Indian Children - MISIC) is used to assess the cognitive ability of the participant students. The brief details of the Standard tool that is used to determine the Intelligent quotient (I.Q) scale was provided in the Annexure II.

The mean IQ score of the participants 55 with the Standard Deviation of 12.1 considering there is a huge variation in the score achieved. The minimum I.Q score

achieved was 32 and maximum was 79. There was only one participant with 99 score of IQ and another with 82 score of I.Q possessing higher level of hyperactive symptoms,

5.2 VIRTUAL REALITY SOLAR LANTERN ASSEMBLING TRAINING-PHASE I

Acceptance for VR Headset: Before performing the test, the participants were provided a VR Headset to make themselves familiar and habituated to the headset placed around the head. The headset was assisted by a researcher/ staff member.

For the first phase, a 3.40 min 2D animated video was played which gave an introduction to the 8 planets of the Solar System (covered previously in classroom using conventional teaching method). The video began with a boy trying to experiment with his rocket eventually hoping on it to go to outer space. Each of the 8 planets were introduced and briefly explained separately. The instructional medium used is English.

Two runs were done with change in the Brightness (26% & 7%). Participants were asked to recall the names of the planets on a paper after each run. Parameters observed included:

1. Level of brightness affecting the video
2. Weight of the VR felt – on the nose
3. Weight of the VR felt – on the head
4. Headset was Hand-held vs Non hand-held

5.3 VR TRANING PHASE II

Acceptance for VR Headset: Before performing the test, the participants were provided a VR Headset to make them familiar and habituated to the headset placed around the head. The headset was assisted by a researcher/ staff member.

For the second phase, a 3.50 min 2D animated video was played which gave an introduction to folding a paper to create an Airplane. The video introduces two hands folding a paper in 5 rounds. Each round consists of different folds. The instructional medium used is both Hindi & English.

The 5 runs were done with change in the Brightness (26%). Participants were asked to recall the procedure and do it on a piece of paper provided to them:

- After showing the first three rounds on the VR Headset, the participants were asked to perform the folds to observe retention (3 times). Time span: 20-25 mins

- Fourth & and the fifth screen were shown to students once who were able to complete the first three screens.

5.4   VR TRANING PHASE III

Acceptance for VR Headset: Before performing the test, the participants were provided a VR Headset to make them familiar and habituated to the headset placed around the head. The headset was assisted by a researcher/ staff member.

For the second phase, a 3.50 min 2D animated video was played which gave an introduction to folding a paper to create an Airplane. The video introduces two hands folding a paper in 5 rounds. Each round consists of different folds. The instructional medium used is both Hindi & English.

The 5 runs were done with change in the Brightness (26%). Participants were asked to recall the procedure and do it on a piece of paper provided to them:

- After showing the first three rounds on the VR Headset, the participants were asked to perform the folds to observe retention (3 times). Time span: 20-25 mins

- Fourth & and the fifth screen were shown to students once who were able to complete the first three screens.

5.5   SESSIONS CONDUCTED ON SOLAR LANTERN ASSEMBLY TRAINING (SLAT)

As a part of solar lantern assembling process (training) understanding of circuit is one of the important elements. Need of circuit connecting the wires were rehearsed from 3-five times with each student in a two-month training process. The practical were conducted with each student and verbal and physical prompts provided in case the student with disability required the prompts. Each element of tools was explained and identification of object is practised in the sessions and information is provided in the syllabus to the students.

Keywords Introduced: Solar energy, Circuit assembly, Solar lantern, VR headset.

Tools Required: Circuit board, battery holder, batteries, bulb, wires, switch, stands, VR headset and mobile phone.

Brief syllabus Covered: The syllabus comprises of basics of electricity, elements working on electricity and sources of energy which produce electricity. It also includes usage of generator and inverter. It aims to provide students with an idea of conductors and insulators. It covers the precautions to be ensured while working with electricity. Lastly, it includes working of a screw driver. The syllabus is properly made keeping in mind the SLAT procedure.

Photo 5.1Practical exam and training

5.5.1 Procedure:

Theoretical exam

1. The questions were verbally explained to individual students. The questionnaire comprised of 26 MCQ's, out of them 6 were subjective.
2. The researcher used interview method while collecting the data from the participant. Researchers read each question and gave multiple choices and then waited for the reply from the participants
3. The questions were posed in simple layman's language so that the students can understand easily.
4. In case if the student wasn't able to understand the concept conveyed then the researcher gave clue by showing the real time objects present in the classes.
5. For the subjective answers some examples have been provided.

Fig 2: Different combinations trying to form series circuit

Practical exam

1. The researcher provided the student with a circuit board, a toolbox and a picture of the circuit connected.
2. The student was asked to search for the elements as in the picture in the toolbox provided.
3. Then with the help of the picture the student connected the circuit for the bulb to glow.
4. The student checked the circuit by switching the bulb on and off.
5. The students who could not follow the picture and connect the circuit were shown the circuit connection video using the VR headset.
6. After the video they were again asked to try the circuit connection.
7. The researcher provided assistance if the students faced problem in insertion of the wires as the battery holder had small holes.
8. Besides this, the researcher saw that the connections were properly made and no element was broken in the process.

Photo 5.1.2: peer learning and cooperation

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5.5.2 Observations

Theoretical exam

1. Participants/Students were able to identify only the examples that were taught to them.
2. They are not clear with the concept of what a conductor or insulator is.
3. They vaguely know what power is and they can relate it to day to day objects such as the computer but they don't know the exact meaning of it.
4. They were able to identify about the solar panel and solar energy but they don't know that solar energy is free of cost.
5. Most of them were unable to point out the exact source of electricity.
6. They knew about the safety issues related to electricity(should not touch switch board with wet hands)
7. The options could be framed in simpler language.
8. They were able to identify the objects easily.
9. The working of screw driver was clear to most of them.
10. The participants were not clear with the concept of placing battery in which direction.

Practical exam

1. The 12th standard students were able to do without the VR video while the 8th standard students needed VR videos.
2. Most students got the battery connection wrong.
3. Headset prototype was used only for boys and mostly students were comfortable with it.
4. Most of the students were able to perform without the VR headset videos, which shows their retention and understanding was good.
5. The time average was of 3-4 minutes.
6. Only one student (Lal) couldn't do even after watching the VR video.
7. Only one student needed the VR video and was able to do it using it.
8. Motivation level is high as it's a practical test.
9. One student (Vik) completed without the switch as it was demonstrated to him in that way.

10. One student (Kart) left in between due to low concentration and didn't feel like doing it.

11. Experiment was conducted after a pen and paper test which included the object identification test as well.

5.5.3 Challenges:

1. The students faced problem in connection of batteries, mostly confused with positive and negative sides.

2. The concept about conductors and insulators is not clear.

3. Pictorial or object examples were required by most of the students to understand the questions.

4. Some questions had closely related answer choices, which led to confusion for some students.

5. Connection of wires was initially difficult for students.

6. The concentration was less for the subjective questions.

7. Some students took time in finding the elements from the toolbox and got confused by different sizes of batteries and bulbs.

8. Most students needed assistance in reading the question papers.

5.5.4 Conclusion:

The lesson plan designed to make the participants better understand the design of the series and parallel circuits. The next plan includes designing a lesson plan to teach them positive and negative sides of batteries, practical training with permutations and combinations.

5.6 DEVELOPMENT OF THE QUESTIONNAIRE

The questionnaire providing knowledge on Solar lantern Assembling training unit is available in the ANNEXURE.

5.7 TRAINING SESSIONS AND TERM EVALUATION

The participants in the study, as mentioned in the demographic profile having lower memorization skills, generalization abilities and require repetitive practice of the training methods. As per the literature review, single teaching strategies cannot accomplish complete skill based training targets for intellectually challenged.

Accordingly, the entire training was divided into three terms. In each term at least 10 training sessions (in exceptional cases, even more than 15 trials)were conducted followed by a term end evaluation. The same questionnaire was used for all the three terms. The questions were posed to the participants through interview method. Participants training session includes practical training as well as technology based intervention.

In-depth analysis on each item of the question was done to better understand the level of the participant and knowledge acquisition of the participant during the training process. Analysis of the data is done in three directions

   i.   Total score achieved by the participants in each term is calculated

   ii.   No concept and wrong answers were also analyzed to understand their learning capacity and process.

   iii.   Difference between the scores achieved in three terms also understood to study the impact of practical training session provided for the participants.

5.8   RESULTS-FREQUENCY DISTRIBUTION

There were 38 items in the questionnaire whose data was collected in the form of Interview method. The questionnaire begins with simple questions like electronic devised and consumption of electricity and moves further on the uses of inverter battery, generator and transformer, The terms like force, voltage and electrons were introduced and related meaning was connected with day to day situations. The information on safety aspects while handling the electronic devices was trained in different combinations along with good and bad conductors of electricity. Further it was preceded with the physical training of rotation of screwdriver's direction. The structured observation check list was also developed to understand the performance rate after the training procedure.

Table 5.4 Participant understanding about the electronic devices and electricity consumption

S. No	Response (values:%) excluding the absentees (AB) from the main total	Fan Vs Air conditioner	Geyser Vs Tube light	Television Vs Elevator	Mobile Vs Computer	Voltage
1	Term I (AB:18)					
2	Right	48	58	55	41	52
3	Wrong	52	42	45	59	48
4	Term II (AB:12)					
5	Right	36	50	21	19	57
6	Wrong	64	50	79	81	43
7	Term III (AB:19)					
8	Right	80	57	60	71	57
8	Wrong	20	43	40	29	43

These questions are intended to understand their awareness towards the electronic devices. This understanding can help the individual to develop concepts on electrical energy utilization. Terms like what consumes more power or electricity fan or Air conditioner. This is general knowledge but gives overall assumption capacity of the participant and also thought process towards this direction.

From the above data it is visible that the participants were asked question related to the theoretical knowledge about the electricity and in this segment the participants understanding/ opinion towards voltage and electrical consumption was collected. From the above Table 5.4 the participants understanding related to the electronic devices they use every day was studied.

In the present situation the participants were not been exposed to any formal training earlier and not been provided with any formal education about the circuit, electricity production and generation, voltage, and other concepts of assembling devices. Methodology was designed after certain trials and step wise training procedure was designed and provided in each aspect. In detail information on Training module was placed in the module II.

The responses from Table 5.4 were the in-depth analysis of the some of the items in the interview questionnaire developed for the project II Solar lantern Assembling training. It indicates how the participants perceived information about electronic devices from the day to day activities. Depending on their responses the knowledge of the participants was analyzed to understand their general abilities in perceiving information from the surroundings. For the question like which electronic devise consumes more electricity compared to fan and Air conditioner 48% of them responded correctly and 52 % responded that fan consume more electricity compared to Air conditioner in the term I evaluation report. In the similar way responses for geyser compared with tube light increased in correct responses. Many of the participants were very much confused on computer and mobile electric consumption. They responded that mobile need to charged and then used. For definition of voltage, the participants tried to identify the similar terms from the responses and then responded for meaning of voltage.

In the second term evaluation report numbers of absentees were less and the correct response rate has been considerably decreased in three questions/items especially on the opinion on consumption of electricity of air conditioner, elevator and mobile. After finding the results the participants were approached back and tried to understand the reason behind the incorrect responses. The reasons were surprising and acted as valuable information. Some of the reasons from the subjective include:

 "*Fan consumes more electricity because it was continuously or more used than Air conditioner*."

Similar response by one of the participant that "I watch Television for 6 hours and travel only two times in elevator so television consumes more electricity"

"*My parents and brother always use mobile so it consumes more electricity than computer*"

Another participant responded that "*I need to keep my mobile two times for charging as the battery gets over so my mobile takes more electricity than computer*"

Session were planned after term II evaluation on electricity consumption and the training procedure of Solar lantern assembling and the results of the Term III has a significant positive score in the responses provided.

Table 5.5 Participants responses on conductivity of the common materials

Response (values:%) excluding the absentees (AB) from the main total	Plastic	Copper	Wood	Iron	rubber	water	Human Body
Term I (AB:18)							
Right	0	0	0	0	0	0	0
Term II (AB:12)							
Right	26% (11)	30% (13)	26% (11)	26% (11)	21% (9)	21% (9)	4% (2)
Term III (AB:19)							
Right	82% (29)	42% (15)	74 (26)	37% (13)	74% (26)	65% (23)	34% (12)

5.9   RESULTS - CORRELATION ANALYSIS

The statistical methods like Pearson correlation, Spearmen Correlation and Chi square were used to understand the association between the variables of the study. For this purpose the following independent and dependent variables are considered

- Independent variables: Gender, age, type of problem, IQ and SQ.
- Dependent variables: Term I, II and III evaluation score.
- Cross correlation between the independent and dependant variables were conducted.
- Data analysis on the percentage of the marks achieved by the students

Table 5.6 Correlation Analysis of SLAT

S. No	Spearmen Correlation on dependent and independent variables	Correlation coefficient	Significance at one tailed/two tailed	P value	Level of significance
1	Term I Vs Intelligent quotient	.393	.004	p>0.05*	association found
2	Term II Vs Intelligent quotient	.185	.184	p>0.05	No Association
3	Term III Vs Intelligent quotient	.267	.053	p>0.05	No Association
4	Term I Vs Chronological age	.494	.000	P<0.05**	Association found
5	Term II Vs Chronological age	.068	.627	p>0.05	No Association
6	Term III Vs Chronological age	.195	.162	p>0.05	No Association
7	Term I Vs Social age	.111	.428	P>0.05	No association
8	Term II Vs Social age	.132	.346	p>0.05	No Association
9	Term III Vs Social age	.141	.313	p>0.05	No Association

The table represents correlation between the term end evaluation and intelligent quotient. There was significant association found between term I evaluation score and intelligence quotient of the participants. There was no association found in the Term II and III evaluation scores indicating that through training there was a significant improvement in the evaluation score and performance abilities. These results indicate that well designed curriculum and training process can overshadow the challenges in understanding due to lesser intelligence quotient. These score are further justified with the results of chronological age.

Social age is an aggregate of the following abilities; communications abilities, locomotive, special, logical, interpersonal and intrapersonal abilities. Due to the dynamic design of the training module the varied social age does not have any influence on the term end evaluation scores of the participants.

Table 5.7 Mean score for Term I, II and III evaluations of SLAT

	Term1	Term 2	Term 3
Mean	28.77	31.94	41.02

From the mean scores of the raw data of term I, II and III were represented in table 5.7. The evaluation scores were statistically analyzed and it was indicated that there is significant mean difference in the score achieved. The average marks achieved by the participants were consistently increasing representing improvement in their performance level after the number of training sessions.

Table 5.8 Results of term evaluation scores with percentages

CAREGORIES Binning	FREQUENCY	PERCENTAGE
Term –I		
Below 30	**8**	**14.8**
Between 30 to 50	**24**	**44.4**
Above 51	**3**	**5.6**
Total	54	100
Term II		
Absent	12	22.2
Below 30	**12**	**22.2**
Between 30 to 50	**28**	**51.9**
Above 51	**2**	**3.7**
Total	54	100
Term III		
Absent	19	35.2
Between 30 to 50	**16**	**29.2**
Above 51	**19**	**35.2**
	54	100

5.10 ATTAINMENT OF THE OBJECTIVES

The research project were comprised of five objectives

- *To highlight the strengths of the participants and identify the interests of intellectually challenged individuals.* The achievement of the objectives were represented by the observational reports that were attached in the Annexure – Training module with the chapters 3 and 6.

- *To establish a suitable technique of the training program as per the requirement of the user group or steps followed for the training program.* This objective was also accomplished and represented in the chapter 3 and 6.

- *To develop the frame work and implementation strategies for the developed training program.* The training modules were divided into multiple lesson plans as per the overall need of the participant to enhance their performance ability and the lesson plans were placed in the Annexure – Training module with chapter 1 and 4.

- *To use the established work and as per the requirement convert the material into multi media and virtual training program.* The content developed for project I and II were in the form of Android games, Virtual reality material, Power point presentations, videos etc are not gender biased. The links for the same would be given and the app will be uploaded.

- *To understand the practical challenges faced during the training program and establish the techniques to overcome situation.* All the information was documented under the segment 4.9 with the section Challenges and possible solutions

5.11 HYPOTHESIS TESTING

- ❖ *By the end of the skill training program the Strengths of the intellectually challenged were identified and trained in the respective field.*

- ❖ *The weaknesses like challenging behaviors and practical problems occur during the course of learning were handled by individualized educational program at 30 percent level of achievement.*

- ❖ *There would be different type of challenges in the course of virtual training and skill development programe. But it is expected that after training in the course the young adults able to perform the skill at 60 percent of accuracy.*

Solar lantern Assembling Training. As mentioned the term wise examination conducted and the marks achieved by the students were converted into percentages. They were further grouped depending on the scores achieved. The categories include "Below 30" which means the participant is considered as "Very low performance". "Between 30 to 50" indicates the participants are performing on "Average" which includes Able to identify parts, Able to physically assemble with simple verbal instructions. "Above 51" group indicates the participants are able to understand the circuit system, wire insulation and other relevant aspects.

Term I evaluation report include, score of participants after two months of initial training. The participants able to score and 44% of the participants were able to perform Average. And only 3 of the participants were in the above average level.

Term II evaluation report includes 22% of the participants were not able to score minimum pass percentage. But the average performers have significantly increased.

Term III evaluation scores are achieved after three months training provided to the participants. The results were significantly improved compared with term I and term II evaluation procedures indicating that 29% of the participants were in the average performance and 35% of the participants are above average performance. Some of the new joining in the NGO has also showed enthusiasm in learning the SLAT.

As per the first hypothesis, by the end of the skill training program the Strengths of the intellectually challenged were identified and trained in the respective field. In the research study done by Achary K. (2017) presented a comparative study on National institute open schooling (NIOS) educational module converted into Virtual videos and its influence on instructional strategies and conventional methods in skill development during the learning process of manufacture of products.

In the Annexure training module individualized and student wise strengths and challenges were stated and strategies implemented fulfilled the second hypothesis.

From the Table 5.8 it is indicated the performance of the participants had significantly increased. As per the hypothesis it was expected that the performance of all the students would be achieved above 60% after the completion trials. But the performance of the participant was achieved in between 40 and above indicating that the hypothesis three was not completely achieved.

CHAPTER 6: SUMMARY AND CONCLUSIONS

6.0   BREIF INTRODUCTION

The present study intended to provide a better understanding of the **"Virtual and Technology based Bio -fertilizer Manufacture Training Program for Students with profoundly mentally challenged"** and "Virtual training program on Solar lantern assembling unit SLAT (Solar lantern assembling Training)"

Data was collected using the structured observation checklist and standard questionnaires. Training was provided to the participants and pre and post training differences are needed to be compared with the results. After the interpretation of the data results need to be summarized and concluded.

6.1   STATEMENT OF THE PROBLEM

The statement of the problem of the present study was the students with intellectually challenged are facing many direct and indirect difficulties or challenges in completing the vocational activities. The project I "Virtual and Technology based Bio –fertilizer Manufacture Training Programme for Students with profoundly mentally challenged". and the project II Virtual training program on Solar lantern assembling unit SLAT (Solar lantern assembling Training).

To motivate the students learning, an attempt was made to enhance the learning experience and make it more enriching and stimulating by incorporating the contemporary innovative methods used in vocational training.

6.2   OBJECTIVES OF THE STUDY

The following objective will be examined:

- To highlight the strengths of the participants and identify the interests of intellectually challenged individuals
- To develop the frame work and implementation strategies for the developed training program.
- To establish a suitable technique of the training program as per the requirement of the user group or steps followed for the training program.

- To use the established work and as per the requirement convert the material into multi media and virtual training program.

- To understand the practical challenges faced during the training program and establish the techniques to overcome situation.

6.3 HYPOTHESIS OF THE STUDY

❖ By the end of the skill training program the Strengths of the intellectually challenged were identified and trained in the respective field.

❖ The weaknesses like challenging behaviors and practical problems occur during the course of learning were hand by individualized educational program at 30 percent level of achievement.

❖ There would be different type of challenges in the course of virtual training and skill development programe. But it is expected that after training in the course the young adults able to perform the skill at 60 percent of accuracy.

6.4 FINDINGS IN BMT AND SLAT

- To create motivation for any vocational training the reason for doing the activity need to be strongly established. For example: Need of (organic) compost for plants and how solar lantern saves electricity.

- The need of strongly establishing basic general knowledge (what plants needs to grow) about the surrounding can improve their performance ability. This was vividly represented by improving in the term evaluation scores and performance in the training.

- Once the participants were able to understand the difference between living and non living concepts which lead to motivation towards conducting the trials increased.

- One of the major finding of the study related to assimilation and accommodation of information and the perception of factual information by special individuals related to their previous learning process.
    - ✓ For example: the special individuals were trained on color concept so many times that special individuals finding it difficult if sorting need to done based on the shapes of the blocks.
    - ✓ It can be noticed that the previous knowledge on color interfere the new learning process.

- ✓ The students who can fade the previous learning and able to assimilate new information and improves his performance by accommodating the new challenges.
- ✓ This was the main reason training and performances of the special individuals were mainly affected.

- ⚜ With the interview methods it was concluded that the reason behind not explaining on what basis the sorting is accomplished was due to the perception of the special educator's belief system on the learning process of moderate to profound and severely challenged individuals.

- ⚜ The educators who strongly belief on special individual's potentials can establish clear concept formation and positive learning process which can improvise the teaching learning experience of the individuals.

  - ✓ Activity: For example the participants were instructed that sorting can happen based on the bio degradable (Green tray) and non biodegradable materials (Blue tray). The green poly bag or caps are placed in green color tray and blue paper was placed in blue tray. Sometimes the sorting activity takes place as a regular basis and due to the misguidance of the special educators making the special individuals to understand the factual information about the products.

- The perception of parents and special educators accepting organic compost making as a respectful vocational activity also become a highly challenging task. And any training without the acceptance of the participant's parents and educators would be considered as incomplete in continuation of the activity independently by them as a profession.
- Similarly keeping safety into consideration perception of parents and special educators accepting the Assembling of Solar lantern as a vocational activity became highly challenging task. (Related to circuits, electricity and handling head gadgets like shouldering iron).
- Majority of the participants had significantly improved in correct differentiating the polythene bag, plastic bottle as Non- Biodegradable) and green peels as Bio-degradable.

- Majority of the participants able to clear the level one in BMT that is sorting of Bio-degradable and Non- Bio degradable.

- Majority of the participants found difficulty in taking the decision of understanding the knowledge in what need to be placed in compost especially cooked food and wood. (As per the procedure cooked food and wood are not placed in compost because they affect the quality of the product). For example: Sliced wood acts as a browns by absorbing excess water released during the process of degradation of greens but if it was in big size it interferes the process of degradation.

- Term I mean score was 14; Term III mean score was 17.3 with the standard deviation of 14.5 indicating the wide range of difference in the evaluation score indicating that the knowledge of the participants varies widely.

- Incorporation of teaching strategies by noting the challenges lead to improvisation in the learning process of Bio compost Manufacture training and Solar lantern Assembling training was on a term wise basis. Individual differences were considered and communication techniques were used during the training process.

- There was the significant association found on the evaluation score achieved by the participants in both projects in term I evaluation score. But in term II and Term III the training techniques lead to increase in the performance rate of the individual's inspite of the influence of I.Q, S.Q and Chronological age.

- The major finding of the study include the influence well designed training process can lead to improvisation of Vocational activity inspite of intellectual quotient, chronological age and Social age. The impact of the training was clearly visible with the slighter association of intelligent quotient in the initial trial.

- There was no influence of gender on the Evaluation scores the participants achieved. Participants were not gender dependent. The content developed for project I and II were in the form like Android games, Virtual reality material, Power point presentations, videos etc are not gender biased.

- The practical solutions for the challenges in project BMT can lead better curriculum design. Delay process of reaching mature state of the compost that is Greens to Organic compost in 2 days lead to new motivation in the participants.

- The practical solutions for the challenges in project SLAT can lead better curriculum design. Instead of soldering iron new method of clapping was done to better fix the wires with least difficulty.

- One of the possible reasons behind the positive score includes special motivation by technology and practical performance and output of the product. The simple answers given by the special individuals on electricity, voltage, and transformer can be included as part of the syllabus or curriculum.

6.5   DELIMITATION OF THE STUDY

- Delimitation of the study was that the Vocational instructions are developed for only two vocational training method
- Usage of technology like Virtual reality head set, tablets and other devises may increase the budget.
- The students are trained only in the direction of assembling Solar lantern that is predefined in the project. Training also needed to provide in the generalization process of assembling other electronic devices so that it can become the vocational activity for the participants.
- Handling electronic devises may increase the chances of accidents.
- Inappropriate process of Organic compost sometimes lead to pungent smell and mould formations which may lead to inconvenient situation.

6.6   RECOMMENDATIONS

- MSJE for persons with Disabilities has one of the objectives of uplifting the vocational training for persons with intellectual disability.

- The present study SLAT and BMT directly worked on fulfilling the objectives of MSJE and contribution of MSJE in promoting and spreading the message for different NGO working in the similar lines can benefit the larger scale population, different states of India.

- Training in the projects establishment of self employment schemes provide financial independence, increase standard of living and secures the self esteem of the individuals with special needs.

- Creating the marketing strategy, developing online portals can increase the work production.

- Awareness about the generation of training methods, consistent motivation and Sharing of the success stories need to be shown.

- Conducting a longitudinal study can be suggested to investigate further areas.

REFERENCES

1. Aanes, D. And Haagenson, C. (1978), Normalisation: Attention to a conceptual disaster. Mental Retardation, 16,1, 55-56.

2. Achary K. (2017). A Comparative Study on the Influence of Virtual Instructional Strategies and Conventional Methods in Skill Development While Learning Bakery Products by the Students with Intellectual Disabilities, Conference on Intellectual disabilities, Amity University, Noida.

3. Achary K. (Krishna veni N.).(17/03/2017). Communication Plays a Critical Role Influencing the Educational Aspects of the Children with Autism – An In Depth Analysis, National conference on learning (NCL), Lady Irwin, Delhi University, New Delhi.

4. Ahmad W.(2012) Barriers of Inclusive Education for Children with Intellectual Disability, Indian Streams Research Journal, Vol.2 Issue II 12pp 1-4

5. Burns T. And Sinfield S. (2004), Teaching, Learning and Study Skills A Guide for Tutors, Sage Publications.

6. Carter E. W. And Hughes C. (2006) Including High School Students with Severe Disabilities in General Education Classes: Perspectives of General and Special Educators, Paraprofessionals, and Administrators; Research and Practice for Persons with Severe Disabilities; Vol: 31 Issue: 2 Pages: 174-185

7. Cohen and Matthew D. (1994) Overcoming Barriers for Inclusion of Children with Disabilities in the Local Schools- A Blueprint for Change, Illinois planning Council on developmental Disabilities, Educational Resources Information Center.

8. Dipankar Gupta (Ed. CV Baxi and Ajit Prasad) (2009), Corporate Social Responsibility Concept and Cases, Excel Books

9. Downin J. E., Eichinger J. And Williams L. J.(1997) Inclusive education for Students with Severe Disabilities: Comparative view of principals and educators at different levels of implementation, Vol.18, Issue:3, Pages :133-142, Sage Publication.

10. Frieman, J.L. (2001). Learning and adaptive behaviour. New York: Cengage Learning.

11. Grossman H. J. (1973) Classification in Mental Retardation, Published: American Association on Mental deficiency.

12. Grossman, H.J. (ed.) (1973). Manual on terminology and classification in mental retardation. Washington, DC: American Association on Mental Deficiency.

13. Gupta A. and Krishna Veni G. (2016) Vocational Readiness Checklist for persons with Intellectually Challenged, Standard Assessment Psychological test, Pub. Psycho matrix, New Delhi.

14. Harper, B. & Hedberg, J. (1997) Creating Motivating Interactive Learning Environments: a Constructivist View. Paper presented at ASCILITE.

15. Harrison, P.L. and Oakland, T. (2003). Adaptive behavior assessment system. San Antonio: Harcourt. Hendrix, E. (1981), The fallacies of the concept of normalisation. Mental Retarded, 7, 9, 195 – 296.

16. Israel M., Carnahan, C. R., Snyder K.K., and Williamson P. (2012), Supporting New Teachers of Students With Significant Disabilities Through Virtual Coaching: A Proposed Model, Remedial and Special Education 34(4) 195–204 Hammill Institute on Disabilities, Sage publications.

17. Keith Waugh, Norman E. Groulund (2013), Assessment of Student Achievement, Pearson Education Inc.

18. Kleinert H. L., Miracle S. A. And Sheppard-Jones K. (2007) Including Students with Moderate and Severe Disabilities and in Extracurricular and Community Recreation Activities: Steps to Success Vol: 39 Issue: 6, page(s): 33-38

19. Krishnamurti V. (2007), DSE (ASD) Manua : Autism, Nature and Needs, Rehabilitation Council of India in association with Kanishka Publishers

20. KrishnaveniAchary, (Achary K.)(2009). Autistic Children in India:An Insight. Doctoral Thesis in Social Sciences, University of Delhi, New Delhi, India.

21. Krishnaveni, N. (AcharyK.)andMalaviya, R. (2007). Study on Inclusion, Integration and Special Schools for Autistic Children, XXVII Biennial Conference of HSAI, (2007) Expanding Horizons for professionals in Family and community Science, Organized by The Home Science Association of India and Govt. M.H.college of Home Science and Science for Women, Jabalpur, Madhya Pradesh.

22. Krishnaveni, N. (AcharyK.)andMalaviya, R. (2008). Abilities in autistic children and their relevance in special education. In Excellence in Home Science: Contemporary Issues and Concerns, Compendium of Papers (pp. 472-476). Lady Irwin College, New Delhi.

23. Krishnaveni, N. (AcharyK.)andMalaviya, R. (2009). A Study on Teaching and Leaning Strategies Followed by Special Educators and Parents for Children with Autism in Delhi, The Magical Years, In A National Workshop on Early Learning and Intuitive Teaching, Katha in Collaboration with NUEPA, The Katha Holistic Early Learning Center, Sarvodaya enclave, Sriaurobindomarg, New Delhi.

24. Lang, Margaret, Fox and Lise (2004) Breaking With Tradition: Providing Effective Professional Development for Instructional Personnel Supporting Students with Severe Disabilities, *Teacher Education and Special Education*, v27 n2 p163-173

25. Marmar Mukhopadhyay and Madhu Parhar (Ed.) (2016), Education in India: Dynamics of Development, 2^(nd) impression, Shipra Publications.

26. Mini Mathew and P.S. Sukumaran, Functional Abilities of Adults with Intellectual Disability, Disabilities and Impairments Volume 32 (1) 2018, pp. 63-75, Akshat Publications

27. Ncube A. C. (2006) Challenges Faced by Learners with Severe Intellectual Disabilities in the Acquisition of Adaptive Behaviours: Insight from Teachers of Special Classes in Zimbabwe, Published: Journal of Emerging Trend in Educational Research and Policy Study

28. Ncube, A.C. (2006). Some major problems of children with severe learning difficulties in developing adaptive behaviour: some implications for teachers. Unpublished research paper: Schools Psychological Services and Special Needs Department, Zimbabwe

29. Panerai, S., Catania, V., Rundo, F., and Ferri, R. (2018). Remote Home-Based Virtual Training of Functional Living Skills for Adolescents and Young Adults With Intellectual Disability: Feasibility and Preliminary Results. *Frontiers in psychology*, *9*, 1730. Doi:10.3389/fpsyg.2018.01730

30. Rena B. Lewis and Donald H. Doorlag (1995), Teaching Special Students in the mainstream 4^(th) Edition, Merrill, an imprint of Prentice Hall, Englewood Cliffs, New Jersey

31. Addlakha R and Stuart Blume et. Al. (2009) Disability and Society, Orient Black Swan, Pvt. Ltd. New Delhi.

32. Sharma Y.K. and Sharma M. (2006), Educational Technology and Management Vol. 2, Kanishka Publishers.

33. Sharma, S., Achary, K.,Kaur, H., Linna, J., …&Daeeyya, S. "Wow! You're Wearing a Fitbit, You're a Young Boy Now!": Socio-Technical Aspirations for Children with Autism in India. ASSETS'18. ACM.

34. Sharma, S., Srivastava, S., Achary, K., Varkey, B., ... & Rajput, N. Gesture-based Interaction for Individuals with Developmental Disabilities in India. ASSETS'16. ACM.

35. Sharma, S., Srivastava, S., Achary, K., Varkey, B., ... & Rajput, N. Kirana: A Gesture-based Market App for Life Skills Learning for Individuals with Developmental Disabilities. ASSETS'16. ACM.

36. Sharma, S., Srivastava, S., Achary, K., Varkey, B.,...& Rajput, N. Promoting Joint Attention with Computer Supported Collaboration in Children with Autism. CSCW'16.

37. Smith M.G. (2000). Secondary teachers perceptions towards inclusion of students with severe disabilities Volume: 84 issue: 613, page(s): 54-60Issue published: February 1, Sage publication.

38. Stanovich K. E.and Stanovich P. J. (David D. Press and Robert J. Sternberg) (2010), Innovations in Educational Psychology, Perspectives on Learning Teaching and Human Development, Springer Publishing Company, New York

39. Susan Hart Bell, Victoria Carr, et. Al. (2004), Challenging Behaviours in Early Childhood Setting – Creating a place for all Children, Paul H. Brooks, Publisher Co. Maryland

40. Vaishnava Narang (Ed), Reddy S.D, (2013) The Significance of Pragmatic Competence for Effective Communication pg.307, Issues in Learning Theories and Pedagogical Practices Vol.II , Orient Black Swan.