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UDL based accessible e-content for inclusive classrooms: End user experiences

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Abstract
National Policies and Schemes have paved a way for children with special needs to access education according to their learning needs. To achieve inclusion of all children in regular classrooms, a flexible approach in curriculum and pedagogy is needed. Inclusive classrooms have learners of different backgrounds, preferences and abilities. Therefore a Universal Design would provide opportunity and flexibility to all learners. UDL based approach ensures that all learners should engage in learning and comprehend the concepts in their own way. Therefore UDL framework has been emphasized by the NEP 2020, so that comprehensive range of students can get specialized accommodations in learning rather than 'retrofit' (Rose & Meyer 2002) teaching practices.

In accordance with NEP 2020, a lot of accessible content has been developed by CIET NCERT, following the principles of UDL, to provide educational e-Content to every nook and corner of the country through online as well as offline modes, to sustain inclusive and equitable education.

But merely developing content would not be enough for understanding its impact on holistic development of children with special needs. Dissemination of this content and analyzing its impact is likewise significant. The present study was conducted to understand the accessibility and awareness of UDL based e content among the stakeholders in the schools of Delhi. The data was collected from the schools with the help of researchers' made questionnaires, observation and feedback form. Both special educators and teachers working in the schools of Delhi were found to be well-aware of UDL based e content. However, many challenges related to infrastructure were faced during integration of this content in the classroom teaching learning process.

Keywords: UDL, NEP 2020, rose, CIET NCERT

Introduction
Inclusive schools welcome children with various abilities, disabilities as well as learning styles. Therefore 'one style fit for all' would not work in an inclusive classroom where learners are from different learning styles. A high level of poverty in India has been a real challenge for the implementation of inclusive education. In spite of recent and economic development, poverty is rampant in India. (Das & Shah 2014) [5].

Several policies and frameworks, like National Education Policy (NEP) 2020 [11], Samagra Shiksha, Rights of Person With Disabilities (RPWD) 2016 and Right To Education Act RTE 2009, have paved the path towards making quality education accessible for every child. Despite the well-meaning policies in place, much needs to be done at the ground, as indicated by research. Schools of Delhi 70% in-service teachers lack training in disability studies and addressing the related special education needs and 87% were found to have no support from management for inclusive pedagogy practices (Das & Kuyini 2013) [5].

The motto of NEP 2020 is "no child left behind", and to provide education at all levels in an equitable and inclusive environment. This in turn opens the opportunity for implementing the Universal Design for Learning (UDL), so that needs of individual learner is addressed in comfortable manner. UDL was developed by Ron Mace and his colleagues at North Carolina State University, in 1988 (CUD 2008) and Center for Applied Special Technology (CAST) reflected upon its applicability and effectiveness in the learning environment.

Understanding UDL
UDL is a pedagogical design theory that recognizes variability across and within learners, both in physical classrooms and with online learning materials (Rearick, B. *et al*., 2021) [9]. It applies concerns of accessibility and inclusive education settings beyond physical environments, so that varied, accessible, multiple (David Black. R. 2015) [6] and engaging,

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teaching and learning opportunities may be designed, for *all* students, including those with diverse needs arising due to disabilities or other disadvantages. (Dalton. E.M 2019) [3].

UDL has three major principles, based on brain research on cognition and learning (Rao, K., & Meo, G. 2016) [8], which has shown that individuals process information in varying ways.

1. **Multiple ways of Representation:** Information and content in the classroom should be delivered through multiple formats, such as, text, audio, video and hands-on learning activities, ICT based, Kinesthetic, animation and print, so that all students can access learning materials as per their needs and preference.
2. **Multiple means of Action and expression:** Provides opportunity to all students to interact or express themselves in multiple ways. The main idea here is to go beyond paper pen/pencil and allow students expression via theater, arts and craft, presentations, debates, models etc.
3. **Multiple means of Engagement:** Engage learners in the same concept via different means of engagement and action such as games, activities, ICT based, individual, group, etc.

UDL based content facilitates the accessibility of contents to every child, as the content is available in multiple formats. The focus is on inclusive education settings and inherent flexibility of content formats for representation, expressions and engagement. It promote the students to learn at their own pace and track their performance.

Rationale of Study: India recognized 21 disabilities, according to the "The Rights of Persons with Disabilities Act", 2016. RTE 2009 has ensured access education in nearby schools for every child between the age group of 6 to 18 years, including CWSN.

NEP (2020) [11] has emphasized on developing UDL based accessible teaching-learning material for all children and recommends that for hearing impaired students, curriculum-based material should be developed in ISL (Agrawal A. *et al*. 2014) [1].

Following the principles of UDL, CIET NCERT has developed ISL videos, dictionary, glossary, Basha Sangam, audio books etc. It also broadcasts special live interactive programs on teaching-learning interventions for inclusive classrooms. These e-Contents are curated following a well-established systematic process and being shared with stakeholders through DIKSHA (Digital Infrastructure for School Education), e-Pathshala, NROER, and PM eVidya DTH-TV channels and radio broadcasts. However, mere development and dissemination of UDL based e-Content will not provide the insights regarding the end user experiences. It is important to understand how well these interventions achieve the desired goal of inclusivity for children with disabilities, studying in inclusive classrooms. In the background of above arguments and reviews of literature, the present study was visualized in the state of Delhi.

Specific Objectives of the study
1. To investigate the awareness about the UDL based e-

Content such as ISL videos and audiobooks developed by CIET-NCERT among the students and teachers.
2. To gather the feedback of teachers, special educators and students' engaged with the UDL based accessible e-content.

Sample
The population for the study was all inclusive and special schools having children from foundational and preparatory stage. Purposive sampling was used to select participating schools from Delhi.
1. Regular teachers =16.
2. Special educators=30.
3. Students=188.

Methodology
On the basis of review of related literature and discussions, drafts of tools were prepared by the researchers, for collecting data from the teachers, special educators and students. Draft tools were then vetted by the team of experts.
▪ Questionnaires for teachers and special educators
▪ Feedback forms for students

Data Gathering Process
For collection of data, the Google forms were prepared in Hindi and English language. An orientation meeting was held in each participating school, with the teachers and special educators, to make them aware of the
▪ Present research.
▪ Their role.
▪ The process of accessing the UDL based e content from DIKSHA portal.
▪ To initiate the filling of the questionnaire.
▪ Providing clarifications and resolving queries.

Paragraph below presents the item wise data analysis, satisfying the objectives of the study.

Objective 1
Awareness about the UDL based Accessible e Content developed by the CIET-NCERT.
This was studied in terms of participants' understanding about the UDL and their familiarity with CIET-NCERT developed UDL based e-content.

Understanding about UDL
The participants' understanding about UDL was gauged by asking them about the various features that an e-content developed following the principles of UDL should have. The assumption behind was, if the content can be used for engaging all students including students with Hearing Impairment and Visual Impairments then it may be called as a sample of UDL based e-content.
The graph below presents the opinion of the responding regular teachers as well as the content teachers about the nature of UDL based e-content.
Item no. 1. A video including sign language translation and audio with closed captions one of the forms of UDL based e-contents? (Y/N).
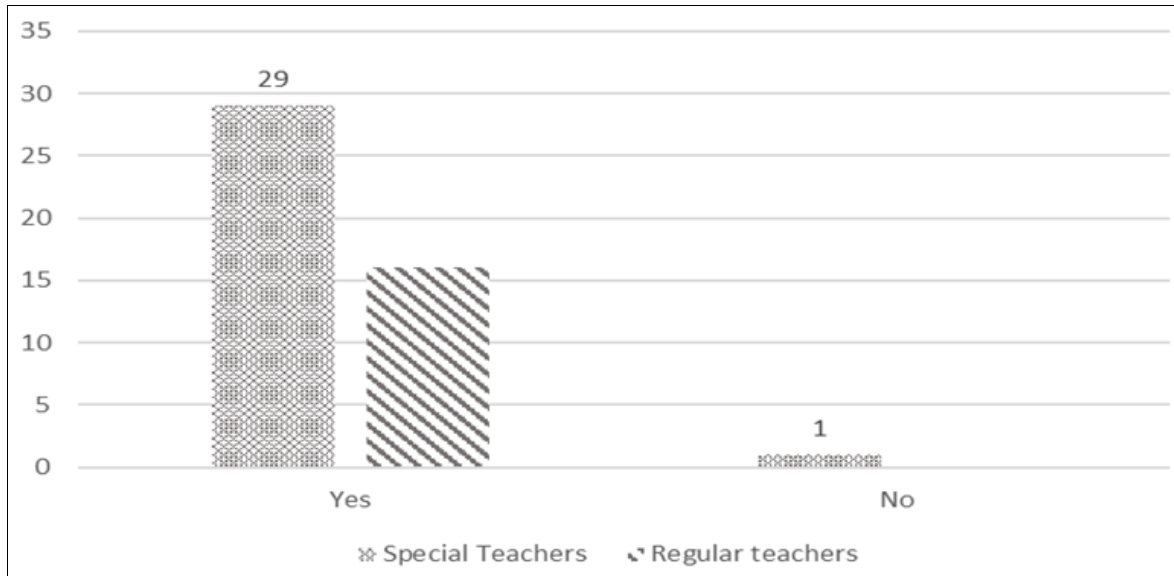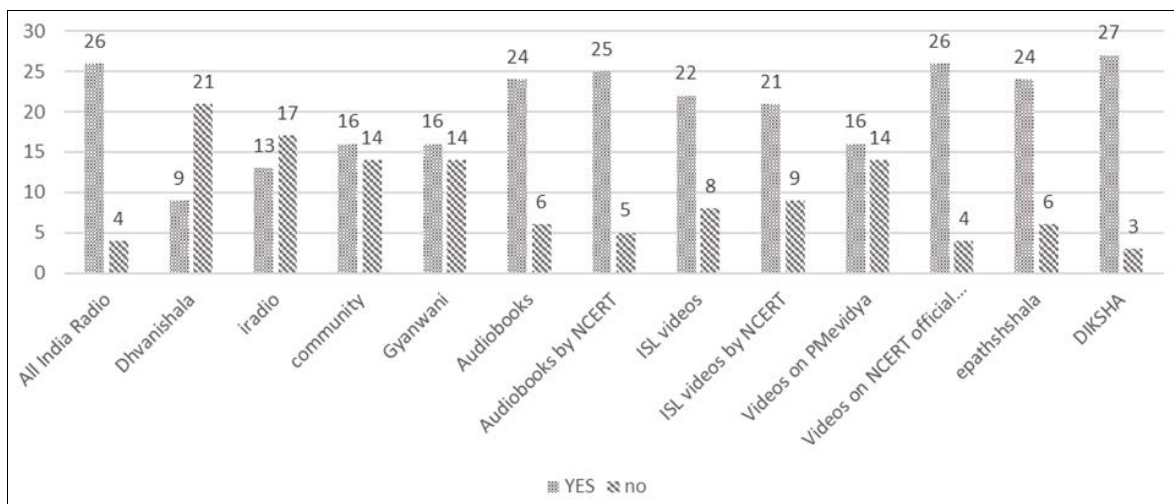
Graph 1: Nature of UDL based e-content

Hundred percent of the responding regular teachers and 96% of the responding special teachers were able to correctly identify the nature of the e-content developed as per the principles of UDL.

Next the regular teachers and the special educators were asked to identify the digital platforms and the digital content being used in the country from the list provided. The data analysis was done separately for the regular teachers and the special educators and the graph below presents the observations in brief.

Item no. 2. Are you aware of the following?

Graph 2: Digital platform and digital content awareness Special teachers
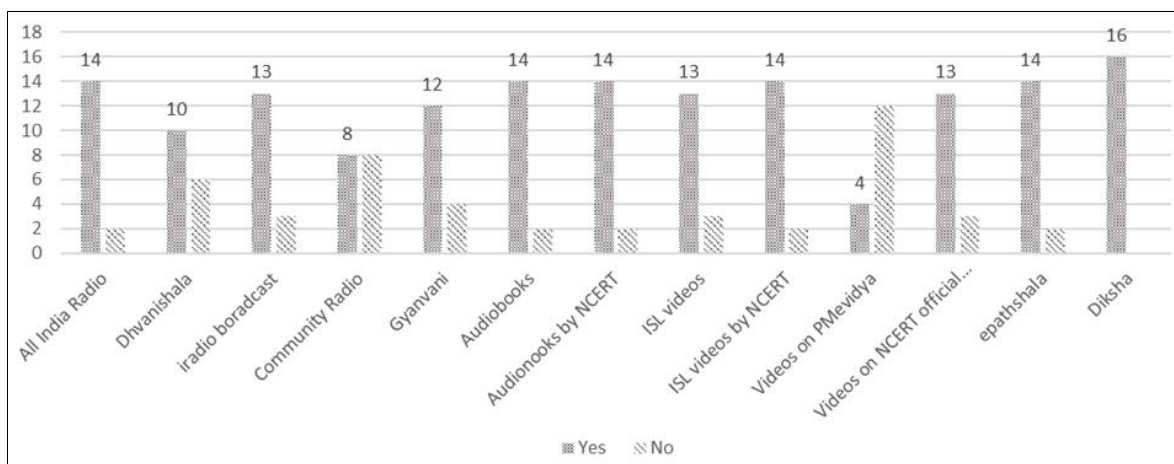
**Graph 3:** Digital platform and digital content awareness General Teachers

Hundred percent of the responding regular teachers and 90% of the responding special teachers were found to be aware of the DIKSHA–Digital Initiative for Knowledge Sharing. This item aimed to satisfy objective two by gauging the awareness of the respondents regarding the UDL based e-content developed by the CIET-NCERT. Therefore the list provided also included the audio books and ISL videos made by NCERT. Data analysis revealed that, the majority of respondents, that is, 87% of the responding general teachers were aware of the audio books and ISL videos developed by NCERT and 76% of responding special teachers were aware of the audio books (83%) and ISL videos (70%) developed by the NCERT. Therefore, based on the data analysis, it may be stated that the majority of the special teachers and the general teachers

were found to be aware of the UDL based e-content developed by the NCERT.

Objective 2
To gather the feedback of teachers, special educators and students' engaged with the UDL based accessible e-content. This was studied by gathering the challenges faced by teachers and special teachers in the usage of UDL based e-content developed by CIET NCERT and the user experience of students. Moreover the special educators were also asked to share their opinion about the recommendation of this UDL based e-content to regular teachers.

Item no. 3: What are the challenges you face while accessing/using UDL based e-content?
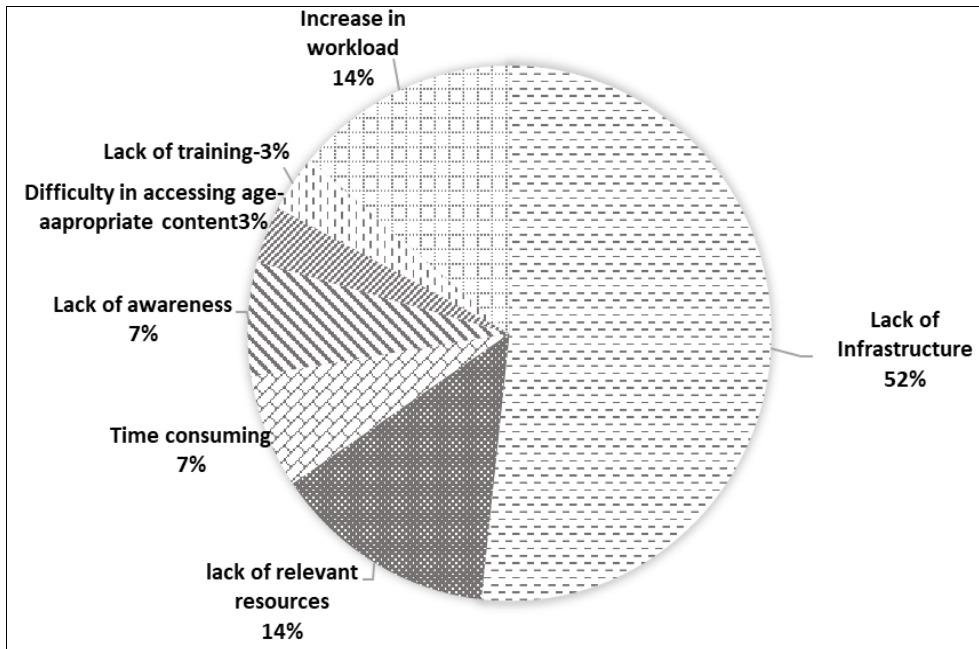
**Graph 4:** Challenges Special Teachers
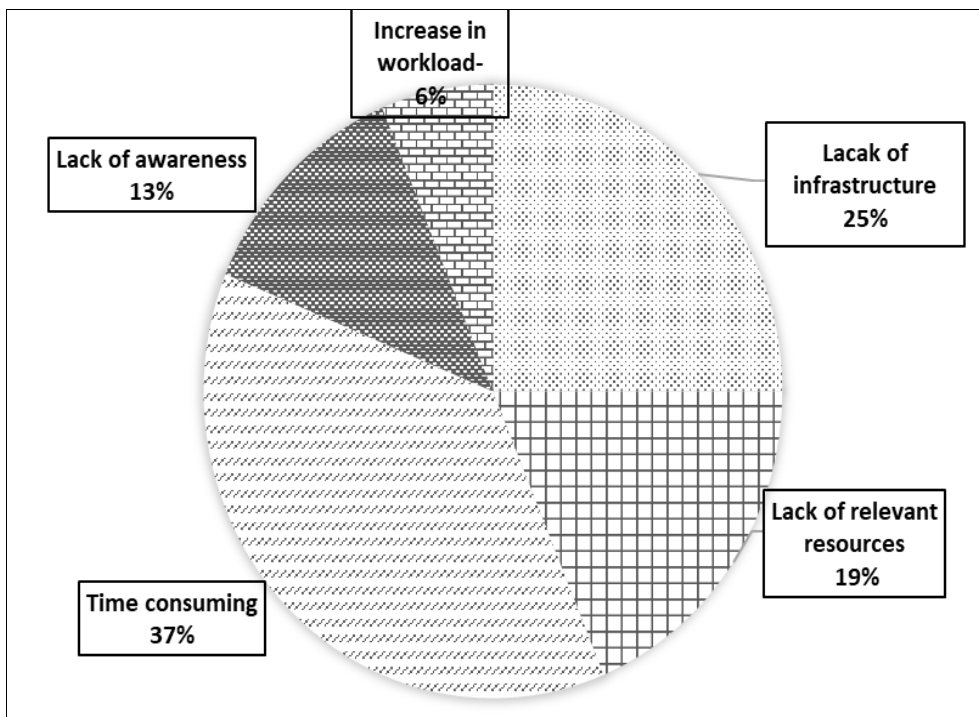
Graph 5: Challenges General Teachers

The lack of infrastructure was found to be a major challenge for responding special teachers (51%) and general teachers (25%) in using UDL based e content whereas the general teachers (37%) opined that using UDL based e-content would be time consuming in comparison to (6.9%) special teachers. Based on the graph 4 and graph 5 it could be inferred that for special teachers major challenges lie in lack of infrastructure, increase in workload (13.8%), and lack of relevant resources (13.8%). On the other hand the general teachers felt that the difficulties exist in the form of time consumption, lack of infrastructure, lack of relevant resources (18.8%) and lack of awareness (12.5%).

Item no. 4: How likely are you to recommend the use of the following to general teachers?
This item aims to assess the feasibility of repeated usage of the UDL based e-content developed by CIET NCERT, in the field and through recommendation by the special teachers. The opinion of special teachers gathered is represented in the graph below.
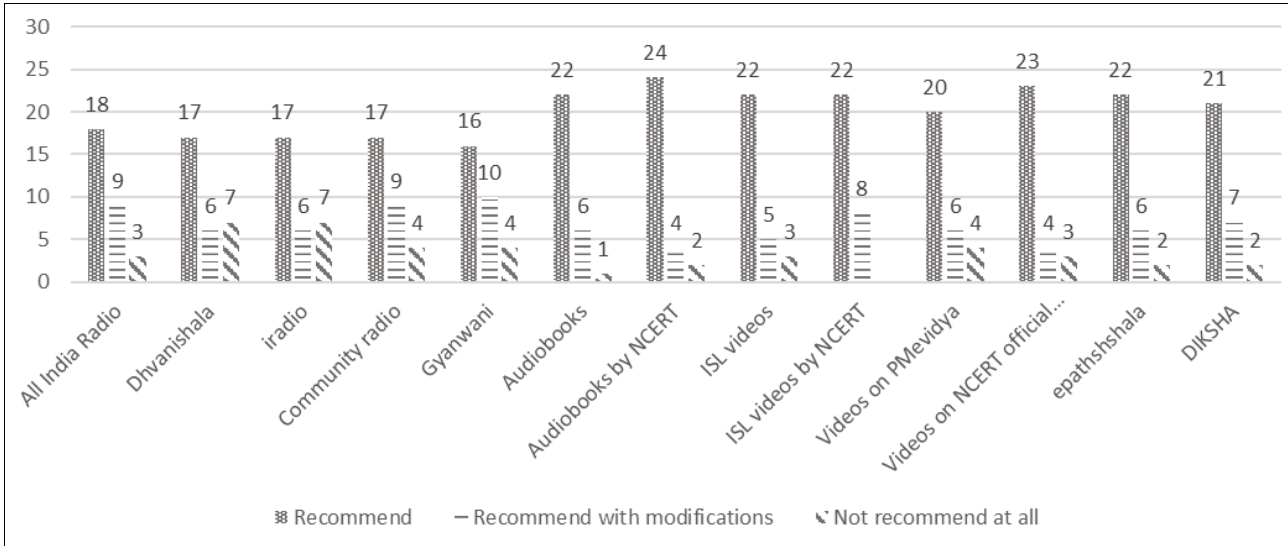

Graph 6: Possibility of recommendations by Special Teachers

The majority of the responding special teachers were found to be in favor of recommending the ISL video and audio books developed by the NCERT, to the fellow regular teachers for use in their classrooms.

Students Responses
188 students were asked to share their experience of the UDL based e content developed by the CIET NCERT. The graph below presents the experiences shared by the students–
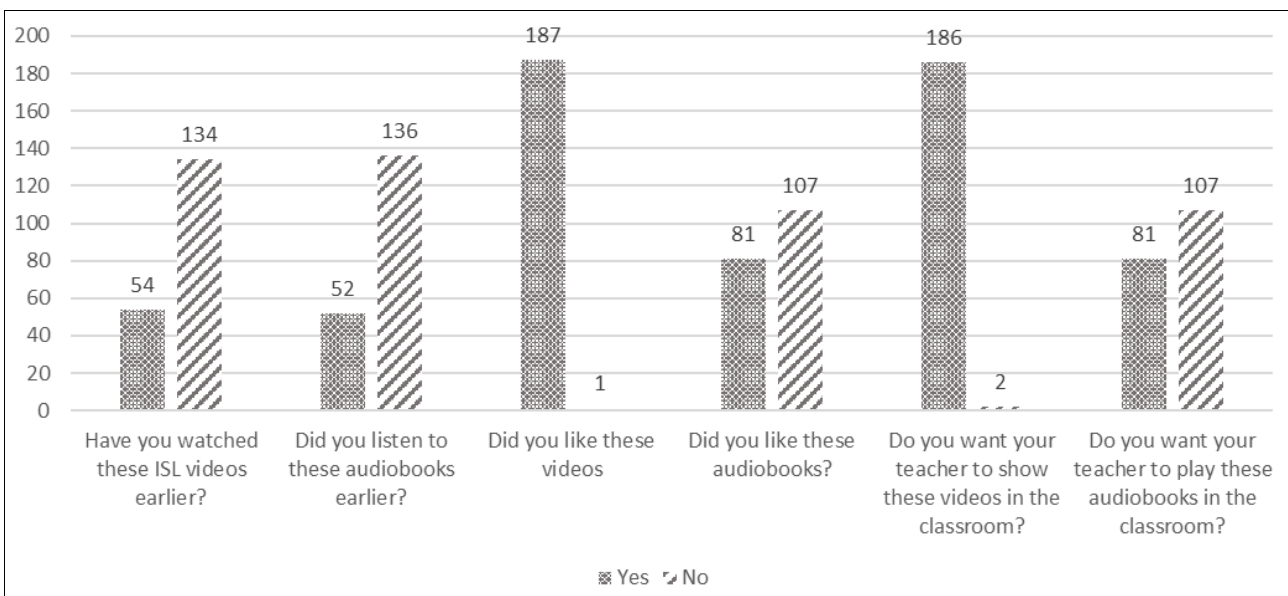
Graph 7: Experience of students'

Prior to this study most of the responding students were found to have no experience of the audio books (72%) and the ISL videos (71%) developed by the CIET NCERT. Majority of the students have liked the ISL videos (99%) developed by NCERT but do not find audiobooks (57%) interesting. Most of the responding students want their teachers to show the ISL videos (98%) in the classroom while only 57% of the responding students desire to listen to audiobooks played by teachers in the classroom. Based on this, it can be inferred that the majority of students are in

favor of using UDL based ISL videos in classrooms.

Major observations

- Most of the regular teachers (100%) and special teachers (96%) were aware of the nature of the UDL based e-content.
- Majority of the responding general teachers (87%) and special teachers (76%) were aware of the audio books and ISL videos developed by NCERT.
- Special teachers opined that major challenges lie in lack of infrastructure (51%), increase in workload (13.8%), and lack of relevant resources (13.8%).
- General teachers felt that the difficulties exist in the form of time consumption (37%), lack of infrastructure, lack of relevant resources (18.8%) and lack of awareness (12.5%)
- Special teachers were found to be in favor of recommending the ISL video and audio books developed by the NCERT, to the fellow regular teachers for use in their classrooms.
- Majority of students were found to be in favor of using UDL based ISL videos in classrooms

Conclusion

Inclusion is accepting all diversity. It is about restructuring the cultures, policies and practices in schools so that they respond to the diversity of students in their locality. (Bindal and Sharma 2010) [2]. NCERT has taken initiative to provide resources for implementation of UDL based learning approaches. And also continuously making efforts to make its content approachable, accessible and meaningful. The present study provides insights about the reach and feasibility of usage of UDL based e-content at the ground level. The findings clearly show that teachers, students and special educators are well aware of ISL content developed by NCERT. However the biggest challenge lies in resolving the issue related to infrastructure.

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