

Research Article

Challenges of Learners with Disabilities in Open Schools in India

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Arranging Education for all with equity and equality had been one of the biggest challenges in India. Despite having RTE (2009), 77 million children were not enrolled with the regular system and such exclusion was commonly observed in marginalised categories like People with Disabilities (PwD), girls, and people belonging to scheduled castes and scheduled tribes. As far as education in India is concerned, Children with Disabilities (CwDs) are observed as the most vulnerable group which requires special attention through special provisions. Census 2011 reveals that 46.2 lakhs is the population of children with disability that lies in the age group of 10-19 years. Out of this population, 27% never attended school, and 12% attended school earlier. Also, 54% of children with multiple disabilities never attended any educational institution. Furthermore, researchers communicated that after the drop out from mainstream schools, most of the learners either leave education altogether or join the open school system. Hence, it becomes imperative to have a strong open education system in the country so that it welcomes and caters the needs of children with disability in the best possible manner that enhances their academic aspirations.

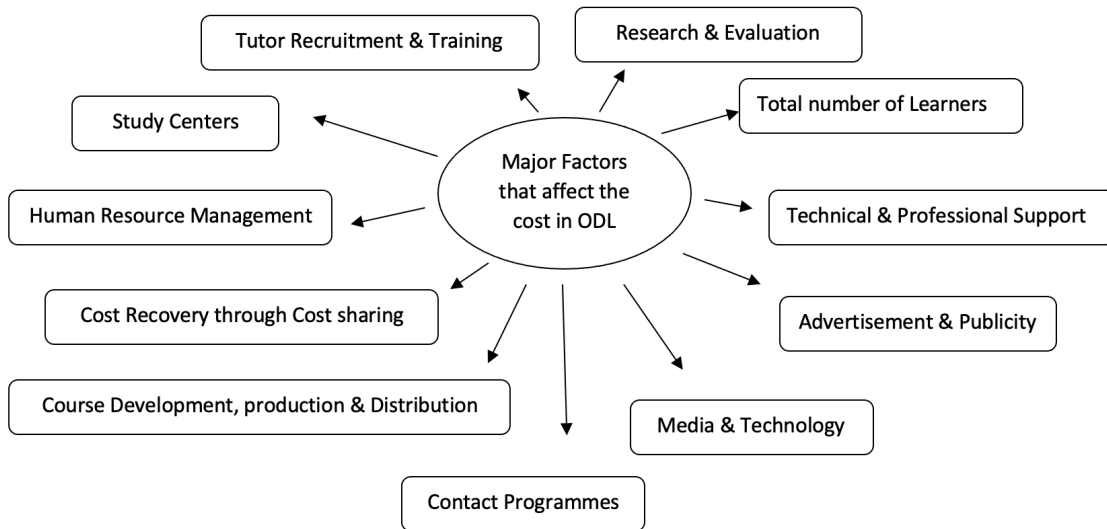
This study aims to improve the current practices of existing open schools and carried out this research in two phases. In the first phase, the researchers intended to explore the concerns and problem areas of the learners in open school and in the second phase an intervention programme was provided to the learners. Hence, basically, this paper shares the findings of the two small-scale pieces of research and is presented in two sections. The first section presents the challenges and the other section shares the outcome of the intervention which was provided to the learners based on the findings of the first section's research. For the research, the authors selected the sample from one of the open schools in India i.e. the National Institute of Open Schooling. The challenges of the learners were explored with respect to the following dimensions: -registration process, accessibility to study centers, study material, personal contact programmes, examination and support services

extended by the organisation. The sample was selected through random selection, 50 learners with different disabilities were selected and a questionnaire was used to gather the data. The questionnaire was translated into three languages i.e. English, Hindi and Indian Sign Language and was shared with the sample through different means video format, personal interaction and hard copy. The findings of the study revealed that most of the learners were facing challenges majorly in accessing the textual study material of open school and attending the examination. Further based on the survey findings, to increase the content accessibility, a modification of one of the chapters of X grade Science subject, topic 'AIR' was done. 15 learners with disabilities were selected through purposive sampling and the effectiveness of the modified content was assessed. The post-test administered at the end of the intervention revealed that 80% of the learners agreed that the 'modified content' was easy to understand, memorise and recall. This research outlines a series of recommendations which includes the need of being more focussed on the presentation of textual material shared with the learners, modification in the ways of taking examinations and a learner-centric support system at open schools. It is further suggested that the content must be prepared and presented on the universal design of learning and the learners must be allowed to take the examination through different modes i.e. verbal, non-verbal (sign language) and written, whichever the learner is comfortable at. Moreover, it is also suggested that special education and related services along with guidance and counselling cells at study centers must be taken into consideration for the psychological well-being of the learners with disabilities enrolled with the open school system.

1. Introduction: Open and Distance Learning, The Non-Traditional Schooling

With a vision to have India as a global knowledge superpower, the National Education Policy 2020 (NEP, 2020) acknowledged the role of Open and Distance Learning (ODL) system in fostering the unique capabilities of each learner in India. ODL system plays a major role in implementing the Education policies as it widens the access to Education, be it at school level or higher level. The intensifying call for quality education at all the levels obliges expansion of ODL through different means. The flexibility in learning, cost-effectiveness, learning satisfaction, access, migration problem, multiple certifications etc. make the ODL system, a need of an hour of dynamic learners of

today's times. The potentialities of the ODL system are hard to ignore as it contributes to expand learning opportunities in different areas (Wordu, N., 2022). ODL system plays a major role in providing the scope of fostering the unique capabilities of the learner and implementing the Education policies at a larger level. Moreover, in current times, technological intervention has made the ODL system one of the most rapidly growing education systems nowadays. The extensive reach and access of ODL have made this parallel and alternate education system widely accepted across the Globe (Ghosh, S. Et.al., 2012). It is substantially catering for the diverse needs of the learners by providing a diverse curriculum, varied means and modes of delivering the instructions, different ways of assessment and flexibility in content presentation. This system re-envision the role of education and promotes a barrier-free environment that focuses and promotes education and training that is free from all kinds of limitations. Modernization and development bring lots of opportunities, challenges and unpredictable situations in life. As the needs and challenges of today's learner are dynamic in nature, the expectations and delivery system of today's Education system are also expected to be dynamic. Also, the pandemic brought a paradigm shift in the ways of engagement and participation of every learner around the globe. The learning of learners of kindergarten to higher education is now not limited to working on interactive whiteboards or watching videos.



Some of the major factors that affect costs in Open and Distance Learning

2. Challenges of Learners in Open Schools in India

Arranging Education for all with equity and equality was the biggest challenge in India. Despite having RTE (2009), 77 million children were not enrolled with the regular system and such exclusion was commonly observed in marginalised categories like People with Disability (PwD), girls, people belonging to scheduled castes and scheduled tribes, etc. (UNESCO, 2019). Research proved that 97% of the PwDs do not have basic literacy skills (UNESCO, 2018). Hence, it was observed as a major concern and legislations and policies were placed as the legal intervention makes the process of bringing inclusion easier. Therefore, there have been consistent efforts from the Indian government and education system to make India a potential educational landscape with global standards.

Primarily, open and distance learning setups have intentions to cater for the needs of the learners belonging to marginalised, under-served or not served at all, by the current education system (Tanyanyiwa, V. et.al., 2021). Open schools provide a platform to those who are majorly affected by the social, emotional, physical, psychological, attitudinal, economic and structural circumstances in life (Abdul Ghafar et.al., 2021 and Gnawali, Yagya et.al., 2022). However, how promising the contributions of open schools in India, there are certain challenges which learners do encounter during the course of study (A.M., 2015). In this paper, the challenges are categorised as academic, infrastructural, information sharing and administrative-related challenges (figure 1). The academic challenges include options in courses offered, lack of complete knowledge of the future relevance of the courses, relevance of the open school curriculum, the content of study material and its presentation, assessment procedures etc. The infrastructural challenges of the learners include problems pertaining to reaching the study centers, the distance between home to the regional center or head office, classrooms of contact programmes, washrooms of study centers etc. Moreover, the information-related challenges especially highlight the service culture and support mechanism of open schools. It focuses on the lack of directions and on the need for the sharing of information/ updates at the right time. The administrative-related challenges cover problems related to lack of technical assistance, problems in the admission and registration process, too much dependency on internet cafes due to online services of open schools, lack of proper distribution of study material and delivery of marksheet/certificate, problems in assignment submissions, improper marketing and promotion of the institution, etc.

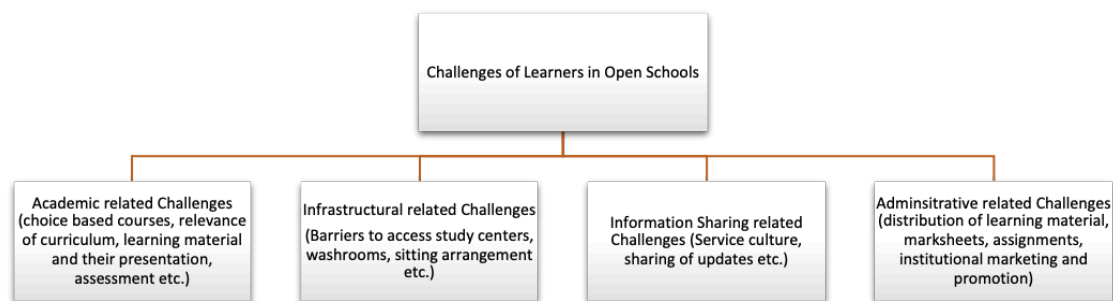


Figure 1. Major Challenges faced by the Learners in Open Schools in India

3. Educational Provisions for CwDs in reference to provisions at the National Institute of Open Schooling (NIOS), India

Many modifications are brought into the system with respect to having better inclusion of learners with different disabilities in the open and distance learning environment. Some of the reasonable accommodations and facilities given at various open schools in India are:-

1. Provision of additional time: Extra 20-30 minutes in the examination with short breaks in between.
2. Provision of Amanuensis: Permission to have a scribe, reader, lab assistants, and Sign language interpreters to take the examinations.
3. Provision to use of Assistive Devices: Learners are allowed to use computers, having text to speech, speech-to-text software, Braille typewriter, talking calculators, talking abacus, Taylor frame, geometry drawing kit, use of adapted hardware like trackball instead of a mouse, augmented communication board, use of adapted chair etc.
4. Provision of change of exam centers and seating arrangement
5. Provision of alternate questions
6. Provision of the presence of near and dear ones during the exam.
7. Special study centers for learners with disabilities like NIOS have SAIED centers, with special arrangements for disabled learners.

4. The Research

The aim of this research was to improve the current practices of existing open schools in India. This study was carried out in two phases. In the first phase, the researchers intended to explore the concerns and problem areas of the learners in open school with a special focus on the learners with disability and in the second phase an intervention programme was provided to the learners, therefore, the effectiveness of the intervention was assessed at the end. Suggestions were made at the end on the basis of the findings.

5. Statement of the Problem

To study the challenges of the Learners with Disabilities enrolled in Open Schools in India

6. Research Questions

Since the enrolment of learners with disability in India is comparatively high in open schools than the regular ones, it is quite imperative to know the current structure of open schools and how learning at open schools in India be improved for the CwDs. Hence, the researchers initiated the study with the following research questions:-

- What are the challenges of learners with disability in open schooling?
- How the content of the courses offered at open schools be made more accessible?
- Would the content designed on Universal Design of Learning be successful for open school learners?
- What is the effectiveness of the content prepared on UDL principles on the understanding of learners with disability?

7. Objectives of the Study

- To explore the challenges of Learners with disability studying in open schools.
- To develop a sample content on UDL principles for the Learners with Disability studying in open schools.
- To observe the effectiveness of the content developed on UDL principles on the understanding of Learners with Disability.

8. Delimitations of the Study

The study had the following delimitations:-

- The study is delimited to open school learners only.
- The study explored the concerns and challenges of Learners with Disability only.
- The effectiveness of the developed content on UDL principles was assessed on the learners of the National Institute of Open Schooling only.

9. Research Methodology

This research had a mixed method research paradigm consisting of qualitative and quantitative tools for data gathering and means of data analysis. The research was carried out in two phases. The first phase of the research had a survey design that focussed on exploring the challenges of the learners with disability whereas the second phase had a quasi-experimental design, with two groups; control and experimental groups, pre-test, and post-test design. 2 stage sampling was done for sample selection. For the first-level survey research, random sampling was done. However, for the second stage of experimental research, purposive sampling technique was adopted.

About the Institution

National Institute of Open Schooling

National Institute of Open Schooling (NIOS) is determined to work in the area of expanding learning opportunities in different domains and contributing to enhancing enrolment retention, vocational competency and life skills. NIOS is striving to maintain a symbiotic relationship between demand and supply by preparing and training the people as per their individual and societal needs (Mahapatra, S., 2016).

Special Accredited Institutions for Education of the Disadvantaged (SAIED) Centers of NIOS

The NIOS has recognised institutes for the education of the underprivileged in order to meet the requirements of those with physical or mental disabilities. Through SAIED, academic courses like open basic education (OBE), secondary and senior secondary courses, and vocational courses are provided on their own or in conjunction with other academic subjects.

The approximate enrolment data of the learners with different disabilities in the last 4 years (2018-2021) reveals that there are quite a good number of Learners with Disabilities (LwDs) enrolled with NIOS. The data is as follows:-

Number of learners enrolled with NIOS	Type of Disability	Year of enrolment				Total
		2018	2019	2020	2021	
	Acid Attack Victim	0	2	2	2	6
	Autism	275	311	348	295	1229
	Cerebral Palsy	167	217	187	168	739
	Chronic Neurological Condition	-	21	18	9	46
	Dwarfism	-	5	3	6	14
	Hearing Impairment	850	1180	807	599	3436
	Hemophilia	-	6	4	3	13
	Intellectual Disability	642	1185	1043	886	3755
	Learning Disabilities	945	1166	905	578	3594
	Leprosy Cured	33	19	23	10	85
	Locomotor Disabilities	1790	19126	470	254	21640
	Low Vision	3	600	90	89	782
	Mental Illness	55	45	57	33	190
	Multiple Disabilities	252	225	177	109	763
	Multiple Sclerosis	-	10	8	1	19
	Muscular Dystrophy	1	78	31	37	147
	Parkinson's Disease	-	1	1	2	4
	Sickle Cell Disease	-	6	1	0	7
	Speech and Language Disability	1	34	26	29	90
	Thalassemia	-	4	8	1	13
	Visual Impairment (Blindness)	267	232	166	124	789

Table 1. Enrolment data of NIOS: Learners with disability (2018-2021)

The above data in Table 1 highlights that NIOS has learners with different disabilities. The disability category here in the above table covers almost all the disabilities listed in the RPwD Act, 2016 of India.

The data reveals that there are more numbers of learners enrolled with locomotor and hearing impairment in the last 4 years whereas the learners with Parkinson's disease, sickle cell anaemia and acid attack are quite low in number. And, if the pattern of enrolment of learners is studied, it is found that in the year 2021, comparatively the admissions were less. Though, in the year 2021, the learners with intellectual disabilities, hearing impairment and learning disabilities are found to be in significant numbers. Such signi

The above data from the last 4 years reveals the enrolment data of the learners with different disabilities with NIOS, it is observed that NIOS have quite a good number of learners with disabilities enrolled. Moreover, if the total enrolment status of learners with intellectual disability, mental illness, learning disabilities, multiple disabilities, cerebral palsy and autism is observed, it is found that approximately 10, 316 learners are enrolled with the NIOS who all require content to be presented in modified and adapted form.

Sample

The learners of the National Institute of Open School were selected as a sample in this research. The data of enrolled learners who were having a disability was taken from the organisation and a list of the same was prepared. Randomly 75 learners were approached for the study. 58 of them gave their consent to be part of the study. But, as per the availability and other factors, the final sample constituted of 50 learners with disability. A sample of 50 learners was prepared. For a better understanding of the sample, the questionnaire was administered to the sample through different means i.e. explanation of the statements through Indian Sign Language, simple statements in written format and verbal explanation of the statements in face-to-face meetings. The data gathered through the questionnaire was analysed through percentage analysis. Out of these 50 learners, purposively, 15 were further contacted for the intervention programme. These 15 learners were again divided into two groups (control group and experimental group) having 7 learners in each group. Before the start of the intervention, the knowledge of the groups on the chapter 'Air' was assessed through the pre-test. The control group was asked to study the chapter 'Air' of grade X through the textbook (NIOS textbook) provided to them whereas the other group was given the modified content of chapter X which was developed by the researchers on the universal design of learning (placed as annexure). The learners

were given the time of 15 days to study the content. After a period of 15 days, the learners were asked to attempt a post-test. The results of the post-test of both groups were compared and the findings are presented in the analysis section.

The following tools were used in the study to gather the primary data:-

- Questionnaire,
- Content on UDL principles, and
- Pre-test and Post-test tools

The questionnaire was prepared on the following 06 domains:-

- Registration process, accessibility to study centers, study material, personal contact programmes, examination and support services extended by the organisation.

The validity of the questionnaire was established by 4 experts and necessary changes were made to construct the final draft of the tool. The sample content on UDL principles of Xth grade Science subject, topic 'Air' was prepared and validated by 03 subject experts. Pre-test and post-test tools were constructed, piloted and validated by the subject experts. The checklist for the content developers was made, piloted and validated by the 02 research experts.

10. Analysis, Findings and Interpretation

10.1. Objective 1: To explore the challenges of Learners with disability studying in open schools.

Findings: A questionnaire prepared on 5 domains was administered to 50 learners having different disabilities. The demographic profile of the learners is as follows:-

S.No.	Academic Level of Learners	Number of Learners	Type of Disability
1	OBE Level 3	12	Hearing Impairment, Intellectual Impairment and Visual Impairment
2	OBE Level 2	09	Intellectual Impairment and Visual Impairment
3	Secondary Stage	23	Hearing Impairment, Intellectual Impairment, Speech & Language Disability, Low Vision and Visual Impairment
4	Senior Secondary Stage	06	Hearing Impairment and Visual Impairment
Total	50		

Table 2. Demographic profile of the sample

A list of all the learners with disability was prepared and randomly some learners were contacted for the research. Majorly, learners with visual, hearing, locomotor and intellectual disabilities were taken in the sample and learners from the secondary stage were more as compared to other academic stages.

Dimension-wise analysis of the questionnaire was done.

Dimensions	Learners acknowledged Challenges	% of the Learners
Registration/ Admission to the course	24/50	48%
Accessibility to the Study Centers	18/50	36%
Accessing the Study Material	38/50	76%
Examination at NIOS	29/50	58%
Student Support System of NIOS	38/50	76%

Table 3. Dimension-wise analysis

The above table reveals that there are 76% of the learners with disability who acknowledged that they find problems in accessing the study material (textbooks) and experienced the student support system of the institution to be less available during their course of study. Further, on personal interaction with the sample, it was found that the content presentation of the textbooks of the organisation was felt to not be so comprehensible and easy to access to most of the learners. Also, 58% of the sample shared their concern about the examination. It was reported that the learners want the examination to be conducted in an accessible format. Some of the visually impaired learners stated that it is difficult to find a scribe to write the exams and expressed their wish of taking a verbal exam rather than a paper pencil exam. Likewise, learners with hearing impairment also expressed their concern about taking the exam in sign language. There were only 36% of the learners who acknowledged their problems with respect to study centers. Hence, it could be observed that the challenges pertaining to study material, support service and exams are high and accessing, assistance, sitting arrangement, and information sharing at study centers of NIOS were observed to be better as compared to others.

On disability-wise analysis, it was found that learners with intellectual disability and hearing impairment were facing more challenges as compared to others.

When the academic level-wise analysis was done, it was revealed that learners belonging to the secondary and senior secondary stages were found to have more challenges as compared to the others.

10.2. Objective 2: To develop sample content on UDL principles for the Learners with Disability studying in open schools.

Findings: The purpose of education is not to make information accessible, but rather to teach learners how to transform accessible information into usable knowledge. Decades of cognitive science research have demonstrated that the capability to transform accessible information into usable knowledge is not a passive process but an active one. **Constructing useable knowledge, a knowledge that is accessible for future decision-making depends not upon merely perceiving information, but upon active “information processing skills”** like selective attending, integrating new information with prior knowledge, strategic categorization, and active memorization. Individuals differ greatly in their skills in information processing and in their access to prior knowledge through which they can assimilate new information. **Proper design and presentation of information—the responsibility of any curriculum or instructional methodology—can provide the scaffolds necessary to ensure that all learners have access to knowledge.** One of the most effective ways to make information more

accessible is to provide explicit cues or prompts that assist individuals in attending to those features that matter most while avoiding those that matter least.

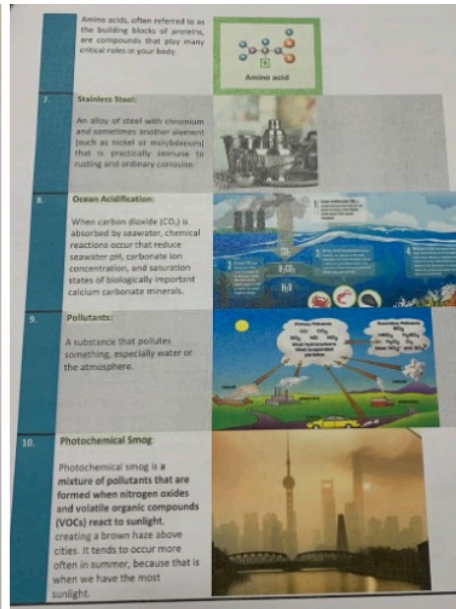
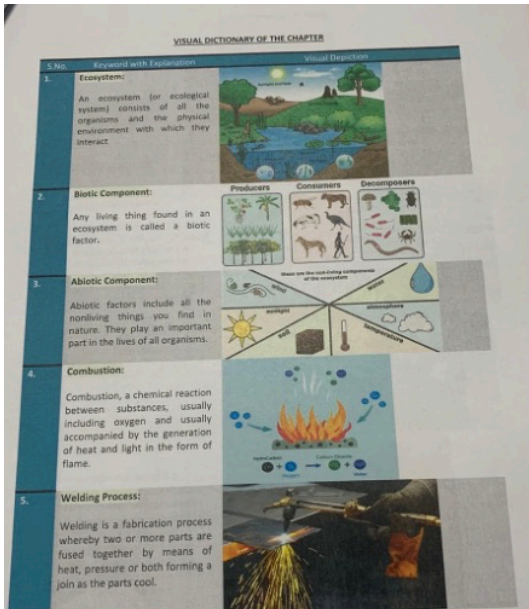
The ODL system promotes self-paced learning as it allows the learners to design their learning experiences on their own and use the materials and resources according to the availability of time, interest and learning preferences. Also, the learning resources of the ODL system are deliberately organised with learning stations and self-checks. Still,

it was found that the existing textual content of the NIOS seems to have a lot of scope for experimenting and bringing modifications as per the recent norms and principles suggested for preparing content for the LwDs. Also, to gauge the lacking point, the researchers attempted to design the existing (NIOS, Xth grade Science Book content) content on Universal Design principles. The modified content was prepared by keeping the following principles in mind:-

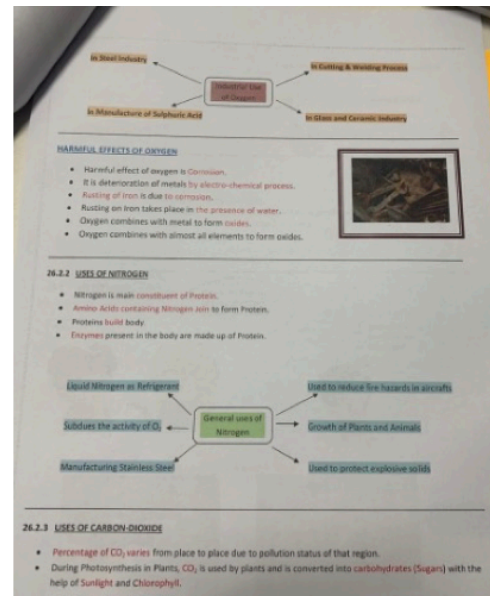
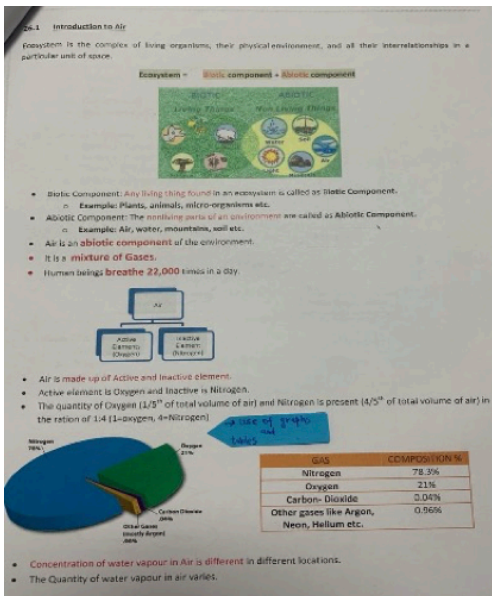
- Breaking down complex sentences into simpler ones.
- Visual dictionary of the Keywords of the chapter.
- Short sentences and pointers.
- Use of images, flow charts, tables, and graphs to comprehend better.
- Use of Mnemonics to memorize the concept.
- Simple In-text Questions to give the learners a sense of achievement, etc.

The preview of the modified chapter is as follows:-

1. The use of a visual dictionary (key terms) in the chapter



2. Use of simple sentences with highlights on important words of the sentence.
3. Use of Graphs, Tables and flow charts for better understanding and linking of concepts.
4. Use of pictures to comprehend the concept.



5. Use of Sciencetoons for the explanation of experiments.

There are many reasons for this. How can we verify the presence of Carbon dioxide in air? Let us do some experiment and understand the presence of CO₂ in air.

Aim: To show the presence of Carbon dioxide in Air.

Material required: A test tube/glass tumbler, freshly prepared lime water, a cork/thermo-cool (having two holes), two glass tubes/straw pipes bent at right angles.

*Fresh lime water can be made by soaking 10g of lime in water overnight.

Steps:

- Take about 4 ml freshly prepared lime water in a test tube.
- Fix a cork/thermo-cool (having two holes) to make it air tight.
- Fix the two tubes in two holes.
- One tube is dipped in lime water.
- Other tube remains above the lime water.
- Suck the air through the tube, which is not dipping in lime water.

What do you observe?

Limewater turns milky.

Right! The milky that is in CO₂ that turned the limewater milky.

Chemical Equation:

$$\text{Carbon dioxide} + \text{Lime water} = \text{Calcium Carbonate} + \text{Water}$$

$$\text{CO}_2 + \text{Ca(OH)}_2 = \text{CaCO}_3 + \text{H}_2\text{O}$$

How can we verify the presence of Carbon dioxide in air? Let us do some experiment and understand the presence of CO₂ in air.

Aim: To show that Air exerts Pressure.

Material required: An empty polythene bottle of mineral water and some hot water.

Steps:

- Take an empty bottle of mineral water.
- Take some hot water in it and tightly screw its cap in order to make it airtight.
- Pour cold water on the bottle.

What do you observe?

The air will get hot because of the hot water. The air will get cold because of the cold water. The air will get compressed because of the hot water. The air will get expanded because of the cold water.

Chemical Equation:

$$\text{Carbon dioxide} + \text{Lime water} = \text{Calcium Carbonate} + \text{Water}$$

$$\text{CO}_2 + \text{Ca(OH)}_2 = \text{CaCO}_3 + \text{H}_2\text{O}$$

6. Use of comic interactions.

used by plants to prepare food. To control the combustion level in the atmosphere.

As Dry Ice. Used in Food Preservation. As coolant in Refrigerator. In Soda/Soft Drinks.

USES OF CARBON DIOXIDE

HARMFUL EFFECTS OF CARBON DIOXIDE

- Green Globalization.
 - CO₂ reacts with H₂O to form Carbonic Acid.
 - Hydrogen ions released from Carbonic acid increase the acidity of the ocean.
- Rise of CO₂ rises the temperature that results in Global Warming.
 - This leads to melting of polar ice caps.

26.3 AIR POLLUTION

How can we verify the presence of Carbon dioxide in air? What is there that makes the air polluted?

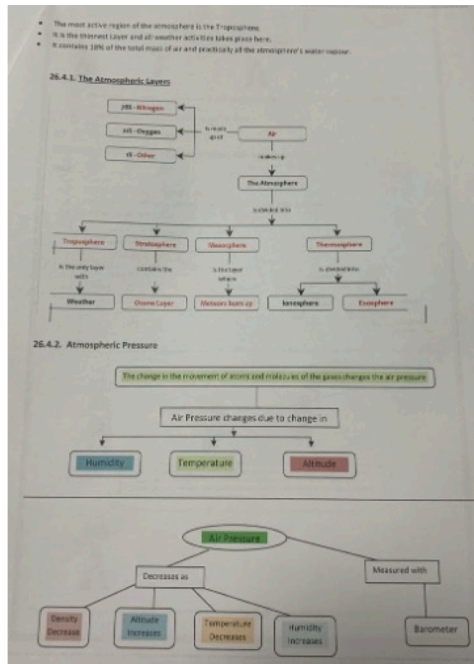
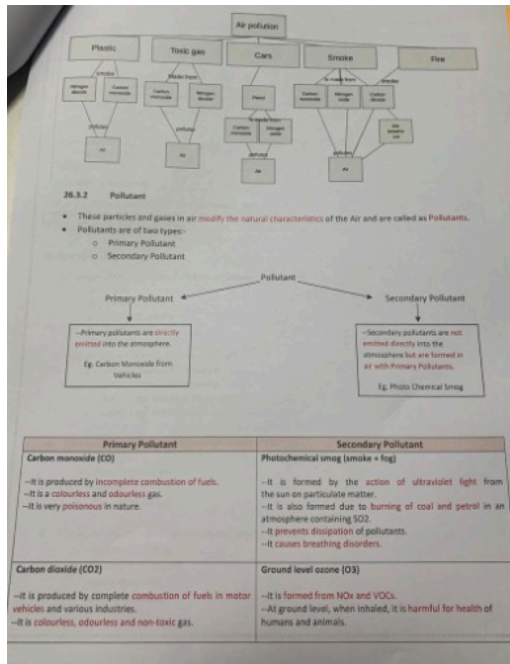
Air pollution is a mixture of solid particles and gases in the air.

26.4 The Atmosphere

- The region of air around earth is called atmosphere.
- Atmosphere protects us and all living organism from harmful radiations like Ultra-violet radiations.
- According to temperature, pressure variation and composition, the atmosphere is divided into layers.

How can I learn the names of Atmospheric Layer?

7. Use of Concept Maps



8. Use of Mnemonics

26.4 The Atmosphere

- The region of air around earth is called atmosphere.
- Atmosphere protects us and all living organism from harmful radiations like Ultra-violet radiations.
- According to temperature, pressure variation and composition, the atmosphere is divided into layers.

How can I learn the names of Atmospheric Layer?

Tina → Troposphere
 Saw → Stratosphere
 Many → Mesosphere
 Toffees → Thermosphere

Layers of Earth's Atmosphere

Layer	Temperature Range	Altitude Range	Key Features
EXOSPHERE	1200° C	800 to 3000 km	Satellite, Space Shuttle
THERMOSPHERE	86.5 to 1200° C	80-90 to 800 km	Aurora
MESOSPHERE	-2.5 to -86.5° C	40-50 to 80-90 km	Meteor, Meteorological Balloon
STRATOSPHERE	-56.5 to -2.5° C	11 to 50 km	Fightback
TROPOSPHERE	15 to -56.5° C	0 to 12-18 km	Passenger Plane, High Jet Balloon

9. Use of simple in-text questions for self-assessment.

INTEXT QUESTIONS

- Which constituent of Air is most important for plants and animals?
 - Nitrogen
 - Oxygen
 - Carbon Dioxide
 - None of the Above
- How does the limewater turns milky?
 - Presence of Oxygen
 - Presence of Carbon Dioxide
 - Absence of Oxygen
 - Absence of Carbon Dioxide
- Fill the blanks in the concept map.

```
graph TD; AIR((AIR)) --> B1[_____, 21%]; AIR --> B2[Nitrogen, _____%]; AIR --> B3[Water Vapour]; AIR --> B4[Other Gases, 0.96%];
```
- Which air is inhaled by human beings?
 - Carbon Dioxide
 - Oxygen
 - Nitrogen
 - None of the Above
- Complete the Concept map:-

```
graph TD; AF([Abiotic factors]) -- include --> T; T --- W([Water]); T --- O([Oxygen]); T --- A([a. _____]); T --- B([b. _____]);
```

10.3. Objective 3: To observe the effectiveness of the content developed on UDL principles on the understanding of Learners with Disability.

Hypothesis:

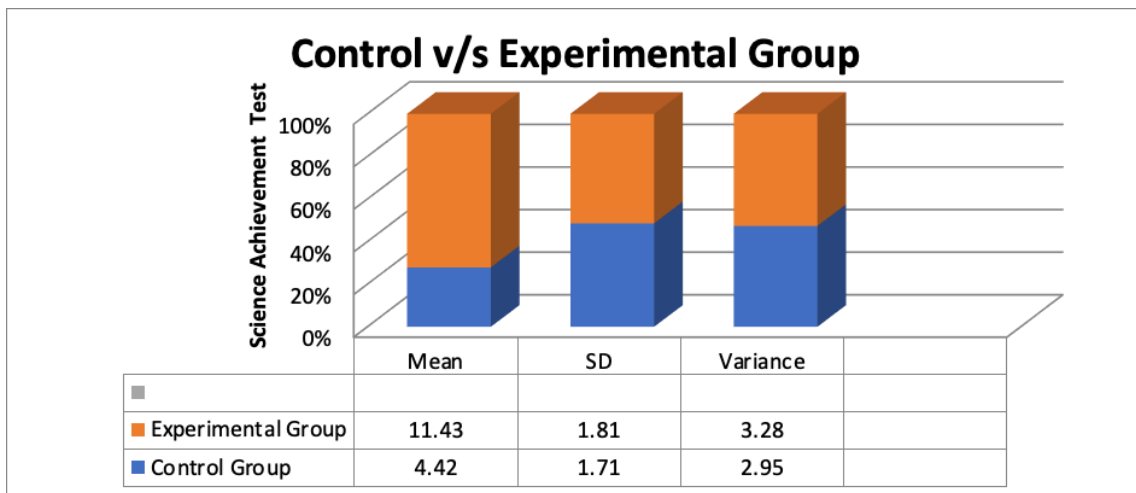
H₀₁: There is no significant difference in the post-test scores of control and experimental groups on the understanding of concepts of Science chapter of Xth grade: 'The Air' after the intervention.

The comparison between the control and experimental group in the post-experimental phase was done by comparing the post-test scores of both groups. The comparative analysis of the post-test scores is as follows:-

Variable	N	Mean		SD		Variance	
		Control Group	Experimental Group	Control Group	Experimental Group	Control Group	Experimental Group
Post-test scores of Science Achievement test	07	4.42	11.43	1.71	1.81	2.95	3.28

Table 4. Descriptive Statistics presenting the comparison of Post-test scores of control and experimental groups

Table 4 revealed that the mean of the post-test scores of the control and experimental group on Science achievement test was 4.42 and 11.43 with SD 1.71 and 1.81 respectively. This shows that there was a difference in the mean of the post-test scores of both groups i.e. 7.01. Hence, a gain score was found in the experimental group and it was interpreted that the performance in the post-test of the experimental group was better than the control group.



Science Achievement Test	N	U	U Critical Value	Z Value
Control v/s Experimental Group	07	0	<p>$p < .05$ is 8</p> <p>$p < .01$ is 4</p>	-3.06661

Table 5. Inferential Statistics presenting the comparison between the post-test scores of the Control and Experimental Group

Formula used:

$$U = NM + \frac{N(N+1)}{2} - \sum_{x_i} Rank(x_i)$$

On computing the Mann Whitney U Test on the achievement test to test the hypothesis, it was found that the computed value was found to be 0 and the critical value at 0.01 and 0.05 level of significance was 4 and 8 respectively (Table 5). Since the computed value was smaller than the critical value, hence, the H_{01} was rejected. Therefore, it could be interpreted that there was a significant difference in the post-test scores of the control and the experimental group on the science achievement test after the intervention was provided.

Hence, it is stated that:-

“There is a significant difference in the post-test scores of control and experimental groups on the understanding of concepts of Science chapter of Xth grade: ‘The Air’ after the intervention.’

11. Conclusion

Though various inclusionary practices are practiced at NIOS like integration of academic and vocational courses, online admission process, accessible content in ISL for learners with hearing impairment, dictionary in ISL, study materials in ISL, talking books and large-print books, mobile app, NIOS virtual open school, on-demand examination, and assessment in the preferred Language

etc., still, there are diverse challenges that remain in the ways of LwDs. Every child has a different style of learning and understanding the knowledge provided by the teacher. Hence, it is accurate to say that the different means of presentation, assessment and engagement of the learners with the content make the learning system efficient and less challenging. All learners need to be able to generalize and transfer their learning to new contexts. Learners vary in the amount of scaffolding they need for memory and transfer in order to improve their ability to access their prior learning. Of course, all learners can benefit from assistance in how to transfer the information they have to other situations, as learning is not about individual facts in isolation, and learners need multiple representations for this to occur. Without this support and the use of multiple representations, information might be learned but is inaccessible in new situations. Supports for memory, generalization, and transfer include techniques that are designed to heighten the memorability of the information, as well as those that prompt and guide learners to employ explicit strategies.

It is concluded that the LwDs are facing challenges majorly in accessing the textual content, taking the examination and with student support services of the organisation. Also, it is concluded that modifications made to UDL principles make the content for LwDs comprehensible, interesting and learning outcome based oriented.

12. Suggestions

Learners may have sensory (hearing, seeing) impairments, physical impairments, mental health conditions/psychosocial disabilities, intellectual disabilities, and developmental delays. Educational institutions must explore different means to make education accessible to the learners. Hence, based on the findings of the research, the researchers recommend some suggestions to make learning more experience-based and interesting.

1. Every open school must conduct small-scale research to explore the challenges of the learners enrolled with them. It enhances the quality of the open school system by improving every bit of it.
2. Learners belonging to the marginalised society are the major chunk of open schools in India, hence, it is suggested to focus on the educational strategies keeping the under-served population in mind.
3. The LwDs at Open schools are facing challenges in accessing the curriculum, hence, it is suggested to revisit the textbooks of open schools and bring modifications in the content as per the need of LwDs.

4. With the change in educational policies, the practices at the ground level may also need to be changed. Therefore, a change in the assessment and examination system at open schools must also be welcomed wholeheartedly in India. Hence, it is suggested that there must be multiple means of taking the examination at open schools in India. The learners may be allowed to take the exam in different modes like verbal, non-verbal, written etc.
5. The learners in this research reported a lack of student support services. Hence, it is suggested that open schools must have support services in their best shape. As the learners don't get the opportunity to interact with the tutors and teachers on the daily basis and are also not associated with the regular system, they tend to face numerous problems pertaining to registration, submission, examination, study material etc. Therefore, it is suggested that a well-established student support service at the open school must be in place with proper public dealing and grievances addressal deadlines. It creates a bond between the learner and the institution, motivates better learning and enhances the academic aspirations of the learner.

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