# Multimedia Learning Materials as Pedagogical Supplements in ODL: A Comparative Study

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## Abstract

*With the outbreak of the pandemic, the usage of multimedia technologies in the teaching-learning process has increased manifold. The unprecedented crisis has led to innovative planning and executing new ways to impart education during the shutdown of educational institutions across the world. One such way to engage with students has been through virtual learning. Classroom transactions have been transformed into online classes delivered to learners through different technology tools. Online learning, which was previously used mostly by learners in distance education institutes, has become the only learning option for all kinds of learners during the Coronavirus Disease or COVID-19 era. The data for this paper was collected before COVID struck the world, and therefore, the usage and utility of the multimedia learning materials by the learners during the lockdown period might vary. The paper attempts to provide a glimpse of the usage of multimedia tools by the learners of distance education in India in the pre-COVID times. A mixed-method approach was used for the collection of data in this study. The study highlights the usage and requisite of multimedia aids by learners, particularly from open and distance learning institutions. It also attempts to identify barriers and challenges faced by learners in using multimedia tools. The study has established significant relationships between age, gender and having accessibility to the internet with use of multimedia learning materials. The respondents considered in the study agreed that multimedia materials are appealing to them and act as supplements in their learning; however, the materials should be user-friendly, and in interesting and engaging formats. The study can strengthen the efforts of educational institutions in planning and designing new strategies to enhance the use of multimedia learning materials among learners.*

*Keywords: barrier, learning materials, multimedia, Open and Distance Learning, technology*

## Introduction

The use of multimedia tools in distance education was initiated with the introduction of postal services and later, telephone for distance learners, followed by radio. Kim and Shih (2003) mentioned the advent of motion picture by Thomas Edison in 1922 as the beginning

of media technologies in learning. Other early events in learning technology are an article published in the 'Radio Times' of 13 June 1924 about the possibility of a 'broadcasting university' and BBC's plans for a 'wireless university' in 1926 (Young, 2015). British Broadcasting Corporation (BBC) broadcast the first adult education talk on 6 October 1924, which was a talk on fleas entitled 'Insects in relation to Man' and the first school radio programme was broadcast two years later in 1926. By 1981, the BBC was broadcasting over 450 radio programmes a year in the continuing education area (Bates, 2005).

In India, the Secondary Education Commission (1952-54) recommended the use of modern methods of audio-visual aids in schools. In 1952, the first National Board of Audio-Visual Education was set up, followed by the establishment of the National Institute of Audio-Visual Education in 1959. However later on, both merged with the Department of Audio-Visual Aids and the National Council of Educational Research and Training (NCERT). Since 1961, University Grants Commission (UGC) has been appointing different committees to get recommendations on new ways to improve the quality and standard of tertiary education.  It was the Sidhanta Committee (1961) that undertook an investigation on issues related to the standards of higher education in Indian universities and recommended use of audio and audio-visual aids like radio, television (TV), films for effective teaching (Parhar, 2006). In the same year, Delhi School Television Project was initiated by setting up a total of 360 TV sets in 150 higher secondary schools aiming to reach about 20,000 students. Gradually, both radio and TV were used for educational broadcasting. However, with the emergence of Open and Distance Learning (ODL) institutions, the need for educational broadcasting was felt more as learners and teachers were separated by distance and time (Arulchelvan & Viswanathan, 2008). The Kothari Commission (1964-66) and later National Guidelines for Educational Broadcasting (1983) further recommended that Educational Broadcasting be integrated with the educational system. A Centre for Educational Technology was set up in 1973 at NCERT, which provided assistance to twenty-one states for the setting up of educational technology cells (Mohanty, 2008). In 1986, the National Policy on Education was formulated, encouraging provision of separate radio and TV channels along with production of audio, video and computer-based materials to strengthen the delivery system of Open University (Ministry of Human Resource Development [MHRD], 1986).

Use of multimedia or educational technology in the education system has been enhanced in the recent times. Emergence of multiple media and latest technologies in education has favoured learning to a great extent. Technologies like smart classrooms, digitised learning content, audio-visuals and others have been used towards personalised, adaptive and learner-centred models of learning (Miglani & Burch, 2018). The National Education Policy of 2020 formulated by Government of India has also emphasized the use of technology in education. It has encouraged the use and integration of technology involving artificial intelligence, machine learning, block chains, smart boards, computing devices alongside various educational software and hardware to impact education (MHRD, 2020).

In this study, an attempt has been made to provide a comparative analysis among the usage of multimedia materials by learners of three Open Universities of India namely Indira Gandhi National Open University (IGNOU), B. R. Ambedkar Open University (BRAOU) and Krishna Kanta Handiqui State Open University (KKHSOU). The usage of multimedia learning materials here signifies use of different tools like radio, TV, Information and Communication Technology (ICT) tools, online learning, frequency of using multimedia materials for learning.

## Literature Review

### Use of Multimedia

A comprehensive study of the use of multimedia in education has been provided by Malik and Agarwal (2012). The authors have presented a list of such papers accompanied by annotations that describe use of multimedia and its relevance in education (Malik & Agarwal, 2012).

Andresen and Brink (2013) described different applications of multimedia at different levels and sectors of education. An analytical pedagogical scenario for using multimedia in education, its role, production process, use of multimedia in teaching and learning process has been elucidated in the book (Andresen & Brink, 2013). To understand the perspectives of medical and allied healthcare students on the usage of multimedia learning materials, Vagg et al. (2020) conducted a study involving 153 students over six months. The results of the study highlight that although the students acknowledge the significance of multimedia aids in learning, these aids cannot replace the traditional tools of learning. The students asserted that multimedia tools can complement the traditional learning and reinforced the use of interactive multimedia tools to supplement their learning (Vagg et al., 2020).

### Factors that Affect Use of Multimedia

A number of factors that influence the use of ICT in Higher Education have been identified in a study conducted by Coomaraswamy (2014). The factors are teacher's attitudes, professional development of teachers, technical support, leadership support, pressure to use technology, institutional policies and support, e-readiness, access to resources, ease of use, incentives to change and government policies and support (Coomaraswamy, 2014). Another study found that the use of digital technology in education of recent times has been marked by different shortcomings and will face future challenges (Anderson & Rivera-Vargas, 2020). The five shortcomings in distance education listed by the authors are high attrition rates particularly in those educational systems that offer less interactive media and low levels of student support; student-content interaction; threaded discussion in distance education; copyright confusion and utopian, compulsive and excessively optimistic visions. The challenges faced by distance education highlighted in the study are the promise and peril of learning analytics, social media and assimilation or singularity.

The recent developments in ICT have led to the expansion of education outreach to far and remote areas. Integration of technology in learning has a number of advantages. However, there are also a number of challenges in using technology in education (Hassan & Mirza, 2020).

### Effectiveness of Multimedia

The importance of ICT for an effective teaching-learning process has been illustrated by Muthuchamy and Thiyagu (2011) in their study. They have laid emphasis on the potential of electronic learning or e-learning, mobile learning, and blended learning. These technologies have a number of advantages and can be utilised for effective teaching-learning process (Muthuchamy & Thiyagu, 2011). To identify use of audio-visual aids in teaching Biology at secondary school level, a study was conducted by Akram and Malik (2012). Various pros and cons of audio-visual aids were also illustrated in the paper (Akram & Malik, 2012).  In another study conducted by Rasul et al. (2011) to analyse the effectiveness of audio-visual aids in teaching and learning at university level, it was found that audio visual aids play a very important role in the teaching-learning process. The study was conducted among 150 students and 50 teachers of The Islamia University of

Bahawalpur. After analysing the responses of the students, it was found that such aids motivate both teachers and students and the knowledge is provided in depth and detail. Audio visual aids change the classroom environment and play an important role in learning. Therefore, universities should provide facilities for using audio-visual aids and teachers should be trained and motivated to use them (Rasul et al., 2011).

Krašna and Bratina (2014) conducted an efficiency assessment to understand efficiency of multimedia learning materials. Two group of students were identified for the test. The first group learnt about statistical methods and procedures using Statistical Package for the Social Sciences (SPSS) from multimedia learning materials while the second group attended frontal lectures about the same topic. After a certain amount of time, both the groups were invited to complete problem-solving tasks using SPSS without any support from the teachers. The results showed that students who used multimedia instructional materials achieved better results than those who attended the frontal lectures. Different tests were taken to check the effectiveness of multimedia instructional materials and after analysing the responses, it was found that although text-narrated learning materials were suitable for the students, multimedia materials which included videos with related links were the best for them. The authors suggested that teachers develop multimedia materials that can be compatible for mobile devices so that students can make use of them conveniently (Krašna & Bratina, 2014). In another attempt to understand the relationship between learning media and online learning outcomes, a study was conducted among 103 students in Indonesia by Barnad (2021). The learning materials provided to the students were in multimedia form. The study found that the learning materials provided to students encouraged them to carry out the learning process independently and the available communication process was used for questions and answers followed by discussions. The study also showed that the average learning outcomes from this form of learning were not much different from those of face-to-face teaching in the computer laboratory (Barnad, 2021).

In a study conducted by Gao (2020), it was highlighted that the primary school teachers in China have been using modern information technology tools to improve the efficiency of teaching. Based on the responses of 40 language teachers, interviews with principal and teachers and classroom observations, some interesting findings were discussed regarding status of multimedia tools used in primary school by Chinese teachers, effect of multimedia teaching on students, teachers' and students' attitudes towards using multimedia and effective ways to use multimedia technology (Gao, 2020).

With the outbreak of the pandemic, the education system has largely shifted to the distance or online learning mode. It is therefore important to adopt new teaching methods as highlighted in the study by Dilmurod and Elmira (2020). The researchers have asserted that use of interesting and interactive multimedia technologies can support the learner in effective learning. They further emphasized that use of hypertext multimedia aids in ODL will help students to search for information in a way that can accurately respond to their requests. The transition from face-to-face learning to online learning during the pandemic has been challenging for teachers as well as the learners (Dilmurod & Elmira, 2020). In the current situation of expansion of distance learning, the education system requires modernisation in accordance with current requirements. Kizi and Alikulovich (2021) have emphasized the use of modern technologies like electronic textbooks, libraries, audio and video textbooks to reform the educational system and make learning more effective (Kizi & Alikulovich, 2021).

# Research Objectives

The objectives of the study are:

i.   to study the availability and usage of multimedia tools in the selected Open Universities of India;
ii.  to provide a comparative analysis of the usage of multimedia tools by the learners of the selected Open Universities of India; and
iii. to assess the relationship, if any exists, between age, gender and access to the internet, and use of multimedia learning materials.

# Research Questions

The literature review has provided the scope to formulate a few research questions for the study, as follows:

i.   What multimedia materials are available in Open Universities in India?
ii.  Are the multimedia tools used by learners of different Open Universities in India?
iii. Is there any relationship between use of multimedia materials and age, gender and having access to the internet?

# Research Method

The primary method used in the study is case study in three selected open universities. The mixed-method approach was adopted in the study, using triangulation design. Qualitative and quantitative methods were used to collect the data, as well as to analyse and interpret the results. The methods used included survey with the learners, interviews with relevant authorities and related members, focus group discussions and analysis of secondary data from related literature. Simple random sampling method was used to select the learners considered for the survey. Structured questionnaires were distributed to the learners with elucidation of the questions and objectives of the study. The quantitative data was entered in SPSS 16.0 and chi-square test was conducted to assess the association between the dependent variable, that is use of multimedia materials, and the independent variables of learners' age, gender and access to the internet.

## Study Area

The researcher selected three sample universities based on their time of establishment. The universities are IGNOU which is the first and only National Open University in India, established in 1985; BRAOU, which is the first Open University of India established in 1982 in Andhra Pradesh; and KKHSOU, which was established more recently, in 2006.

The selection of the sample Open Universities can also be justified when considering the regional categorization of India. IGNOU is situated in New Delhi, that is in the northern region of the country; BRAOU is situated in southern region, that is Andhra Pradesh and KKHSOU is in the north-eastern region; that is in Assam.  Three study centres based in the headquarters of each University were selected for this study and visited by the researcher in person.

**Sample**

The total sample size considered in this study is 750. The sample size calculation was done according to the Guthrie (2010) sample size table and by using an online sample size calculator.

# Findings

In this study, quantitative data was collected to assess the use of multimedia materials. Of the respondents, 53.7% were in the age group ranging from 15 to 25 years, 40% were in the age group of 25 to 35 years, 5.1% were aged between 35 and 45 years and 1.2% were in the age group of 45 to 55 years. Besides, 42.4% of the learners were male while 57.6% were female. It is found that 82.1% of the respondents had access to the internet while 17.9% did not. The responses provided by the learners are presented as follows in the form of comparative analysis:

**Table 1**

*Nature of Multimedia Materials*

| Name of the university | User friendly (%) | Not user friendly (%) | Not Applicable (%) |
|---|---|---|---|
| IGNOU | 69.6 | 19.8 | 10.6 |
| BRAOU | 43.6 | 10.4 | 46.0 |
| KKHSOU | 74.4 | 7.2 | 18.3 |

**Table 2**

*Content of Multimedia Materials*

| Name of the university | Updated (%) | Not updated (%) | Outdated (%) | Poor Quality (%) | Not Applicable (%) |
|---|---|---|---|---|---|
| IGNOU | 66.3 | 16.2 | 1.7 | 2.0 | 13.9 |
| BRAOU | 42.4 | 2.0 | .8 | .4 | 54.4 |
| KKHSOU | 63.9 | 10.0 | 3.9 | 5.6 | 16.7 |

**Table 3**
*Access to Internet*

| Name of university | Access to the internet (%) | No access to the internet (%) |
|---|---|---|
| IGNOU | 93.4 | 6.6 |
| BRAOU | 70.4 | 29.6 |
| KKHSOU | 81.1 | 18.9 |

**Table 4**

*Download of Online Materials for Learning*

| Name of the university | Easy (%) | Very easy (%) | Tough (%) | Very tough (%) | Never done (%) |
|---|---|---|---|---|---|
| IGNOU | 56.8 | 9.9 | 13.5 | .3 | 19.5 |
| BRAOU | 31.5 | .4 | .7 | 1.9 | 65.5 |
| KKHSOU | 43.5 | 7.8 | 7.2 | 4.3 | 37.2 |

**Table 5**

*Preference of the respondents in Using Radio for Learning*

| Name of the university | Gyan Vani (%) | Community radio (%) | AIR (%) | Others (%) | Do not use (%) |
|---|---|---|---|---|---|
| IGNOU | 24.8 | 13.9 | 25.1 | 9.9 | 26.4 |
| BRAOU | 4.1 | 3.4 | 18.4 | 9.4 | 64.8 |
| KKHSOU | 2.2 | 11.1 | 34.4 | .6 | 51.7 |

**Table 6**

*Preference of the Respondents in Using Television for Learning*

| Name of the university | Gyan Darshan (%) | Doordarshan (%) | Others (%) | More than one channel (%) | Do not use (%) |
|---|---|---|---|---|---|
| IGNOU | 29 | 26.1 | 7.9 | 14.9 | 22.1 |
| BRAOU | 3.7 | 18.4 | 4.9 | 14.6 | 58.4 |
| KKHSOU | 13.3 | 37.8 | 14.4 | 29.4 | 5.0 |

**Table 7**

*Internet Sources Used for Learning*

| Name of the university | Social networking (%) | Google (%) | University materials (%) | Wikipedia/ OER (%) | More than one source (%) | NA (%) |
|---|---|---|---|---|---|---|
| IGNOU | 13.2 | 46.0 | 2.8 | 5.6 | 31.6 | .8 |
| BRAOU | 10.8 | 47.6 | .4 | 1.2 | 9.6 | 30.4 |
| KKHSOU | 9.6 | 55.6 | 3.2 | 2.0 | 26.8 | 2.8 |

**Table 8**

*Usefulness of Multimedia Materials for Learning*

| Name of the university | Useful (%) | Not Useful (%) | Can't say (%) |
|---|---|---|---|
| IGNOU | 80.2 | 11.2 | 8.6 |
| BRAOU | 52.0 | 16.5 | 31.5 |
| KKHSOU | 93.3 | 5.6 | 1.1 |

**Table 9**

*Frequency of Using Multimedia Materials for Learning*

| Name of the university | Always (%) | Sometimes (%) | Often (%) | Never (%) |
|---|---|---|---|---|
| IGNOU | 19.8 | 58.7 | 10.6 | 10.9 |
| BRAOU | 5.6 | 32.1 | 23.5 | 38.8 |
| KKHSOU | 8.9 | 65.0 | 6.1 | 20.0 |

**Table 10**

*Barriers to Using Multimedia Materials for Learning*

| Name of the university | Ambiguous (%) | Lack of knowledge of use of technology (%) | Lack of efficient instructors (%) | Lack of time or interest (%) | No difficulty (%) | Not Applicable (%) |
|---|---|---|---|---|---|---|
| IGNOU | 15.8 | 22.1 | 35.6 | 20.5 | 5.9 | .1 |
| BRAOU | 31.1 | 23.6 | 27.0 | 14.2 | 2.2 | 1.9 |
| KKHSOU | 22.2 | 25.6 | 35.6 | 15.0 | 1.6 | 0 |

Some major findings from this study are as follows:

i.  Indira Gandhi National Open University: In this study, data on availability of multimedia tools was collected through secondary sources like journals, university website, books etc. and through focus group discussion with learners and an in-depth interview with Joint Director of Electronic Media Production Centre (EMPC). IGNOU has been a pioneer in producing multimedia materials for ODL learners. It provides radio lessons through its own Gyan Vani and TV lessons through Gyan Darshan, now available through SWAYAM platforms, teleconferencing, video conferencing, interactive radio counselling, live streaming and other platforms.

    The survey respondents for this study were mostly young females in the age group of 15 to 25 years. The respondents mostly live in or near the national capital of the country and 93.4% of them had used and had access to the internet. A majority of the respondents agreed that IGNOU multimedia materials were user-friendly, updated and of standard quality. Most of the respondents also preferred using smart phones and browsing the internet particularly Google. Also, 56.8% of them found using and downloading online materials easy, with the majority of the IGNOU respondents being aware that their university provides online materials.

    In IGNOU, an almost equal number of the respondents used Gyan Vani and All India Radio though the same number of respondents did not listen to the radio for learning. The respondents also preferred Gyan Darshan followed by Doordarshan and preferred to use multimedia and surf the internet at home.

    A large proportion of respondents (80.2%) found multimedia useful for learning and 75% indicated that they required multimedia for learning. According to the respondents, lack of efficient instructors was the biggest barrier for using multimedia technologies followed by limited use of technology and lack of time and interest.

ii. BR Ambedkar Open University: Based on data collected through the secondary sources and qualitative methods like focused group discussions with learners of the university

and in-depth interview with the Director of Audio-Visual Production and Research Centre of BRAOU, the multimedia materials provided by the university are radio lessons through All India Radio (AIR), video lessons through Doordarshan Saptagiri channel, Manna TV and Gyan Darshan, interactive live teleconferencing and TV lessons through Doordarshan.

Similar to IGNOU, a majority of the respondents from BRAOU were also in the age group of 15-25 years and were mostly female learners. A majority of the respondents (70%) used and had access to internet. Also, 43.6% of the respondents said the multimedia materials of BRAOU were user friendly, 46% were not able to comment on the nature of the multimedia materials provided by the university, and 10.4% said they were not user friendly. Moreover, 88.8 % of the respondents said that quality of Self Learning Materials (SLM) is standard, while 9.2% said they are of a high standard. As far as multimedia materials, 42.4 % indicated they were updated while 54.4% could not say anything about the content of multimedia materials for learning. Among the ICT tools, cell phones are used the most by the respondents while 31.5% of the respondents find it easy to use and download online materials but a large percentage of learners (65.5%) have never used online materials or downloaded materials for learning.

In BRAOU, 64.8% did not use radio and 58.4% did not use television for learning. Of those who used radio as a medium of learning, All India Radio was the most frequently used, followed by Gyan Vani and community radio station. As far as television is concerned, the viewership is the highest for Doordarshan followed by other informative channels and Gyan Darshan. As far as their attitudes towards multimedia, 52% indicated that multimedia could be useful for learning while 31.5% did not have any idea about it. Though 58.8 % had not used multimedia materials for learning, 22.1 % used it sometimes, 13.5 % often and 5.6 % used it always for learning purposes. When it comes to challenges, most of the respondents found multimedia materials ambiguous for them and indicated that lack of proper instructors often poses a hurdle to using multimedia materials efficiently.

iii.   Krishna Kanta Handiqui State Open University: KKHSOU has a range of multimedia aids for its learners, like radio lessons through AIR and its own community radio, Jnan Taranga, video lessons through DVDs to study centres and audio lessons for the visually impaired learners. The university has been developing a Learning Management System (LMS) called ePragya under a collaborative project with Commonwealth of Educational Media Centre for Asia (CEMCA). It will offer various programmes including special programmes for teachers. This service is designed in the Moodle learning platform and facilitates online and blended learning. KKHSOU also has an android App that links learners to the university website for quick access to relevant information like admission, examination, and multimedia tools. Unlike the IGNOU and BRAOU participants, the KKHSOU sample comprised more male learners than female learners, mostly in the age group of 25 to 35 years and mostly unemployed. A majority of the respondents found multimedia learning materials user-friendly, standard, and updated. Among the ICT tools, the cell phone was used the most, followed by browsing. Also, 81.1% of the respondents used the internet and almost half of the respondents, that is 47.8%, knew about and found it easy to download materials from the internet. In KKHSOU, a majority of the respondents did not use the radio for learning, but the learners who used the radio preferred All India Radio the most, followed by community radio and Gyan Vani. With regard to television, the respondents watched Doordarshan the most, followed by different informative channels and Gyan Darshan. They preferred to use multimedia materials as well as to surf the internet at home. About 93.3 % indicated that they think multimedia is useful for them and so they require more multimedia materials for learning. Also, 65 % of the respondents use multimedia materials at least sometimes, 8.9 % always and 6.1 % often. Similar to the respondents

from IGNOU, the respondents from KKHSOU also selected lack of instructors as the greatest barrier followed by lack of knowledge of technology in using multimedia materials for learning.

In order to see if the use of multimedia materials is affected by socio-demographic and independent variables like gender, age and having accessibility to the internet; Pearson chi-square test of significance was done. The calculation of chi-square test was done using the equation $X2= \sum (fo-fe/ fe)$, where $fo$ is the observed frequency and $fe$ is the expected frequency. The findings of the test are presented in the tables below:

- Null Hypothesis: There is no association between attributes.
- Alternative Hypothesis: There is association between attributes.

**Table 11**

*Association Between Use of ICT Tools and Other Attributes*

| Sl No. | Association between attributes | Chi-square value | df | P-value | Remarks |
|--------|-------------------------------|-----------------|-----|---------|---------|
| 1 | Use of ICT tools and age | 33.88 | 30 | 0.286 | Accepted |
| 2 | Use of ICT tools and gender | 38.055 | 10 | 0 | Rejected |
| 3 | Use of ICT tools and access to internet | 137.5 | 10 | 0 | Rejected |

The P-Values of use of ICT tools with regard to gender and access to the internet are smaller than 0.05. As such, we can reject the null hypothesis for the two attributes and can conclude that there is an association between use of ICT tools and gender as well as access to the internet. However, there is no association between use of ICT tools and age as the P-value is greater than 0.05, and as such we have to accept the null hypothesis.

**Table 12**

Association Between Downloading & Using Online Materials and Other Attributes

| Sl No. | Association between attributes | Chi-square | df | P-value | Remarks |
|--------|-------------------------------|-----------|-----|---------|---------|
| 1 | Downloading and using online materials with age | 16.723 | 12 | 0.16 | Accepted |
| 2 | Downloading and using online materials with gender | 47.257 | 4 | 0 | Rejected |
| 3 | Downloading and using online materials with access to the internet | 197.6 | 4 | 0 | Rejected |

Since P- Values of downloading and use of online materials with regard to gender and having access to the internet is less than 0.05, we can reject the null hypothesis. It signifies that there is association between downloading and use of online materials and gender and accessibility to the internet. However, we have to accept the null hypothesis in case of downloading and using online materials with age as the P-value is higher than 0.05. Therefore, there is no association between age and downloading and using online materials.

**Table 13**

*Association Between Use of Radio for Learning & Other Attributes*

| Sl No. | Association between attributes | Chi-square value | Df | P-value | Remarks |
|---|---|---|---|---|---|
| 1 | Use of radio for learning with age | 39.279 | 18 | 0.003 | Rejected |
| 2 | Use of radio for learning with gender | 46.942 | 6 | 0 | Rejected |
| 3 | Use of radio for learning with access to internet | 84.245 | 6 | 0 | Rejected |

Since the P-Value is less than 0.05 in all the attributes, we may reject the null hypothesis. Thus according to the chi-Square test, there is association between Using Radio for Learning with age, gender and learners having access to the internet.

**Table 14**

*Association Between Use of TV for Learning & Other Attributes*

| Sl No. | Association between attributes | Chi-square value | df | P-value | Remarks |
|---|---|---|---|---|---|
| 1 | Use of TV for learning with age | 24.23 | 12 | 0.019 | Rejected |
| 2 | Use of TV for learning with gender | 23.099 | 4 | 0 | Rejected |
| 3 | Use of TV for learning with access to internet | 63.93 | 4 | 0 | Rejected |

In the above table, it can be seen that the P-value is less than 0.05 in all the attributes, and we may reject the null hypothesis. Thus, according to the chi-Square test, there is association between use of television with age, gender and having access to the internet.

**Table 15**

*Association Between Frequency of Using Multimedia Learning Materials (MLM) with Other Attributes*

| Sl. No. | Association between attributes | Chi-square value | df | P-value | Remarks |
|---|---|---|---|---|---|
| 1 | Frequency of using MLM with age | 24.699 | 9 | 0.003 | Rejected |
| 2 | Frequency of using MLM with gender | 49.363 | 3 | 0 | Rejected |
| 3 | Frequency of using MLM with access to internet | 78.888 | 3 | 0 | Rejected |

The respondents of the study were asked if they use multimedia materials always, sometimes, often or never. Based on their responses, chi-square test was conducted. In Table 15, it can be seen that the P-value is less than 0.05 in all the attributes, and we may reject the null hypothesis. Thus, there is association between frequency of using multimedia materials with age, gender and access to the internet.

Some other findings from the study are presented below:

- Use of radio for learning: It is seen those learners in higher age groups (35-45 years of age group) use All India Radio more than learners in lower age groups. Similarly, male learners used All India Radio and community radio more than female learners. However, females were found to use Gyan Vani more than males. Learners having access to the internet also used radio more than those who did not have access to the internet.
- Use of television for learning: Television is not a preferred medium of learning for the learners in this study. However, 21.8 % of learners in the 15 to 25 age group preferred Gyan Darshan followed by Doordarshan. 25% of the learners aged 25 to 35 years used Doordarshan followed by Gyan Darshan. In terms of gender, females used Doordarshan (21.2%) the most followed by Gyan Darshan (17.5%) while the male learners used Gyan Darshan (24.8%) and Doordarshan (24.2 %) both for learning followed by other channels. Also, 43.2 % of the learners who did not have access to the internet did not use the television for learning.  Learners having access to internet preferred Doordarshan the most followed by Gyan Darshan and other channels.
- Preferred place of use of multimedia materials: The preferred place to use multimedia places was their homes irrespective of age, gender or having access to the internet.  Learners of a lower age group, that is 15 to 25 years, used their mobile phones to surf the internet while higher age groups, for example 25 years and above, preferred to use the internet at homes. Female learners used their cell phones at any place while male learners used other places and more than one place to surf the internet. Learners with internet access mostly used their cell phones to surf the internet.
- Use of the internet: Google was the most used source of learning through the internet irrespective of socio-demographics.
- Use of multimedia materials: Learners of all age groups agreed that multimedia materials are useful for learning. In terms of other variables, male learners asserted usefulness of multimedia materials more than female learners. Those who had access to the internet found multimedia tools more useful than those who did not have access to the internet.
- Barriers to using multimedia materials: There are a number of barriers for effective use of multimedia learning materials. In the study, lack of instructors was the biggest hurdle for learners of different age groups, gender and internet access levels, followed by lack of use of technology, materials being ambiguous and lack of time or interest.

**Findings of focussed group discussion**

The focus group discussions conducted with participants from the selected universities revealed that the multimedia materials provide added knowledge about the curriculum. The materials break the monotony of printed books due to the unique format of the multimedia aids. The barriers in using multimedia tools for learning have been identified as technological barriers, poor content in some audio-visual materials, language barriers, high cost, delay in delivery and other issues like lack of electricity or internet connectivity, and lack of time.

## Discussion

The study has revealed some interesting findings about the use of different multimedia tools by the learners of IGNOU, BRAOU and KKHSOU. The findings have also provided answers to the research questions formulated at the beginning of the study. The different multimedia materials available in the open universities are radio and television lessons,

teleconferencing, video conferencing, digital or web-based materials. The learners used different multimedia materials based on their preference and convenience.

The statistical tests have also provided answers regarding the association between dependent and independent variables. In this study use of multimedia materials has been identified with use of radio and TV, different ICT tools, downloading and use of online materials and frequency of using multimedia materials. The tests conducted in the study have provided evidence that use of radio and television and frequency of using multimedia materials have significant associations with age and gender of a learner and having access to internet while there is no association between 'learner's age' and use of different ICT tools, and downloading and use of online materials. These findings are also supported by the study conducted by Simonds and Brock (2014), that found a statistically significant relationship between age of students and their preference for using online learning. Based on a survey and online focus groups with different students, it was found that older students prefer videos of professor lectures while the younger students prefer more interactive learning materials. Similar results were found by Owate et al. (2017) to understand demographic variables and students' use of e-learning resources in Nigerian schools. The study showed significant differences in use of e-learning resources between younger and older students. In another study by Wehrwein et al. (2007), it was evident that significant differences existed in learning style preferences between males and females. The study has highlighted the importance of supporting equitable learning opportunities to all so that different genders are allowed to learn from one another. Considering the literature and findings of the current study, it was evident that independent demographic variables such as age, gender, and internet availability and accessibility have influences on the use of e-learning resources.

The use of multimedia materials can be enhanced if proper strategies are implemented to produce quality materials and disseminate them efficiently to the end-users. Authorities and policymakers can plan unique strategies to motivate the learners about the significance of multimedia materials and the benefit from using them. Based on the findings of this study, appropriate multimedia materials should be developed and made easily accessible to all to address the demographic diversity. Specific strategies can also be designed so that multimedia materials reach the learners having no access to internet.  Regional/study centres need to be well equipped so that teachers or coordinators can make use of the multimedia materials efficiently in the teaching-learning process in their centres.

Like any other research, there is scope for further studies in this area. Since this study was conducted before the pandemic struck the world, a study can be done to assess the use of multimedia materials during the pandemic when online learning is being used by learners around the country. Another study can be done to understand the effectiveness of the multimedia materials. Similar studies can be conducted in other educational institutions with larger sample size.

## Conclusion

Multimedia technologies have the potential to turn the world into a smaller place to live in and can thus eliminate the gap between learners and teachers. This study has attempted to provide an overview of the availability and usage of multimedia tools for learning in the selected open universities of India. It has also assessed if the use of multimedia learning materials is affected by the sociodemographic and independent variables of gender, age and access to the internet. Quantitative data were collected from respondents of the selected universities to learn more about the multimedia materials they are using, their nature and frequency of using the materials. The qualitative data collected through focus group discussions of selected respondents revealed the different multimedia materials used by the

learners and barriers faced in using them. The statistical chi-square test established the relationship between dependent and independent variables investigated in the study. The respondents in this study agreed that multimedia materials are appealing to them, and they should be provided with more such materials along with the printed SLM. Materials should be user friendly and should developed in interesting and engaging formats. This study will provide insights to the authorities of educational institutions to plan a better strategy to boost the use of multimedia materials provided by the institutions to their learners.

## Acknowledgement

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