

Chapter III

RESEARCH DESIGN - DATA AND METHODS

This chapter provides the research framework, along with the explanation of the variables. It also includes the operational definitions of the terms used in the study, the theoretical framework, quantification of variables and the research methodology adopted. The research methodology section explains the research area, tools and techniques of data collection, sampling methods and techniques of data analysis.

3.1 Conceptual Framework

The study is on the new media technologies' usage in the field of distance education, confined to the few distance learning institutions of India and specifically on Assam. It is necessary to analyse the main terms used in the thesis, as many of the terms are relatively new and less familiar. The two most important terms of the study are discussed here in details:

3.1.1 *Concept of New Media*

According to Craig Robertson, "To understand what is meant for old media to be new is to come to recognize that through history, the meaning of any new media is up for grabs: its social role, who can make use of it, who will organize its

distribution, etc.” (Robertson, 2006). Many media forms have evolved and upgraded over the time and many have been developed to meet the communication demands. The unifying term ‘new media’ refers to a wide range of technological as well as textual, conventional and cultural changes in media production, distribution and use (Lister, Dovey, Giddings, Grant & Kelly, 2009). The term ‘media’ usually refers to communication media and the organizations in which people work and the products of these organizations. The connotations of the ‘new’ as derived from a modernist belief are, ‘the cutting edge’, the ‘avant-garde’. The term ‘new media’ is all inclusive; it refers to a range of phenomena, unlike the terms ‘digital media’, ‘electronic media’ or ‘computer-mediated communication’.

According to Webopedia, ‘new media’ is a generic term for the many different forms of electronic communication that are made possible through the use of computer technology. New media includes websites, streaming audio and video, email, online communities, DVD and CD-ROM media, virtual reality environments, internet telephony, digital camera and mobile computing (www.webopedia.com).

The term ‘New’ proposes a novelty, it captures the newness of the media, along with the newness in the sense of their use, deployment and practices involving them. The ‘New Media’ is ‘new’ in the sense that it has transformed cinema, television, communication storage and transmission, leisure and computing (Nayar, 2012).

Martin Lister, et al (2003) say that new media are often referred to as ‘digital media’ or ‘digital new media’ or ‘the media that use computers’. In digital media process, all input data are changed into numbers. Pierre Levy (1998) summarized ‘digitality’ as, “The established differences between author and reader, performer and spectator, creator and interpreter become blurred and give way to a reading writing continuum that extends from the designers of the technology and networks to the final recipient, each one contributing of the activity to the other – the disappearance of the signature”. According to Lev Manovich, the popular idea of new media identifies it with the use of a computer for distribution and exhibition; hence, texts distributed on a computer are considered to be new media, whereas texts distributed on paper are not (Manovich, 2001). Manovich listed the categories commonly discussed under the ‘new media’ as, the Internet, websites, computer multimedia, computer games, CD-ROMs and DVD, virtual reality, and so on. Today, we are in the center of a new media revolution – the shift of all culture to computer-mediated forms of production, distribution and communication.

New media is an umbrella term, under which various forms of media are listed, such as texting, mobile phones, gaming, interactive TV, hypertext and blogging. New media’ is mainly used to describe computer cultures and within this, Internet cultures. The other usual term is ‘digital media’, which signals more towards the technological aspect rather than the social implications and contexts (Nayar, 2012).

Historically, media have undergone many changes to develop, adopt and to be accepted widely. It has travelled a long way since Gutenberg's printing press. Since the 1830s to the present times, media technology developments include telegraph, telephone, radio, television, cinema, computer and the Internet. And today, the media industry is undergoing a major transformation due to the introduction of the digital technology. The use of digital computer technology in media production, development, distribution, storage and use is what new media technology is about. According to Lev Manovich, new media operates through processes of 'numerical representation' while old media do not. Tony Feldman says new media makes information highly manipulable, networkable, dense, compressible, and impartial.

The new media technologies create just the right environment for today's busy distance learners. Most technologies described as new media are digital, having the characteristics of being manipulable, networkable, dense, compressible and interactive. New media technologies have strong portability; they enhance learning through interaction and collaboration, as they provide two-way communication, which is very helpful to the distance learners. The busy learners could access the study materials and information at any time and at any place with the help of the new media technologies. These technologies do not require a classroom to impart education to the users, and hence they are best suited for distance education scenario. New media technologies enhance learning through interaction and collaboration; it creates a learning community, providing access to

a variety of online resources, allowing new skills or knowledge to be applied immediately. One of the most advantageous characteristics of new media technologies is that it does not need a classroom, which creates the right kind of environment for distance education for the busy learners of these days. New devices having new features are increasing everyday providing various opportunities to the distance learner. E-learning is a generic term used to describe a wide range of applications of electronic technologies, like television, radio, CD-ROM, DVD, cell-phone, internet, etc., on study environments, with the special emphasis on learning through the web.

Generally we think that the message is the most important element, and that numerous messages that come of the same technology are for very different purposes; for example, the electric light can be used for sports and in operation theatres. But Marshall McLuhan argues that the medium contains its own message (McLuhan, 2011). The technological medium forms our perception towards the world, the way we interact with the world. As per McLuhan's idea on "hot and cool media", a medium is "cool" if it requires interaction or audience participation. In this context, new media could be termed as "cool" medium as it is interactive and engaging.

3.1.2 Concept of Distance Education

The National Extension Institute was established in the year 1963 in the United Kingdom, as a model for an open university (Perraton, 2007). The main

philosophy of distance education is to make education accessible and available for all. This philosophy stresses the flexibility of the system to eliminate difficulties caused by barriers of age, geographical location, time constraints and economic situation, and so on (Bates, 1995). Open and distance learning (ODL) is therefore a system which unites the methodology of distance education with the concepts of open learning and flexible learning. As acknowledged by UNESCO (1997), “Education is a basic human right and a universal human value and should be made available over the entire lifetime of each individual”.

Distance education is a broad term that includes distance learning, open learning, networked learning, flexible learning, distributed learning and learning in connected space. Definitions vary with the distance education culture of different countries, but there is some agreement on the fundamentals. Desmond Keegan (1990) prefers to use the term “distance education” because it includes both distance learning and distance teaching. Distance learning is learning while at a distance from one’s teacher, usually with the help of pre-recorded, packaged learning materials (Rowntree, 1992). Distance learning is generally recognized as structured learning experience that can be done away from an academic institution, at home or at a workplace. Desmond Keegan (1993) identifies six key elements of distance education, they are:

- Separation of teacher and learner
- Influence of an educational organization
- Use of media to link teacher and learner

- Two-way exchange of communication
- Learners as individuals rather than grouped
- Education as an industrialized form

Distance learning is flexible in nature, which fulfills the needs and demands of the learners. With the rapid progression in the technology and networks, the forms of instructions in open and distance learning have changed from only print to including technological ones as well.

The term ‘distance learning’ is used as a synonym for the term ‘distance education’. Distance education is any educational process in which all or most of the teaching is conducted by someone removed in space and /or time from the learner. The historical evolution of distance education has been in four main phases – Correspondence system, Educational television or radio systems, Multimedia systems and Internet-based systems (Unesco, 2002). In the Internet-based systems, multimedia materials in electronic format are delivered to learners through computers.

The concepts are the basic tools of thought that enable us to study digital technologies as media. The concept of open and distance learning and its definition are relatively new in the field of distance education, having gained prominence only in the 15 to 20 years. The language and terms used to define distance education could be different in different places. Phipps and Merisotis (1999) say, “It is important to understand what is meant by ‘distance learning’.

Because the technology is evolving, the definition of what distance learning is continues to change (Phipps and Merisotis, 1999, p.11)”. The United States Distance Learning Association defined distance learning in 1998 as, “the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance (Roblyer and Edwards, 2000, p.192)”.

3.2. Theoretical Background

Importance of a theory to a research problem cannot be denied, Garrison (2000) wrote, “Theoretical frameworks and models are essential to the long term credibility and viability of a field of practice”. The development of theory for distance education is considered as crucial for its sustainability. There have been arguments since long that there is the requirement of a global, comprehensive theory which can explain all activities related to distance education. There is a positive correlation between the increase in new technology being integrated into society and the development of new theories on how to use technology as a catalyst of learning. The most prevalent of these new leaps in technology is the use of the Internet in teaching and learning. Online learning environments have changed the dynamics of the traditional classrooms. Technology is simply a tool to aid education and learning and allows students to do a lot of research using Internet and other tools. Technology can be used as a platform for collaboration

among learners and teachers. New Media Technologies, such as OERs, Social media, websites and the likes open up numerous opportunities for distance learners to increase their knowledge level. The theoretical framework would provide a background into media technologies and their usage in education, along with explaining the field of distance education.

Larreamendy-Joerns and Leinhardt (2006) defines three views or visions that propel educational technology use and development. They are the presentational view, the performance-tutoring view and epistemic-engagement view. The presentational view focuses on theory and practice that make our discourse and especially our visualizations more clearly accessible to learners. Theories of multimedia use focus on the cognitive effect of selecting and transmitting relevant images and words.

Credited for major contributions to the Sociocultural Constructivist theory is L.S. Vygotsky. A Russian psychologist, Vygotsky is well known for his Zone of Proximal Development theory (ZPD). The ZPD is often described as the relation between what a learner knows and the knowledge that exists within the social context (Staupe & Hernes, 2000). Through interaction within the social sphere, the knowledge level of the learner increases and the opportunity provides scope for acquiring a new level of knowledge. Zeina Nehme (2008) describes how a socio-cultural learning environment would work in a synchronous online community of learners. She states that “the synchronous online tool is the mediator and the social area is achieved through the different types of communication, collaboration,

cooperation and interaction that happen among the moderator and the learners online” (Zeina Nehme, 2008, p. 247). The online learning environment creates a framework for interaction among participants from diverse cultures and makes them learn and grow.

During 1997, Micheal Moore developed the Transactional Distance Theory. Gorsky and Caspi (2005) agree that Transactional Distance is viewed as a framework for understanding distance education and the way it affects those who participate in such learning environments (Gorsky and Caspi, 2005). According to Moore, in distance education, there exists the physical distance between the learner and the teacher and hence, increase the scope for miscommunication among the two. And this distance involving in raising miscommunication is defined as transactional distance. The principle factors that determine the Transactional Distance with a particular learning environment are the amount of dialogue, structure and learner autonomy present (Moore, 1993). Online education has the ability to adapt instruction based on the learner autonomy. Regarding the application to distance education based on a range of technologies in the spectrum available across the generations, Moore and Kearsley (1996) argue that different technologies can support the use of a variety of media. For instance, certain books, audio-tapes, or video-conferences are different in the ways they support varying degrees of structure in educational programs, different degrees of dialog between teachers and learners as well as differing degrees of self-directedness of the learners (Moore and Kearsley, 1996).

Transactional distance included the distance that exists in every educational relationship. There need to be a particular amount of structure in distance education that fosters a certain amount of dialogue between the learner and instructor. On the other hand, Social Presence is a strong communication component that reduces isolation between the distant learner and other learners and instructor. Lack of social presence might affect the performance level of the learner and the outcomes during the instructional transaction. Social presence is the degree to which a person is perceived as a real person in a mediated situation (Short et al., 1976).

People can learn more from pictures, sounds and words than words alone. The Cognitive Theory of Multimedia Learning, developed by Richard E. Mayer in 2005 asserts the interests and usefulness of multimedia learning. Since long, words have been the major format for instruction, both verbal and written. In distance learning environment, written words remained to be the major format for delivering knowledge. Due to technological advances, pictorial forms of instruction are becoming popular and widely available. Multimedia instructional messages that are designed in light of how the human mind works are more likely to lead to meaningful learning (Mayer, 2005).

Whether in positive or negative way, mass media do affect the lives of the mass people. Although social psychologists been studying these effects for many decades, the cognitive psychologists have recently started to study mass media and exploring their effects on certain cognitive processes. Media is an important source

of knowledge, and how people process that information is vitally important to understand their effects on attitudes and behaviour. As the media becomes technologically more advanced, the researchers should continue to examine the possible effects of these media on the users. Technological Determinism Theory states that media technology shapes how we as individuals feel, think, act and how the society operates as we move from one technological age to another. The advent of computers itself altered the very texture of daily life to a great extent. When new technological developments take place in the society, the culture changes to adapt to that technology. The term 'technological determinism' is believed to be coined by Thorstein Veblen, an American sociologist who lived between 1857 and 1929.

Theory of Independent Study by Charles Wedemeyer asserts that the essence of distance education is the independence of the student. Wedemeyer sets a system with ten characteristics emphasizing learners' independence and adoption of technologies as a way to implement that independence. In the 1960s, Wedemeyer broke from the concept of correspondence study and focused instead on independent study or learning.

3.3 Research Variables

In order to study the use of new media technologies in the field of distance education and the impact factors that determine its usage, the under-mentioned variables have been formed.

The independent variables for the research have been categorized in two sections, the first section comprises of “**available new media technology**”, and “**new media technology preferred and used**”. The second section of independent variables are considered to be the demographic characteristics of the open and distance learners, which are “**locality**”, “**age**”, “**gender**”, “**educational qualification**”, and “**employment status**”. These factors are considered to be the independent variables for the present study as manipulation of these factors would influence the “**use-pattern of new media technology in distance learning**” as well as “**the benefits or impact on distance education and distance learners**”, which are considered to be the dependent variables in the present study.

3.4 Research Questions

It is necessary to address the research objectives before explaining the research methodology as the nature and context of research objectives would determine the methodology to follow (Saunders, Lewis, & Thornhill, 2009). The proposed study will be carried out by forming the following research questions:

- 1) Are the leading open and distance learning institutes in India changing their mode of delivery from traditional print to new media technologies?
- 2) Are the learners already using new media technologies in receiving education, benefited and satisfied?

- 3) What factors affect the delivery system of study contents to learners through distance education?
- 4) What uses are preferred by learners in regard to new media?
- 5) What gratifications the learners perceive from the use of social networks?
- 6) What motivates the learners to use new media?

3.5 Research Methodology

3.5.1 *Research Approach*

The methodological approach selected for the study is a descriptive one. Descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. It helps to explain educational phenomena in terms of the conditions or relationships that exists, opinions that are held by the students, ODL institutions/ universities, experts, process that are going on, effects that are evident, or trends that are developing. The present study adopts combination of both quantitative and qualitative research approach for the convenience of the study. A quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind.

3.5.2 *Research Methods*

In the present study, the basic objectives have been to study the delivery mechanism of open and distance learning materials of ODL institutions and the use of new media technologies in open and distance learning. This part of the chapter provides a rationale for the research design, which was implemented through the use of mixed methods by interviews, a questionnaire based survey and case study and focus group discussions. The study combines both qualitative and quantitative research approaches, since it will be directed at making careful observation of the use of new media technologies in distance learning and scientific methods would be used to seek answers to the causes and reasons for the observed phenomenon. The study will be qualitative because it seeks to gather in-depth understanding of the issues and reasons related to the use of new media technologies in distance education. The study is also quantitative since it will conduct an empirical investigation of the propositions through statistical techniques. Mixed methods have gained popularity as a result of approach development and have the strengths of both qualitative and quantitative research (Creswell, 2011).

Based on the aims and objectives of the study and review of related literature, mixed methods are adopted by a concurrent triangulation strategy. Triangulation generally ‘refers to the application and combination of several research methodologies in the study of the same phenomenon’ (Bogdan & Biklen 2006). In a concurrent triangulation approach, both quantitative and qualitative

data are collected concurrently and then the two databases are compared to determine if there is convergence, difference or some combination (Creswell, 2011). The data gathered through the quantitative and qualitative methods can complement each other to reach more valid findings. In the recent years, it has been felt that any one method of data collection is insufficient; hence, it has become more acceptable to combine quantitative and qualitative research. The study uses triangulation methodology which involves the following methods of data collection: (a) survey of distance learners, (b) in-depth interviews of the heads of the ODL institutions/universities (c) focus group discussions and (d) secondary quantitative and qualitative data available in related literatures.

In the present study, questionnaires are employed to generate quantitative data from the distance learners regarding usage of new media technologies, available NMTs and delivery mechanism of ODL materials. Simultaneously, in-depth interviews are conducted among the heads/appropriate authorities of the ODL institutions/universities and focus group discussions are held among few groups comprising learners, coordinators and counselors of KKHSOU. The quantitative and qualitative data obtained from three methods are used to validate/substantiate the findings from the questionnaires. On the other hand, various literatures on OLD universities and Institutions in India are also surveyed and relevant quantitative and qualitative secondary data are collected. This methodology has been designed keeping in view the methodology being adopted in some previous studies involving the issue of the present study.

3.5.3 Selection of Research Locations

3.5.3.1 Selection of research location for field study of ODL learners

The study would seek to delve into the usage and benefits of new media technologies received by the distance learners of India, and specifically, Assam. The research also seeks to study the present delivery mechanism being utilized by open and distance learning institutions/universities of India, especially Assam. For an in-depth study, a survey would be conducted among the learners of the study centres of KKHSOU, located within the state of Assam. The KKHSOU is the first and only state open university of the entire north-eastern region of India, which was established in 2007 to impart higher education to almost every corner of the state of Assam, establishing a number of study centres around the state to achieve its motto of 'Education beyond barriers'. The university has been providing education in the distance mode through the study centres, few of which are also located outside the state. Before the establishment of KKHSOU, distance learning has been imparted in the state of Assam by the Regional Centre of Indira Gandhi National Open University, located in Guwahati, though it provided selected number of courses for the learners of North-east India, and by the regional centres or study centres of many other distance learning institutions of the country, like Annamalai University (Directorate of Distance Education), Tamil Nadu Open University, and so on. The medium of instruction adopted by these distance learning institutes/ universities was in English or Hindi, which posed to be a barrier for many learners of Assam, to some extent. KKHSOU provided its study

materials and learning instructions in English as well as Assamese, allowing many more aspiring learners to carry on their studies through the distance mode. The university also started many courses for the benefit of the learners and adopted technologies to impart learning. Hence, a study on the delivery mechanism and usage of new media technologies by KKHSOU is important to understand the scenario of distance education as well as the use of new media technologies in distance mode in the state of Assam.

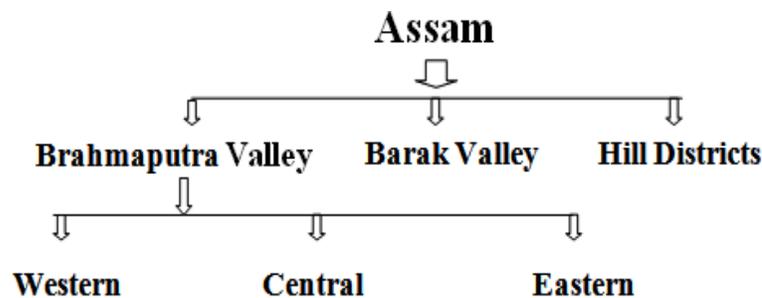


Fig. 3.1: Zone-wise distribution of Assam state

(Source: Figure prepared by the researcher)

The state of Assam has been divided into different geographical zones, namely, Brahmaputra Valley, Barak Valley and Hills Districts, to make the study representative, as the samples are selected from the study centres of KKHSOU, located in the distributed zones of the state. The Brahmaputra Valley is further sub-divided into Western, Central and Eastern zones, as shown in the figure 2.1.

3.5.3.2 Selection of ODL Institutions / University locations

The research also seeks to study the present delivery mechanism being utilized by open and distance learning institutions/universities of India, especially Assam. Hence, case study has been done on five leading and operating open and distance learning institutions/ universities of India, located at different areas of the country, which would help in drafting a picture of the present status of use of new media technologies in India. These five universities/ institutions have been selected on the basis of their number of years of existence and the extent of usage of new media technologies in their teaching and learning process. These universities/institutions are already using various new media technologies in their education system to some extent, for the benefit of their learners. The dates of establishment of the five selected universities/ institutions ranges from 1979 to 2007, which would help in understanding the growth of the use of new media technologies in distance education in the last two and half decades. The selected universities/institutions are:

- Dr. Bhim Rao Ambedkar Open University, Hyderabad, Andhra Pradesh
- Yashwantrao Chavan Maharashtra Open University, Nashik, Maharashtra
- Annamalai University, Directorate of Distance Education, Tamil Nadu
- Krishna Kanta Handiqui State Open University, Guwahati, Assam
- Indira Gandhi National Open University Regional Centre, Guwahati, Assam

3.5.4 Sampling Design and Sampling procedure

The population of the proposed study is formed by the learners of the various Post Graduate (PG) and Under Graduate (UG) level courses of the first state open university of the North-east India, Krishna Kanta Handiqui State Open University (KKHSOU). The University also offers courses on BPP (Bachelors Preparatory Programme), many certificate and diploma courses as well, but the learners enrolled in these courses were not considered for the present study considering the short duration of these courses, as compared to the UG and PG courses. The short duration of the BPP, certificate and diploma courses would not sufficient for the learner to understand and utilize the new media technologies adopted by the University for teaching and learning. The university, at present (2014-15), provides UG courses namely Bachelor of Arts (BA), Bachelor of Mass Communication (BMC), Bachelor of Business Administration (BBA), Bachelor of Computer Applications (BCA) and Bachelor of Commerce (BCom). The PG courses offered are Master of Mass Communication (MMC), Business Administration (MBA), Computer Application (MCA), Social Works (MSW), Information Technology (MSc IT), Economics (ECO), Applied Economics (AEC), and Master of Arts (MA) in many subjects, alongwith Post Graduate Diploma in Computer Application (PGDCA), Business Management (PGDBM), Tourism and Hospitality Management(PGDTHM), Broadcast Journalism (PGDBJ) and Mass Communication (PGDMC). The learners enrolled in the UG and PG courses during the 2012-13 session have been selected for the study, as they have already

completed atleast one year of academic programme in the distance mode and hence, have experience of using or getting benefits of the new media technologies used by the particular University.

The study centres of the University have been selected on the basis of their geographical locations in Assam, so that whole of the state is covered. The study centres offering both UG and PG level courses and those with the highest number of enrolment have been considered for the present research. 46 study centres of KKHSOU, located in various parts of Assam have been selected, on the basis of the courses (UG and PG) offered and the number of enrolment. The selected study centres are representative, as they include 28 centres offering UG level courses and 18 centres offering PG courses. The selected study centre offer either UG or PG course or both and has a high number of learners enrolled. Table 3.1 provides the number of study centres of KKHSOU selected for the sample survey:

Table 3.1
Zone-wise distribution of selected study centres of KKHSOU

Zones →	Brahmaputra Valley	Barak Valley	Hill Districts	Total
Number of Study Centres selected for UG level	22	4	2	28
Number of Study Centres selected for PG level	14	3	1	18
Total study centres	36	7	3	46

Source: KKHSOU Official Documents

The list of selected study centres of KKHSOU is given below in Table 3.2:

Table 3.2
List of selected study centres (Zone-wise)

ZONES	Brahmaputra Valley	Barak Valley	Hills Districts
Name of selected study centres providing UG courses	<ol style="list-style-type: none"> 1. Tinsukia College 2. Sibsagar College 3. Bir Lachit B. College 4. J B College 5. Cinnamara College 6. Sarupathar College 7. DHSK College 8. Nandalal Barauah City College 9. Brilliant Academy 10. Mangaldai College 11. MNC Open College 12. Nalbari Commerce College 13. Rangapara College 14. Nowgong College 15. Lakhimpur Girls College 16. North Lakhimpur College 17. Cotton College 18. Pragjyotish College 19. Darwin School of Correspondence 20. Dispur College 21. Jawaharlal Nehru College 	<ol style="list-style-type: none"> 1. Ramkrishna Nagar College 2. ALC College, Algapur 3. Cachar College 4. Miraj Foundation 	<ol style="list-style-type: none"> 1. Maibang College 2. Diphu Commerce College

	22. P B College		
Name of selected study centres providing PG courses	<ol style="list-style-type: none"> 1. Brilliant Academy 2. Nandalal Baruah City College 3. DHSK College 4. Cinnamara College 5. Cotton College 6. Dispur College 7. North Lakhimpur College 8. Morigaon College 9. Nowgong College 10. MNC College 11. Nalbari Commerce College 12. Sibsagar College 13. Moran College 14. AIMCMR 	<ol style="list-style-type: none"> 1. Cachar College 2. Ramkrishna Nagar College 3. BDPS Computer Education Society 	<ol style="list-style-type: none"> 1. Maibang College

Source: Official Documents of KKHSOU

The research has a finite population of 7131, registered with respective enrolment numbers in the selected 46 study centres of KKHSOU, under different PG and UG level courses. Tippett's random number tables are used for the purpose of selecting samples from the given population. The sample is drawn based on their respective enrolment numbers, as recorded in the KKHSOU official documents.

The sample size has been estimated for each zone using the Krejcie and Morgan (1970) formula, which they used in their article “Determining Sample Size for Research Activities”. The formula used to determine the sampling size is as follows:

$$S = \frac{X^2 NP (1-P)}{d^2 (N-1) + X^2 P (1-P)}$$

Where, S = required sample size; X^2 = Chi-square for the specified confidence level at 1 degree of freedom; N = Population size; P = the population proportion (assumed to be .50) and d = the degree of accuracy expressed as a proportion.

The calculated sample size for a population of 6332 (Brahmaputra Valley), a confidence level of 95%, and a margin of error (or degree of accuracy) of 3.5% would be 698. Similarly for population of 482 (Barak Valley), the sample size is 299, and for 317 (Hill Districts), the calculated sample is 226. Hence, the total sample size is 1223. The zone-wise distribution of the population, along with the calculated sample size has been shown in the table below:

Table 3.3
Zone-wise distribution of total population and sample taken

Zones ↓	Total population of selected Study Centres (UG&PG)	Total sample taken (UG&PG level)
Brahmaputra Valley	6332	698
Barak Valley	482	299
Hill Districts	317	226
Total	7131	1223

Source: KKHSOU Official Documents (2012-13)

3.5.5. Tools and Techniques of Data Collection

The data for the study are collected from both primary and secondary sources; they have been closely studied, since the authenticity of the sources is an important aspect of a research. The primary sources are surveyed with the help of a structured questionnaire and in-depth interviews with learners and administrators of the five selected distance education universities/institutions of India, for obtaining information.

The study is based on both primary and secondary sources. Keeping in view the objectives and variables under study, a questionnaire and an interview schedule were prepared to collect relevant data from the respondents.

3.5.5.1 Interview schedule for In-depth Interviews

An interview schedule with open ended questions was prepared for the administrative heads/appropriate authorities of the five institutions/ universities, addressing the present status of the delivery of learning materials in ODL, use of new media technologies and its perceived impact. The selected ODL universities/institutions are Dr. B.R. Ambedkar Open University, Hyderabad, Yashwantrao Chavan Maharashtra Open University, Nashik, Annamalai University Directorate of Distance Education, Krishna Kanta Handiqui State Open University and Indira Gandhi National Open University Regional Centre at Guwahati.

The Interview Schedule included both close-ended and open-ended questions, which were responded to by the institutional heads/appropriate authorities of each selected university/ institution. The interviews were recorded and schedules were filled-in by the researcher in case of few face-to-face interactions with few institutional heads, whereas in the other cases, the schedules were administered via e-mail, which were filled-in by the respondents themselves and sent back to the researcher again via e-mail.

3.5.5.2 Questionnaire for field study of Distance learners

A structured questionnaire was prepared to address the present status of the delivery of learning materials to ODL learners of KKHSOU, Guwahati to analyze the use of new media technologies in the delivery mechanism and its benefits. The questionnaire has been formed in the Matrix Questions Format, using Lickert response categories (1 to 5). The questionnaire was pretested to locate any ambiguity in the questions. The required information was obtained using the pretested questionnaire, which was distributed to the respondents through their respective study centres, located in various parts of Assam.

3.5.5.3 Focus Group Discussion

Focus Group Discussion (FGD) is a research strategy to understand the audience attitude or behaviour. In a Focus Group Discussion, 6 to 12 people are interviewed

simultaneously with a moderator leading the respondents in a discussion on the focal topic. In the context of the present study, 3 focus groups have been considered for the discussion on the understanding, use and benefits of the new media technologies in distance education. Each focus group comprised of counselors and learners, with the researcher acting as the moderator. The FGDs were conducted in three selected study centres of KKHSOU; the study centres were selected on the basis of the number of learners, availability of both post graduate and under graduate courses, as well as convenient geographical locations. Each discussion was conducted for 15 to 20 minutes, where the participants offered their views on the availability of new media technologies for distance education, their use and benefits, challenges faced, and future prospects of their usage.

3.3.4.4 Tools and techniques for secondary data collection

The present study is heavily dependent on various quantitative and qualitative secondary data on Open and Distance learning available in different sources. Therefore those literatures have been thoroughly reviewed and relevant data are collected. The available literature related to the present study is thoroughly investigated. For this purpose secondary data were collected from various available literatures like websites of ODL Universities/ Institutions, research publications, reports, students' records, institutional documents, archival materials and published books, articles, reports, papers, journals, internet based articles on

the subject for collecting data to support the objectives. However, authenticity and reliability aspects were kept in mind in the process of selection of literature.

A case study uses as much data sources as possible to systematically investigate individuals or organisations. It investigates a contemporary phenomenon. In the present study, the websites and other available new media technologies of the five ODL universities/institutions of India, selected for the case study, were studied and an attempt was made to interpret the use of new media technologies by the universities/institutions. Those ODL Universities and ODL selected for the case study, out of which two were visited personally by the researcher, while the rest of the universities/institutions were investigated with the help of resources and information available on their respective websites and other related relevant online sources.

3.5.6. Pilot Research

For the phase of pilot study, a sample of 40 learners was selected using purposive sampling technique. The prepared questionnaires were administered to the selected learners. Based on the data provided, and the challenges faced by the learners, a few changes had been made in the questionnaire, which was used for the empirical research in the later stage.

3.5.7. Methods of Data Analysis

Methods of data analysis used for the study are discussed below. The primary data collected from the sample learners were scored, tabulated and analyzed.

3.5.7.1 Analysis of Data collected by Questionnaire

The data collected through the questionnaire are first organized. The raw data has been computerized, where the data is categorized and coded. The codes has been analysed using the statistical software packages, they were treated like other nominal or ordered categorical data. The frequencies of different types of response have been counted or cross-tabulated. Statistical techniques have been utilized to analyze the primary data at the later stages.

Profiling of the respondents has also been done by tabulating the data provided in the questionnaire. MS Excel and SPSS software is used to process the data analysis.

3.5.7.2 Analysis of Data collected by Personal Interview

The interview data are organized and patterns or themes among the data are identified. The approach of Thematic Analysis of the interview data has been selected for the present study. The themes of the data were identified, and the data was analysed using cross-case analysis.

3.5.7.3 Analysis of Data collected by Focus Group Discussion

Based on the previous literature review and objectives of the study, focus group questions were developed, revised and divided into several domains. The domains were delivery mechanisms of study materials for distance learning, use of new media technologies, their utilization, benefits and challenges. The same set of

questions was used for data collection from the three different focus group discussions. The collected data was analyzed qualitatively on the basis of the themes selected.

3.5.7.4 Analysis of Secondary Data

Secondary data collected through different sources are reviewed and cross-checked before using those data wherever necessary in the study.

3.5.8. *Statistical tools used in this study*

Various statistical tools like frequency and percentage, contingency table and chi-squared test, Principal Component Analysis (factor analysis), Cronbach's alpha scale-reliability tests, one-way ANOVA, effect size (omega squared) are used for analysis of survey data collected through questionnaires.

3.5.8.1. Frequency and Percentage

“A percentage frequency distribution is a display of data that specifies the percentage of observations that exist for each data point or grouping of data points. It is a particularly useful method of expressing the relative frequency of survey responses and other data” (Lavrakas, 2008, p. 577). For the purpose of this study, the primary data is first analyzed in terms of frequencies and percentages to interpret the demographic profile of the sample and with parameters related to the use of new media technology. They were also used for interpreting to the use-

pattern of various new media technology tools by the students and the problems associated with the use.

3.5.8.2. Contingency table and Chi-squared test

A contingency table is a type of table in the format of matrix that displays the (multivariate) frequency distribution of the variables. Contingency tables are constructed by listing all the levels of one variable as rows in a table and the levels of the other variables as columns, then finding the joint or cell frequency for each cell. They provide a basic picture of the interrelation between two variables and can help to find interactions between them.

Hypothesis tests on contingency tables are based on a statistic called Chi-square. Chi-square test is widely used in the mass media research (Wimmer & Dominic, 2006). Chi-square test has been used to find out the association between dependent variables and different selected independent variables. The chi-square test is a tool which helps to determine whether or not it is worth the researcher's effort to interpret a contingency table. A 'significant' result (where $p < .05$) of this test means that the cells of a contingency table should be interpreted on the other hand a 'non-significant' test (where $p > .05$) means that no effects were discovered and the observed differences in the cells could be explained by chance. In this case, an interpretation of the cell frequencies is not useful.

3.5.8.3. Principal Component Analysis

Principal Component Analysis (PCA) is a kind of data reduction technique. It 'is a procedure for identifying a smaller number of uncorrelated variables, called "principal components", from a large set of data. The goal of principal components analysis is to explain the maximum amount of variance with the fewest number of principal components' (Minitab® 17 Support, 2015). "Variables that have a high correlation between them and are largely independent of other subsets of variables, are combined into factors." (Gaur & Gaur, 2009, p.131). For the purpose of this study PCA was used to extract the important problems (factors) perceived by the learners of distance education from the statement based questions in likert scale format. The identified problems are later prepared for further analysis using other techniques like one-way-ANOVA and effect size calculation by omega squared.

3.5.8.4. Cronbach's Alpha test of Scale-reliability

The coefficient of 'Cronbach's alpha determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability (Santos, 1999). Here in this study Cronbach's alpha is used to check the internal constituency of the factor scale (problems) extracted by Principal Component Analysis. More the value of Cronach's alpha closer to 1, more is the reliability of the scale constructed.

3.5.8.5. One-way ANOVA

“The one-way analysis of variance (ANOVA) is used to determine whether there are any significant differences between the means of two or more independent (unrelated) groups. The one-way ANOVA compares the means between the groups you are interested in and determines whether any of those means are significantly different from each other.” (Laerd Statistics, 2013, p. 1). The null hypothesis of the ANOVA tests that samples in two or more groups are drawn from populations with the same mean values. Usually the one-way ANOVA is used to test for differences among at least three groups rather than two, since the two-group case can be covered by Student’s *t-test*. For two-groups case, *t-test* and the *F-test* (for ANOVA) are equivalent. In this study one-way ANOVA was used to analyse the effect of independent variables on the problems (factors) extracted from the Principal Component Analysis.

3.5.8.6. Omega Squared for Effect Size Calculation

‘Omega squared (ω^2) is a measure of the strength (or magnitude) of an effect. Omega squared is relevant to experimental studies that have been analyzed using one-way or factorial analysis of variance’ (Voi, 2007). In this study omega squared were calculated for significant ANOVA tests see the effect of a particular independent variable on a problem (factor) indentified by principal component analysis.

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