



CHAPTER 3

3.1. Introduction

This chapter presents a discussion of the methodology that is applied in the current research investigation. The research methodology provides a means of systematically resolving the issue the research sought to investigate. It is the scientific way of studying the research problem. It is the "blueprint" of the entire process of the study, which consists of collecting data, testing the hypothesis, and analyzing the data that was gathered (Kothari, 2004). In addition, it is “the framework that governs the entire process of research” (Creswell and Clark, 2007). The selection of a suitable research methodology is a crucial determinant of the precision and dependability of the findings obtained from a study. The present chapter aims to elucidate the methodology employed in the present study. This chapter provides an outline of an in-depth discussion of the research method, the population, the sample, and the sampling techniques, as well as a description of the research tools used for data collecting and the statistical techniques applied for the analysis of the data for this research. The subsequent sections of this chapter focus on the various methodologies employed in the investigation, comprising ten sections, each centred on a specific methodological consideration:

3.2. Locale of the Study

3.3. Research Design

3.4. Research Method

3.5. Population

3.6. Sample and Sampling Technique

3.7. Tools

3.8. Procedure of Data Collection

3.9. Data Analysis

3.10. Standards of Trustworthiness for the Qualitative Data

3.11. Ethical Considerations

3.2. Locale of the study

According to the official list issued by the UGC as of 1st January 2023, the North East Region of India consists of 11 central universities. From among these 11, three universities have been excluded from the research study, owing to specific reasons:

- The researcher decided not to include the Central Agricultural University in Imphal, Manipur, as well as the National Sports University in Koutruk, Manipur, because these universities focus specifically on agricultural sciences and sports education-related areas. This research had no bearing on either agricultural or sports education.
- Secondly, Tezpur University, located in the state of Assam, has not been included because it served as the testing ground for the research tools used in the study. Tezpur University has been initially included as a site for the piloting phase of the research; it has been subsequently excluded from the final sample for the research.

As a result, the focus of the present research has been on eight central universities that provided a diverse array of academic fields and encompassed a wider scope of disciplines. Table 3.1 below presents a concise overview of the 8 central universities located in the North-East region of India.

Table 3.1: An overview of the 8 central universities of North-East India

Serial No.	Name of the University	Location	Year of Establishment
1	Assam University	The main campus is located in Silchar, Assam, with an additional campus in Diphu, located in the Karbi Anglong district of Assam.	1994
2	North Eastern Hill University	The university is comprised of two distinct campuses, located in Shillong and Tura, respectively, both situated within the state of Meghalaya.	1973; 1996(Tura campus)
3	Rajiv Gandhi University	Rono-Hills, Doimukh, Arunachal Pradesh	2007
4	Nagaland University	At present, the University has four campuses: (a) Lumami campus in Zunheboto district (headquarter) (b) Kohima campus at Meriema in Kohima district; (c) Medziphema campus at Medziphema in Dimapur district; and (d) A temporary campus at Dimapur	1994

5	Manipur University	Canchipur, Imphal, Manipur	2005
6	Sikkim University	Gangtok, Sikkim	2007
7	Mizoram University	Aizawl, Mizoram	2001
8	Tripura University	Suryamaninagar, Tripura	2007

3.3. Research Design

The research design is an essential step in the research process, and adopting an appropriate one is of foremost importance in order to ensure that the research problem is addressed effectively and efficiently. Research designs are systematic and methodological approaches that guide researchers to conduct structured and logical research studies by providing a framework for collecting, analyzing, interpreting, and reporting data, enabling informed decisions on methods and interpretation, resulting in more robust and reliable findings (Creswell and Plano Clark, 2017). The present study focused on providing a detailed description of the attitudes of teachers towards the adoption of OER in higher educational institutions of North-East India, to ascertain the current level of adoption of OER and to identify the key factors that facilitate the adoption of OER among teachers. Furthermore, the study sought to investigate the effectiveness as well as the challenges associated with the adoption of OER from the perspectives of individuals who utilize OER and those who created them.

Therefore, a mixed-method research design with a convergent parallel approach is used to gather and analyze both qualitative and quantitative data to accomplish the objectives of the study. According to Creswell and Plano Clark's (2017) explanation "Convergent parallel mixed research design involves collecting and analyzing two independent strands of qualitative and quantitative data in a single phase, merging the results of the two strands, and then looking for convergence, divergence, contradictions, or relationships between the two databases". The convergent parallel mixed research design allowed for an extensive investigation of the problem by combining quantitative and qualitative methods of data collection (Creswell & Plano Clark, 2017). Thus, the convergent parallel mixed research design is selected to provide a more nuanced and detailed understanding of teachers' attitudes towards OER adoption, their usage and the current status of OER adoption, the factors that facilitate

OER adoption, and the effectiveness and challenges of OER adoption from the perspectives of both OER users and creators.

3.4. Research Method

The study utilized a descriptive survey method to collect data from teachers of higher education institutions in North-East India. The descriptive research method is a systematic strategy that seeks to obtain accurate and precise information about the current state of phenomena. The ultimate goal of this approach is to derive valid and general conclusions based on the discovered facts (Aggarwal, 2008; Koul, 2013). It strives to provide an answer to questions about the current condition of the phenomenon under study. Closky (1969) defined a survey “as any procedure in which data are systematically collected from a population or a sample thereof through some form or direct solicitation, such as face-to-face interviews, telephone interviews or mail questionnaires” (as cited in Mathiyazhagan & Nandan, 2010, p.34). Thus, the researcher adopted the descriptive survey method, which allows for the collection of relevant data on teachers’ attitudes and adoption of OER adoption in North-East Indian higher education institutions, with a large sample size providing a comprehensive understanding of the phenomenon.

3.5. Population

The term “population” refers to a vast collection of individuals, objects, events, or other entities that share a common characteristic and are of interest to the researcher, from which a sample is selected for study. In the present study, the population comprises faculty members from the Humanities and Social Science disciplines across all 8 central universities located in North-East India. As of the year 2022, there are a total of 442 faculty members (holding the positions of Professors, Associate Professors, and Assistant Professors) in these universities. It includes faculty members from disciplines such as Education, Sociology, Political Science, Mass Communication, History, English, and Hindi, as these disciplines exhibit uniformity across all 8 central universities in North-East India. This selection ensures that the study covers an accurate representation of faculty members from different disciplines in the region.

3.6. Sample and Sampling Technique

The researcher decided to include 50% of the teachers from the discipline of Humanities and Social Sciences of the Central Universities of North East India for the main research study. The sample population comprises 221 faculty members of the Central Universities of North East India. The researcher justified the appropriateness of the sample selected based on two criteria:

- (a) **Solvin's formula** is used to estimate the required sample size for the research study.

$$n = \frac{N}{1 + Ne^2}$$

Where, n= sample size; N= population size that is 442; e = the margin of error is 0.05

$$\begin{aligned} \text{Sample size (n)} &= \frac{442}{1 + 442(0.05)^2} \\ &= \frac{442}{1 + 442 \times 0.0025} \\ &= \frac{442}{2.105} \\ &= 210 \end{aligned}$$

- (b) **Krejcie and Morgan (1990)** published a standard table that is widely used for determining the appropriate size of the sample for research studies. This table suggests that a sample size of 205 is recommended for a population of 442 (see Fig 3.1).

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—N is population size.
S is sample size.

Fig 3.1: Krejcie and Morgan's table for determining sample size. *Source:* Krejcie and Morgan (1990).

According to Solvin's formula, the appropriate sample size for the study is 210, which accounts for 47% of the entire population. On the other hand, Krejcie and Morgan's table recommends a sample size of 205, which corresponds to 46% of the entire population. Consequently, the researcher decided to approximate the sample size to 50%, yielding a total of 221 samples. The decision is made to attain a greater sample size, which is predicted to increase the representativeness and accuracy of the study's results while also mitigating the possibility of sampling errors. Table 3.2 provides an overview of the overall characteristics of the research sample.

Since the present research employs a mixed-method research design, the sampling technique that has been chosen is the concurrent nested sampling method. A concurrent nested mixed research sampling design involves conducting both quantitative and qualitative phases of a study simultaneously (shown in Fig. 3.2). In this design, the samples for the qualitative phase are nested within the quantitative phase of the investigation (Mertens, 2010; Onwuegbuzie and Collins, 2007).

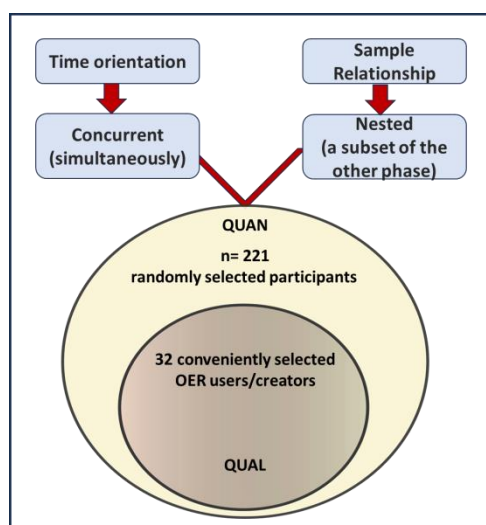


Fig 3.2: Mixed Method Sampling Design.

Following that, after deciding on mixed sampling procedures, the researcher used random and non-random sampling strategies to choose samples for the quantitative and qualitative phases (Johnson and Christensen, 2017).

For the quantitative phase, a multistage sampling technique has been adopted for carrying out this research. The researcher divided the population into 2 strata based on the uniformity of departments across all the central universities in North-East India

and based on the academic rank of the faculty. Proportionate Stratified random sampling has been employed to determine the required sample size. However, if the required number of samples from a particular stratum cannot be fulfilled, the researchers may need to obtain samples from other strata to make up the overall sample size (Torto, 2019). The fact that the desired sample size has not been reached could be due to factors non-availability of eligible participants and the unwillingness of participants to take part. Consequently, the researcher collected additional samples from the other two strata in order to address the deficiency and attain the intended total sample size. For the second phase which is the qualitative phase of the study, the researcher conveniently selected those OER users and OER creators who consented to take part in the interview session. Figures 3.2 and 3.3 present a complete overview of the sample design.

Table 3.2: Demographic Profile of the Sample

Sample Description based on Academic Rank	
Professor	43
Associate Professor	44
Assistant Professor	134
Total	221
Sample Description based on Gender	
Male	128
Female	93
Total	221
Sample Description based on Teaching Experience	
1-5 year	43
6-10 year	77
More than 10 year	101
Total	221

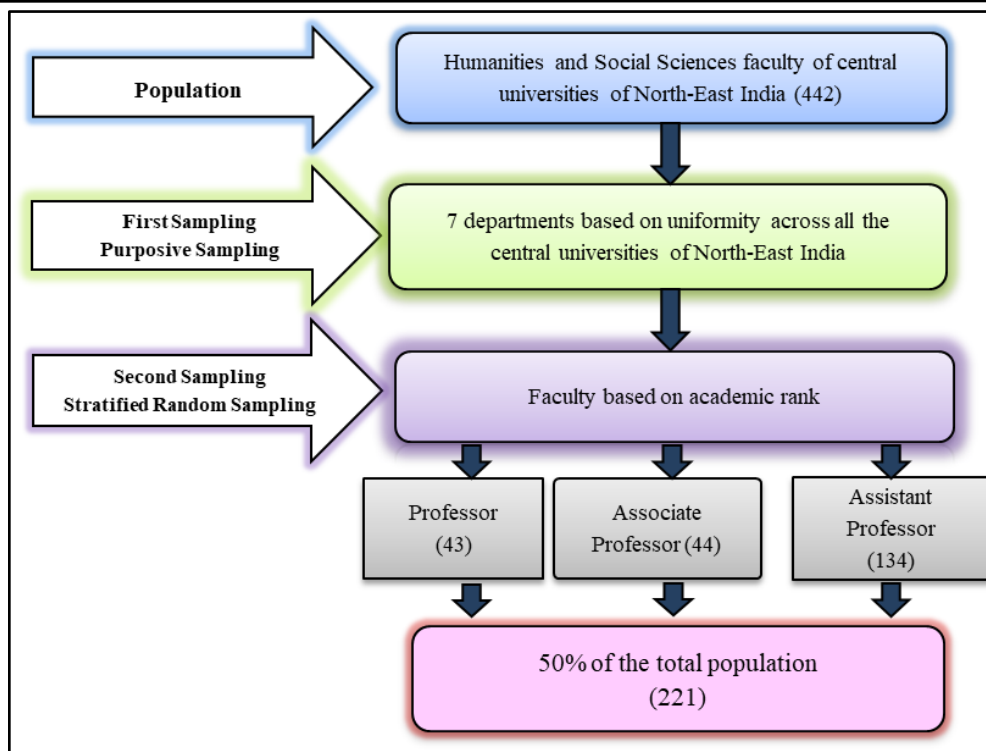


Fig 3.3: Sampling design for the Quantitative phase of the study.

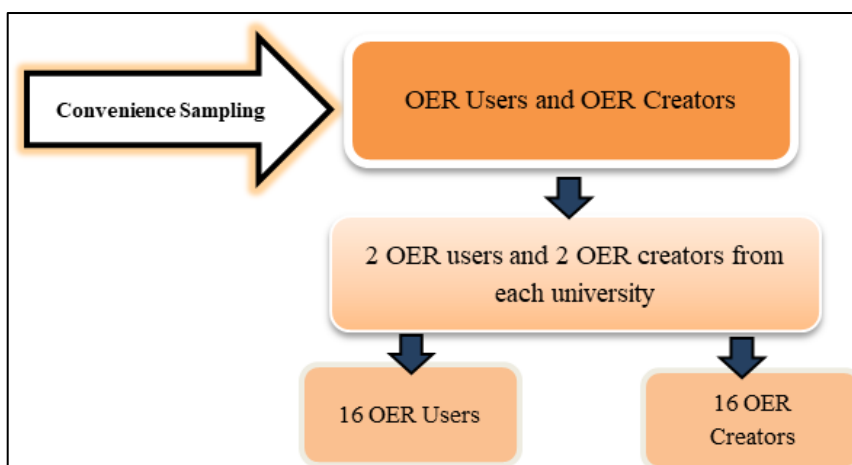


Fig 3.4: Sampling design for the Qualitative phase of the study.

3.7. Tools Used

After the determination of the desired sample size, the researcher proceeds to identify appropriate tools to facilitate the collection of data from the selected samples. The researcher developed four different tools for the present study:

1. Teacher OER Attitude Scale

2. Questionnaire on Usage of OER
3. Questionnaire on Factors Facilitating OER Adoption
4. OER Semi-structured Interview Schedule

The tools were developed in accordance with the research objectives as illustrated in Table 3.3.

Table 3.3: Use of tools based on the objectives of the study

<i>To study the attitude towards the adoption of OER among the teachers of higher educational institutes of North East India.</i>	<ul style="list-style-type: none"> ➤ Teacher OER Attitude Scale ➤ OER Semi-structured Interview Schedule
<i>To find out the significant difference between the attitudes of teachers towards the adoption of OER with regard to gender, years of teaching experiences and designation.</i>	<ul style="list-style-type: none"> ➤ Teacher OER Attitude Scale
<i>To investigate the adoption of OER (in terms of 5R's framework- retain, reuse, revise, remix and redistribute) by the teachers of higher educational institutes in North East India.</i>	<ul style="list-style-type: none"> ➤ Questionnaire on Usage of OER ➤ OER Semi-structured Interview Schedule
<i>To assess the current state of the enabling conditions (i.e., access, permission, awareness, capacity, availability, and volition) that facilitate teachers' adoption of OER in the higher educational institutes of North East India.</i>	<ul style="list-style-type: none"> ➤ Questionnaire on Factors facilitating OER adoption
<i>To ascertain the relationship between the factors that influence OER adoption and the attitude of the teachers towards OER adoption.</i>	<ul style="list-style-type: none"> ➤ Questionnaire on Factors facilitating OER adoption ➤ OER Semi-structured Interview Schedule
<i>To explore from the perspectives of both OER users and OER creators, the effectiveness and challenges of OER adoption in the higher educational institutions of North East India.</i>	<ul style="list-style-type: none"> ➤ OER Semi-structured Interview Schedule

3.7.1 Teacher OER Attitude Scale

Description of the tool

The researcher has developed a 5-point Likert scale to measure the attitudes of university teachers toward the adoption of OER. Each item is presented with five possible responses ranging from 'Strongly Agree' to 'Strongly Disagree.' The scale incorporates positive and negative items, with scores ranging from "Strongly Agree" to "Strongly Disagree" from 5 to 1 for positive items and from 1 to 5 respectively for

negative items. The scale has a maximum possible score of 185 and a minimum possible score of 37. The scale consists of thirty-seven (37) items that are categorized into five dimensions, namely: (i) Attitude toward the use and creation of OER, (ii) Attitude towards Sharing of OERs, (iii) Attitude towards the use of OER for professional development, (iv) Attitude towards open licenses and Creative Commons Licenses, and (v) Attitude toward accessibility of OER. Here is an explanation of the dimensions:

- Attitude toward the use and creation of OER: This dimension is comprised of statements on an individual's attitude or feelings regarding the use and creation of OERs. It measured how individuals perceive the worth of these educational resources as well as their tendency to utilize and create such resources.
- Attitude towards Sharing of OER: This dimension consists of statements that refer to an individual's willingness or attitude to share OERs with others.
- Attitude towards the use of OER for professional development: This dimension consists of statements concerning individuals' feelings about the value of OERs in their professional and career pursuits.
- Attitude towards open licenses and Creative Commons Licenses: This refers to an individual's affective response towards open licenses and Creative Commons licenses.
- Attitude toward the accessibility of OERs: This dimension refers to an individual's perception or feelings toward the ease of access to OERs.

Development of the Teacher OER Attitude Scale

The development of the OER teacher attitude scale typically entails a systematic procedure that encompasses several steps. These steps are discussed below:

STEP 1: Preliminary draft of the scale

An extensive literature review has been conducted to prepare the first draft of the scale. The preliminary draft of the scale comprises a compilation of 74 statements that were sourced and formulated through consultation with diverse literature, including

books, journals, and articles. These statements were subsequently categorized into 7 distinct dimensions. The 5-point Likert Scale intends to measure the attitude of teachers toward OER adoption.

- Define the construct: The first step in developing an OER teacher attitude scale is to describe the construct that the scale aims to measure. This process requires reviewing the existing literature on OER and identifying the key dimensions of teacher attitudes toward OER. In the initial phase, the researcher uncovered 7 different dimensions: Attitude towards the use and creation of OER; Attitude towards Sharing of OER; Attitude towards 5R's of OER; Attitude towards the use of OER for students' academic enrichment; Attitude towards the use of OER for professional development; Attitude towards open licenses and Creative Commons Licenses and Attitude towards accessibility of OER.

STEP 2: Item generation

After the construct has been specified, the following step is to generate a pool of items that represent different aspects of the construct. Items ought to possess clarity, concision, and relevance with respect to the construct under consideration. The preliminary draft of the scale consists of a list of 74 statements that were collected and constructed by reading various books, journals, and articles classified under 7 dimensions to measure the attitude of teachers towards the adoption of OER.

STEP 3: Content validation

After the generation of the items, the next step involves the validation of items. The scale comprising 74 statements has been subjected to validation by experts in the domains of Open Educational Resources and Educational Technology, in order to evaluate the appropriateness and usefulness of the statements. The scale is evaluated by a panel of six experts, consisting of three international and three national experts, who provided their respective opinions. The statements were scrutinized to make sure they measure the intended construct and cover a variety of aspects of that construct. In addition, the items need to be examined to make sure that they do not include any ambiguity or bias of any kind. The experts were asked to evaluate the statements by assigning a relevance score of '0' (not relevant), '1' (somewhat relevant), or '2' (relevant) to each item, taking into consideration the clarity and accuracy of the items

in question. This would be used to determine which statements on the scale needed to be revised or eliminated before it could be used in its final form. In addition to this, this process also ensured that the final scale contained statements that were acceptable to the research community and that were valid and reliable to the research variables under investigation. The suggestions put forth by the experts were carefully considered and integrated into the development of the Teacher OER Attitude Scale. Following the feedback received, a decision is made to eliminate the statements of the dimension of attitude towards the use of OER for students' academic enrichment. Thus, the second draft of the OER teacher attitude scale consisted of 6 dimensions and 49 statements.

STEP 4: Pilot testing

The second version of the Teacher OER Attitude Scale, which consists of 49 statements, has been developed and pilot-tested with a sample of 30 faculty members from the Humanities and Social Science discipline at Tezpur Central University. The study involved a random selection of faculty members who were requested to respond to the scale. The responses were subsequently scored and tabulated in descending order, ranging from the highest scorer to the lowest scorer. Responses were then subjected to an item analysis procedure to evaluate the psychometric properties of the scale.

STEP 5: Item Analysis

The scores obtained in the pilot test were arranged in descending order, i.e., from the highest score to the lowest score. Two groups, one with high scores and the other with low scores, were selected, and for this purpose, 27% of individuals from the high-scoring group and 27% of individuals from the low-scoring group were picked in order to evaluate each item on the scale as recommended by Edwards (1957). After this step, the point-biserial correlation coefficient and discrimination index value were calculated for the item analysis of the scale.

The point-biserial index serves as a measure of item discrimination, which pertains to an item's ability to accurately gauge individual differences within the domain being assessed by the exam. According to Matlock-Hetzel (1997) and Dichoso and Cabauatan (2020), the values of the point-biserial correlation coefficient (R_{pbi}) determine the discriminating index of an item, which in turn determines whether or not

the item should be accepted or excluded from the scale. The Rpbi indicates the extent to which each item is capable of distinguishing between the higher and lower groups. A higher value of rpbi indicates better discrimination ability of the item (Brown, 2001). Therefore, the final draft of the scale included items with a point-biserial correlation coefficient and discrimination index value of 0.20 or higher, as recommended by Kimpton and Harnisch (2008) and Ebel and Frisbie (1991). Table 3.4 presents the outcomes of the item analysis, specifically showcasing the Point Biserial Correlation Coefficient and Discrimination Index for each item.

Table 3.4: Point Biserial Correlation Coefficient and Discrimination Index of each item

Sl. No	Statements	Rpbi values	Discrimination Index	Remark
1	Statement 1	0.10	0.18	Rejected
2	Statement 2	0.53	1.32	Accepted
3	Statement 3	0.55	1.41	Accepted
4	Statement 4	0.55	1.14	Accepted
5	Statement 5	0.67	1.18	Accepted
6	Statement 6	0.19	0.18	Rejected
7	Statement 7	0.59	1.36	Accepted
8	Statement 8	-0.02	-0.18	Rejected
9	Statement 9	0.50	0.95	Accepted
10	Statement 10	0.54	1.05	Accepted
11	Statement 11	0.63	2.14	Accepted
12	Statement 12	-0.03	-0.41	Rejected
13	Statement 13	0.57	2.05	Accepted
14	Statement 14	0.21	0.41	Accepted
15	Statement 15	0.20	0.41	Accepted
16	Statement 16	0.27	0.41	Accepted
17	Statement 17	0.35	0.73	Accepted
18	Statement 18	0.47	0.82	Accepted
19	Statement 19	0.45	0.91	Accepted
20	Statement 20	0.05	-0.55	Rejected
21	Statement 21	0.15	-0.05	Rejected
22	Statement 22	0.16	0.18	Rejected
23	Statement 23	0.28	0.55	Accepted
24	Statement 24	0.14	0.14	Rejected
25	Statement 25	0.09	-0.23	Rejected
26	Statement 26	0.38	0.77	Accepted
27	Statement 27	0.50	1.14	Accepted
28	Statement 28	0.36	0.50	Accepted
29	Statement 29	0.40	0.64	Accepted

30	Statement 30	0.54	1.14	Accepted
31	Statement 31	0.25	0.59	Accepted
32	Statement 32	0.32	0.68	Accepted
33	Statement 33	0.55	1.05	Accepted
34	Statement 34	0.28	0.55	Accepted
35	Statement 35	0.30	0.55	Accepted
36	Statement 36	0.37	0.82	Accepted
37	Statement 37	0.54	1.05	Accepted
38	Statement 38	0.56	1.05	Accepted
39	Statement 39	0.54	0.95	Accepted
40	Statement 40	0.42	0.68	Accepted
41	Statement 41	0.43	0.77	Accepted
42	Statement 42	0.53	1.55	Accepted
43	Statement 43	0.46	1.18	Accepted
44	Statement 44	0.48	1.09	Accepted
45	Statement 45	0.35	0.73	Accepted
46	Statement 46	0.10	0.00	Rejected
47	Statement 47	0.30	0.55	Accepted
48	Statement 48	0.39	0.91	Accepted
49	Statement 49	0.43	1.18	Accepted

The final statements included in the Teacher OER Attitude Scale were selected by the researcher that fulfil the predetermined criteria. Ten statements that failed to meet the established criteria were removed from the scale. Furthermore, a decision has been made to eliminate the third dimension of the scale, which is the attitude towards the 5R's (Reuse, Revise, Remix, Redistribute, and Retain) of OER. The rationale for the exclusion is that three of the items relating to this dimension were deemed unacceptable based on the item analysis, and two items failed to reflect the five essential features of OER. A total of 12 items were eliminated from the scale. Hence, there are a total of 37 items on the final version of the Teacher OER Attitude Scale, 30 of which are positive and 7 of which are negative categorized into 5 dimensions. Table 3.5 displays the number of statements within each dimension of the scale.

Table 3.5: Description of the final Teacher OER Attitude Scale

Sl.No	Dimensions	No. of Statements
1	Attitude toward the use and creation of Open Educational Resources	09
2	Attitude towards Sharing of OERs	06
3	Attitude towards the use of OER for professional development.	09
4	Attitude towards open licenses and Creative	08

	Commons Licenses.	
5	Attitude toward accessibility of Open Educational Resources	05
TOTAL		37 statements

STEP 6: Standardization of the scale

- Validity of the scale: The degree to which a test or scale measures what it is designed to assess is referred to as its validity. The researcher established both the face validity and content validity of the scale. Each item on the scale is evaluated for its clarity, relevance, and appropriateness by a panel of experts to determine its face validity. This helped to ensure that the scale appeared to measure what it intended to measure. The CVR formula established by Lawshe (1975) has also been applied to determine the content validity of the scale. An item with a CVR value above 0.50 to 1.00 is retained and the CVI is found to be 0.93 (see Table 3.6). This demonstrates that the scale is valid.

Table 3.6: CVR of the items included in the final version of the Teacher OER Attitude Scale

Item No.	Content Validity Ratio
Item 1	0.83
Item 2	0.83
Item 3	1.00
Item 4	0.83
Item 5	0.83
Item 6	1.00
Item 7	1.00
Item 8	0.83
Item 9	1.00
Item 10	0.83
Item 11	1.00
Item 12	1.00
Item 13	0.83
Item 14	1.00
Item 15	1.00
Item 16	1.00
Item 17	1.00
Item 18	0.83
Item 19	1.00
Item 20	0.83
Item 21	0.83
Item 22	1.00
Item 23	1.00
Item 24	0.83
Item 25	0.83

Item 26	0.83
Item 27	1.00
Item 28	1.00
Item 29	1.00
Item 30	0.83
Item 31	1.00
Item 32	1.00
Item 33	1.00
Item 34	1.00
Item 35	1.00
Item 36	1.00
Item 37	0.83
Content Validity Index (CVI)	0.93

➤ Reliability of the scale: The degree to which a test or a scale consistently measures the construct that it is designed to measure across different situations, times, and raters is referred to as its reliability. A reliable scale yields consistent and stable findings as it is the prerequisite for any valid measurement. The final version of the scale is validated and standardized on 35 faculty members of the central university. Cronbach's alpha and the split-half method were utilized by the researcher to determine the internal consistency or the reliability coefficient of the scale. Cronbach's alpha is a statistical measure used to evaluate the internal consistency of a scale by assessing the degree to which its items are interrelated and measures the common underlying construct. Cronbach's alpha is utilized to establish the internal consistency of the scale. Cronbach's alpha for the scale is 0.89, which indicates that it is highly consistent and reliable. The Cronbach alpha coefficient for each item of the scale is provided in Table 3.8. Thus, the items on the scale were highly correlated with one another, indicating that they all measured the same construct of teacher attitudes toward OER. Secondly, the Teacher OER Attitude Scale had a split-half correlation coefficient of 0.88 and a Spearman-Brown Coefficient value of 0.89, showing a high degree of reliability. Therefore, the Teacher OER Attitude Scale is a reliable tool for assessing teachers' attitudes toward OER, as evidenced by the high values of Cronbach's alpha and split-half correlation coefficient (as given in Table 3.7).

Table 3.7: Reliability Statistics

Cronbach's Alpha	0.890
Split-Half Reliability	0.881
Spearman-Brown Coefficient	0.890

Table 3.8: Cronbach alpha value of each item of the scale

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	132.89	210.575	.344	.888
Item 2	132.80	206.753	.621	.883
Item 3	134.23	229.829	-.359	.897
Item 4	134.03	229.440	-.239	.901
Item 5	133.71	221.445	-.011	.896
Item 6	132.43	211.487	.461	.886
Item 7	132.31	208.869	.513	.885
Item 8	133.26	209.255	.367	.888
Item 9	133.23	221.240	-.013	.897
Item 10	131.97	209.617	.601	.884
Item 11	132.03	213.205	.452	.887
Item 12	132.06	209.173	.589	.884
Item 13	132.29	211.798	.478	.886
Item 14	132.26	212.667	.427	.887
Item 15	132.31	208.869	.565	.884
Item 16	132.77	200.417	.683	.881
Item 17	132.37	204.358	.618	.883
Item 18	132.34	210.997	.506	.886
Item 19	132.63	210.064	.415	.887
Item 20	132.60	205.247	.607	.883
Item 21	132.46	204.785	.608	.883
Item 22	132.34	208.997	.516	.885
Item 23	132.46	206.726	.700	.883
Item 24	132.54	206.608	.653	.883
Item 25	132.74	207.608	.627	.884
Item 26	132.74	209.785	.501	.885
Item 27	132.91	202.551	.675	.882
Item 28	132.60	203.776	.640	.882
Item 29	132.49	206.375	.604	.883
Item 30	132.54	211.020	.545	.885
Item 31	133.66	220.055	.038	.894
Item 32	133.57	210.723	.327	.889
Item 33	133.20	208.929	.420	.887
Item 34	132.77	203.358	.599	.883
Item 35	134.51	228.787	-.367	.896
Item 36	132.43	211.487	.521	.886
Item 37	133.00	214.059	.288	.889

- Norms: A set of norms has been formulated for the interpretation of the data. The obtained raw scores were tabulated in ascending order. Norms have been prepared in the form of Z-scores as presented in Table 3.9.

Table 3.9: Norms for Interpretation of the Level of Attitude towards OER Adoption

Range of z-Scores	Interpretation of Attitude Scale
+1.77 and above	Extremely High Positive
+0.59 to +1.76	Highly Positive
-0.58 to +0.58	Moderate or Neutral
-0.59 to -1.76	Low Negative
-1.77 and below	Extremely Low Negative

3.7.2. Questionnaire on Use and Creation of Open Educational Resources

The researcher prepared a questionnaire to seek information from teachers in higher educational institutions about their use and creation of OERs. The questionnaire consists of 9 questions that are designed to explore the teachers' usage of OER in terms of the 5R's of OER, the types of OER they use and create, and their preferences regarding the types of CC licenses. The questions are presented in a variety of formats, including "Yes/No", "Always/Sometimes/Never", "multiple Answering Questions"; and even some conditional questions. The questions were generated following a thorough analysis of the relevant literature. The questions were then sent to experts for evaluation. The face validity of the questionnaire has been established by the subject experts. Only the questions deemed relevant based on expert suggestions are retained. The questionnaire is administered to a group of samples to check its reliability. The Cronbach's alpha coefficient for the questionnaire is determined to be 0.62, indicating a moderate level of reliability.

3.7.3. Questionnaire on Factors facilitating the adoption of Open Educational Resources

Another questionnaire has been developed by the researcher to investigate the current state of factors that facilitate the adoption of OER among teachers in higher educational institutions. The questionnaire contained a total of 35 questions, which have been designed to explore six key factors: access, permission, awareness, capacity, availability, and volition which facilitate the adoption of OER. The questions related to

the first two factors, i.e., access and permission, are put forward in a “Yes/No” manner, whilst the questions related to the remaining four factors are presented in a 3-point rating scale. The questions are developed after an in-depth review of the relevant literature. The questions are then sent to experts for evaluation. Consequently, the face validity of the questionnaire is established by the subject experts. Only those questions that were found to be relevant according to the suggestions and modifications provided by the experts have been retained. The reliability of the questionnaire is measured using Cronbach’s alpha and found to be 0.88, which is regarded to be high reliability.

3.7.4. OER Semi-Structured Interview Schedule

A semi-structured interview schedule has also been prepared by the researcher to have an in-depth understanding of the research study. According to Bryman (2012), semi-structured interviews offer greater flexibility, allowing both the interviewer and interviewees to delve deeper into issues related to the primary topic of discussion. The interview schedule is divided into two distinct sections, with one section designed for the OER users and the other set of questions addressing the OER creators. Each section consists of 16 questions aimed at knowing the viewpoints and insights of teachers towards OER adoption, their usage, factors facilitating OER adoption, the effectiveness of OER adoption in the teaching-learning context and professional development and lastly, the challenges faced in the OER adoption. After that, the initial draft of the semi-structured interview schedule is given to experts to review for content clarity, linguistic accuracy, and validity. The constructive feedback from the experts has been incorporated, modified and then finalized by the researcher. The final version of the interview schedule has been attached in Appendix D.

3.8. Procedure of data collection

The researcher personally visited all 8 central universities of North-East India to collect primary data for the study. The data has been gathered between the months of March to November in the year 2022. Prior to conducting field research, due permission is obtained from the Head of the Department and the supervisor. The permission letter from the Department is submitted to the concerned faculty members of the study. For the quantitative phase of data collection, the OER teacher attitude scale, questionnaire on OER usage, and questionnaire on factors facilitating the

adoption of OER were distributed along with a cover letter to all the samples of the study. The cover letter ensured the confidentiality of the information that has been gathered while also explaining the objective of the research study. The tools included detailed instructions on how to carry out the tasks. The participants were given an adequate amount of time to help them make an informed decision regarding the degree to which they agreed or disagreed with the issue involved in each statement. The qualitative phase of data collection involved conducting interviews exclusively with faculty members who voluntarily agreed to participate. The duration of each interview session is between 20 to 30 minutes. Following the administration of all the tools, the quantitative data is then imported into the SPSS and Excel software programs for further analysis. With the use of the NVivo software, the recorded interviews were transcribed in an accurate and detailed manner.

3.9. Data Analysis

This research employed a mixed-method approach that integrated qualitative and quantitative techniques for data analysis. The study used both descriptive and inferential statistics for the analysis of quantitative data, while thematic analysis is utilized for the qualitative data analysis. The quantitative data were analyzed through the use of SPSS software version 20.0 and MS Excel, while the qualitative analysis was conducted with NVivo software. The study used various statistical techniques to analyze the data collected, in accordance with the stated objectives. Table 3.10 displays the statistical techniques used for data analysis in connection with the objectives of the study.

Table 3.10: A glance at statistics used in this research study

<i>Normality test of the data</i>	<ul style="list-style-type: none"> ➤ Descriptive Statistics: Mean, Median, Mode, Standard Deviation, Skewness and Kurtosis, Normal Q-Q plot, Histogram
<i>To study the attitude towards the adoption of OER among the teachers of higher educational institutes of North East India.</i>	<ul style="list-style-type: none"> ➤ Descriptive Statistics: Percentage, Frequency ➤ Thematic analysis
<i>To find out the significant difference between the attitudes of teachers towards the adoption of OER with regard to gender, years of teaching experiences and designation.</i>	<ul style="list-style-type: none"> ➤ Descriptive Statistics: Mean and Standard Deviation ➤ Inferential Statistics: t-test and One-way ANOVA

<i>To investigate the adoption of OER (in terms of 5R's framework- retain, reuse, revise, remix and redistribute) by the teachers of higher educational institutes in North East India.</i>	<ul style="list-style-type: none"> ➤ Descriptive Statistics: Percentage ➤ Thematic analysis
<i>To assess the current state of the enabling conditions (i.e., access, permission, awareness, capacity, availability, and volition) that facilitate teachers' adoption of OER in the higher educational institutes of North East India.</i>	<ul style="list-style-type: none"> ➤ Descriptive analysis: Percentage, Mean and Standard Deviation
<i>To ascertain the relationship between the factors that influence OER adoption and the attitude of the teachers towards OER adoption.</i>	<ul style="list-style-type: none"> ➤ Inferential Statistics: Point-Biserial Correlation and Product Moment Correlation ➤ Thematic analysis
<i>To explore from the perspectives of OER users and OER creators, the effectiveness and challenges of OER adoption in the higher educational institutions of North East India.</i>	<ul style="list-style-type: none"> ➤ Thematic analysis

3.9.1 Quantitative data analysis:

- **Skewness and Kurtosis** are statistical measures used to assess the normality of a dataset. Skewness measures the extent of asymmetry in a given distribution, whereas Kurtosis measures the degree of peakedness in a distribution. The accuracy of the statistical tests performed in the study can be guaranteed by first ensuring that the data follows a normal distribution.
- The measures of **frequency, percentages, mean, and standard deviation** were employed to describe the central tendency and variability of the data. The distribution of responses in each variable is described using frequency and percentages, whereas the average score and dispersion of scores were described using mean and standard deviation.
- The **t-test** is a statistical test for comparing the means of two independent sample populations. The present study employed the t-test to examine the statistically significant difference between the means of two distinct groups, specifically the difference in attitudes towards OER adoption among male and female teachers.

- **ANOVA** is a statistical test used to assess the statistical significance of differences among multiple groups across different variables. This study applied ANOVA to examine the statistical significance of differences among teachers' attitudes toward OER adoption, with respect to different demographic variables such as academic rank and teaching experience.
- The **Point-biserial correlation coefficient** (denoted as r_{pb}) is a statistical technique used to evaluate the degree of the relationship between a dichotomous nominal scale and an interval or ratio scale (Brown, 2001). In the present study, the point-biserial correlation is used to test the relationship between a nominal variable, such as factors facilitating OER adoption (access and permission), and an interval variable, such as attitude towards OER adoption.
- The **Pearson Product Moment Coefficient of Correlation** is a statistical measure used to determine the association between two variables that are continuous in nature. This study used Pearson's product-moment correlation to test the relationship between two continuous variables, which includes the relationship between factors facilitating OER adoption (awareness, capacity, availability and volition) and attitudes towards OER adoption.

3.9.2 Qualitative data analysis:

Thematic analysis is a prevalent approach for analyzing qualitative data (Ryan and Bernard, 2003) since it involves “identifying patterns and themes in data” (Braun and Clarke, 2006). According to Burnard, Gill, Stewart, Treasure, and Chadwick (2008), this technique involves performing an analysis of the transcripts, identifying themes within the data, and supporting each theme with some evidence from the text that has been discovered. This study followed the six phases of thematic analysis as outlined by Braun and Clarke (2006), using NVivo software, a widely used qualitative data analysis software program. This six-step framework proposed by Braun and Clarke (2006) is considered to be the most robust approach to thematic analysis, owing to its provision of a well-defined and practical framework, as noted by Maguire and Delahunt (2017). The interview has been recorded, transcribed into a Microsoft Word document, and then imported into the NVivo software for further analysis.

In the first step, the researcher went through the data provided by the participants by reading and rereading the transcripts to get a critical and in-depth understanding of what was said, while also making sense of the thoughts and opinions of the participants. Additionally, comments and quotations that were important to the objectives of the study were highlighted. It is recommended to read the transcripts multiple times to identify any themes or potential patterns across all facets of the data (Braun and Clarke, 2006). Secondly, after several readings of the transcripts, a list of codes has been generated by identifying and labelling passages considered useful with brief, pre-determined codes that were both descriptive and illustrative; for example, see Table 3.11.

Table 3.11: An example of Coding of the data

Pre-determined themes	Description	Data extracts	Codes
Perception	Participants' attitudes, beliefs, and views regarding the adoption of OER in higher education.	<p><i>“In this age of technology, it is not very simple for everyone to gain access to hard print materials, and in the midst of this COVID pandemic, it is obvious that open educational resources are helpful in the teaching and learning process of the institution”</i></p> <p><i>“Open educational resources have the potential to be an excellent resource hub”</i></p> <p><i>“Teachers have access to a valuable asset in the form of open educational resources”</i></p> <p><i>“It is one of the most useful academic resources that anyone can have access to...”</i></p> <p><i>“Certainly, open educational resources are good and quality resources, and I like to utilize both in the classroom while I'm teaching and also for my professional development”</i></p>	<ul style="list-style-type: none"> ✓ Helpful in the teaching and learning process ✓ Excellent resource hub ✓ Valuable asset ✓ Useful academic resources ✓ Good and quality resources

Thirdly, after preparing the list of codes based on the interview transcript excerpts, the researcher made an effort to combine the codes into broad themes and more specific sub-themes. The following Fig 3.4 depicts how the researcher linked the codes that were first identified and organized them into overarching sub-themes.

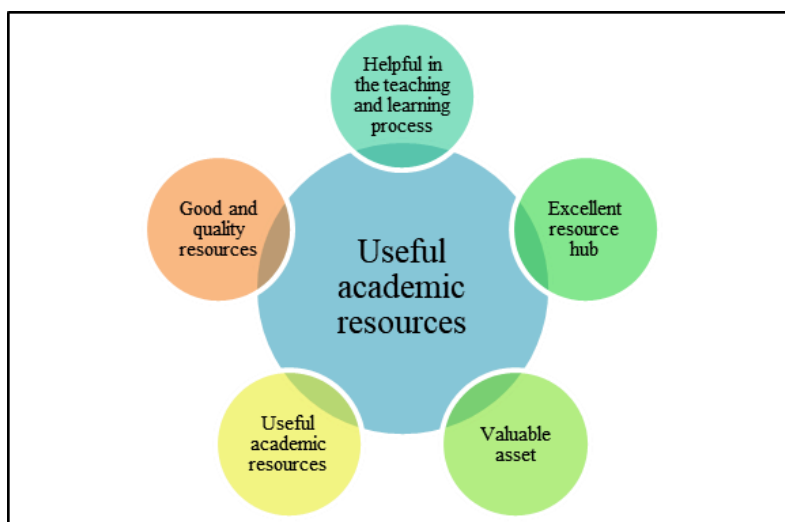


Fig 3.5: An example of a sub-theme emerged by combining the codes.

In the fourth stage of the analysis, the researcher gathered all of the themes and critically reexamined each one to ensure that the sub-themes accurately reflect the main theme. In cases where it seemed necessary to do so, the researcher revised and formulated the initial themes. Next, the researcher defines the sub-themes based on the interview data extraction. The sub-theme should be clear and appropriate to address the objectives of the study. The final step is reporting the results of the theme analysis. The researcher presented a clear and precise summary of the themes and their supporting evidence in the results.

The outcomes of the research study have a higher degree of validity and accuracy when appropriate statistical tests are adopted. Based on the analysis of the data, the findings, and the discussions, conclusions and recommendations on the study, including some implications and some ideas for future research have been proposed.

3.10. Standards of Trustworthiness for the Qualitative Data

The present research carefully maintained trustworthiness by adhering to Lincoln and Guba's (1985) criteria, which include credibility, dependability, confirmability, and

transferability. The **credibility** of a study refers to the extent to which research participants' views and the researcher's interpretations are very consistent with one another (Jensen, 2008). To ensure credibility, robust measures are employed, such as carefully evaluating and transcribing recorded interviews, comparing research notes with digital recordings (Rosenthal, 2016), conducting data triangulation to compare results collected from multiple strategies (such as attitude scales and open-and closed-ended questionnaires), and engaging in researcher-supervisor debriefing to develop ideas and interpretations while avoiding researcher bias (Spall, 1998; Shenton, 2004). Data triangulation is essential in a qualitative research study to mitigate the risk of potential errors in findings that could arise from relying primarily on a single data source and missing corroboration (Collis and Hussey, 2021; Núñez, 2023). **Confirmability** in qualitative research is the measure of accuracy and reality of understanding the phenomenon and the meaning attributed to it from the participants' perspectives (Mertens, 2010; Jensen, 2008). Here, in this study, the research procedure and the result are scrutinized by the supervisor and endorsed by the Doctoral Research Committee members of the university. The findings section includes participant remarks or quotes, highlighting the evidence-based interpretations, which reduces researcher bias and increases the confirmability and objectivity of the results. (Makokotlela, 2022; Shenton, 2004). The term '**dependability**' refers to the consistency of data over a period and under different contexts (Elo, et al 2014). The research design, participant selection criteria, and sampling methods have all been thoroughly described (Connelly, 2016; Alexander, 2019). In addition, this procedure will also help to improve the clarity and openness of the research study (Jensen, 2008). Research **transferability** relates to the ability to apply or extend findings to various settings or populations beyond the scope of the research (Jensen, 2008; Elo, et al 2014). According to Jensen (2008) and Mertens (2010), readers can assess the relevance of research findings to their context through thick description and purposeful sampling. By meeting each of these criteria, the research study appears to be more trustworthy and ensure objectivity.

3.11. Ethical Considerations

It is necessary to ensure ethical standards to preserve the rights of the research participants, as well as to maintain the integrity of the research. Adhering to ethical

norms, the researcher obtained informed consent from the participants prior to data collection. Recording of the interview session were carried out only after prior approval. To ensure the anonymity of participants, the participants involved in the interview session were assigned pseudonyms (P1, P2, P3....), upholding privacy and confidentiality guidelines (Marshall and Rossman, 2011). The researcher ensured that the data were well-managed and well-organized to avoid any errors that could affect the precision of the results.