CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

The methodology in research is essential for doing any investigation systematically and scientifically. It is the discipline that examines the methodical conduct of research (Mishra & Alok, 2017). The selection of research methodology is essential to the investigative process. It delineates the various steps necessary to address a research challenge, encompassing problem formulation, term definition, subject selection for investigation, validation of data collection instruments, data collection, data analysis and interpretation, and the derivation of inferences and generalizations (Koul, 2015). He asserted that the selection process of a method and its specific design is contingent upon the nature of the problem, the research objectives, and the type of data involved. Research methods refer to the techniques employed by the researcher to carry out the research, whereas research methodology elucidates the framework guiding the researcher in the research process (Goundar, 2012).

This chapter discusses the methodology that is used in the present study, and it is described under the below-given headings:

3.2 Locale of the study

3.3 Research Design

3.4 Method of the study

3.5 Variables involved in the study

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- 3.8.1 Classroom Engagement Scale
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3.14 Conclusion

3.2 Locale of the Study

The present study is conducted over six districts in Assam selected through simple random sampling method. As a result, the focus of the present research has been on Teacher Training Institution from six different districts that provided a diverse array of academic fields and encompassed a wider scope of disciplines. The Figure no 3.1 depicted through map shows the locations of the selected districts of Assam in the present study.

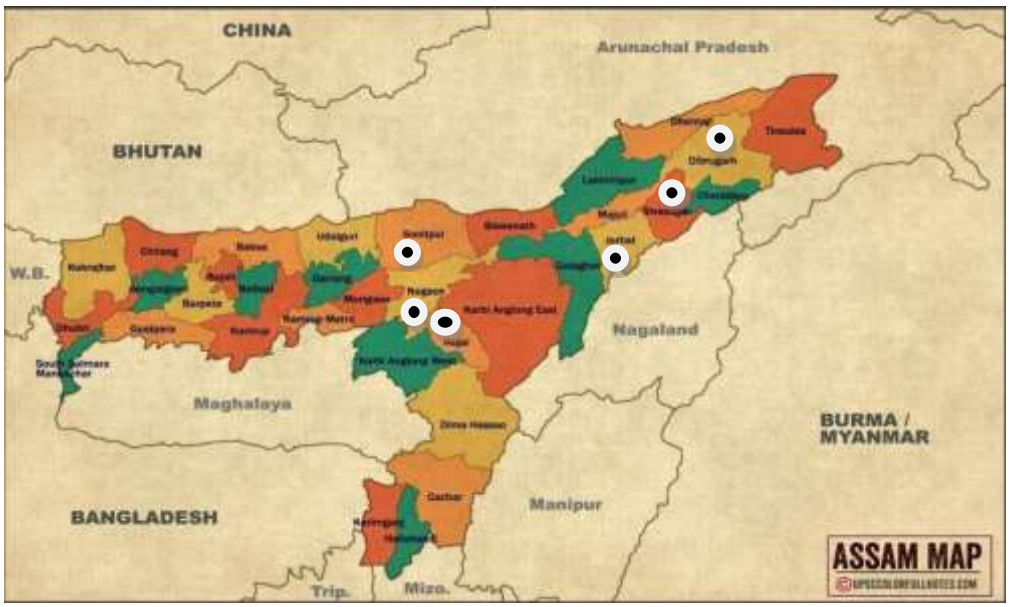

Figure no.3.1: Geographical location of the selected districts

(Source of Map: Download Assam Map | Assam Map with District HD [2023] - s

3.3 Research Design

Research design is essential because it guarantees that all research activities are conducted efficiently, thereby generating the greatest amount of knowledge with the least amount of effort, time, and money. The research design impacts the reliability of the acquired data. As a result, it provides a solid foundation for the rest of the research. The theoretical and conceptual framework must align with the study objectives. Similarly, the data-gathering strategy must be in line with the research's goals, conceptual and theoretical framework, and data analysis procedure. We can categorize research design into three types: quantitative, qualitative, and mixed method, based on the approach to data collection, analysis, and interpretation. The present study focused on providing a detailed description of the Academic Resilience and Classroom Engagement among Pre-service teachers of Assam in relation to Academic Achievement based on gender, stream, locality, and types of institution and ascertaining the level and relationship among Academic Resilience, Classroom Engagement, and Academic Achievement. The study also looked into different underlying factors and barriers that Pre-service teachers face, as well as measures that the researcher came up with based on suggestions from Pre-service teachers for getting around these problems in the classroom.

Hence, as per the demand of the study, the researcher collected quantitative and qualitative data. Therefore, the researcher adopted a descriptive survey research design to conduct the research study. Descriptive research designs are employed if it is necessary to fully capture the characteristics of a population in such a way as to discover meaning or the frequency of certain events. Both qualitative and quantitative data collection is possible in descriptive research methods (Nassaji, 2015). A correlational research design was also used in this study. This is a way to find relationships between dependent and independent variables and see how well the independent variables can predict the dependent variables (Creswell, 2012).

3.4 Method of the study

The researcher has adopted the survey method because this study is an attempt to investigate the present status or the level of Academic Resilience, Classroom Engagement, and Academic Achievement of the Pre-service teachers of Assam, as

well as the existing relationship between them at a single point in time. Survey design helps researchers answer three types of questions: (a) descriptive questions, (b) questions about the relationships between variables, (c) questions about predictive relationships between variables over time (Creswell, 2012).

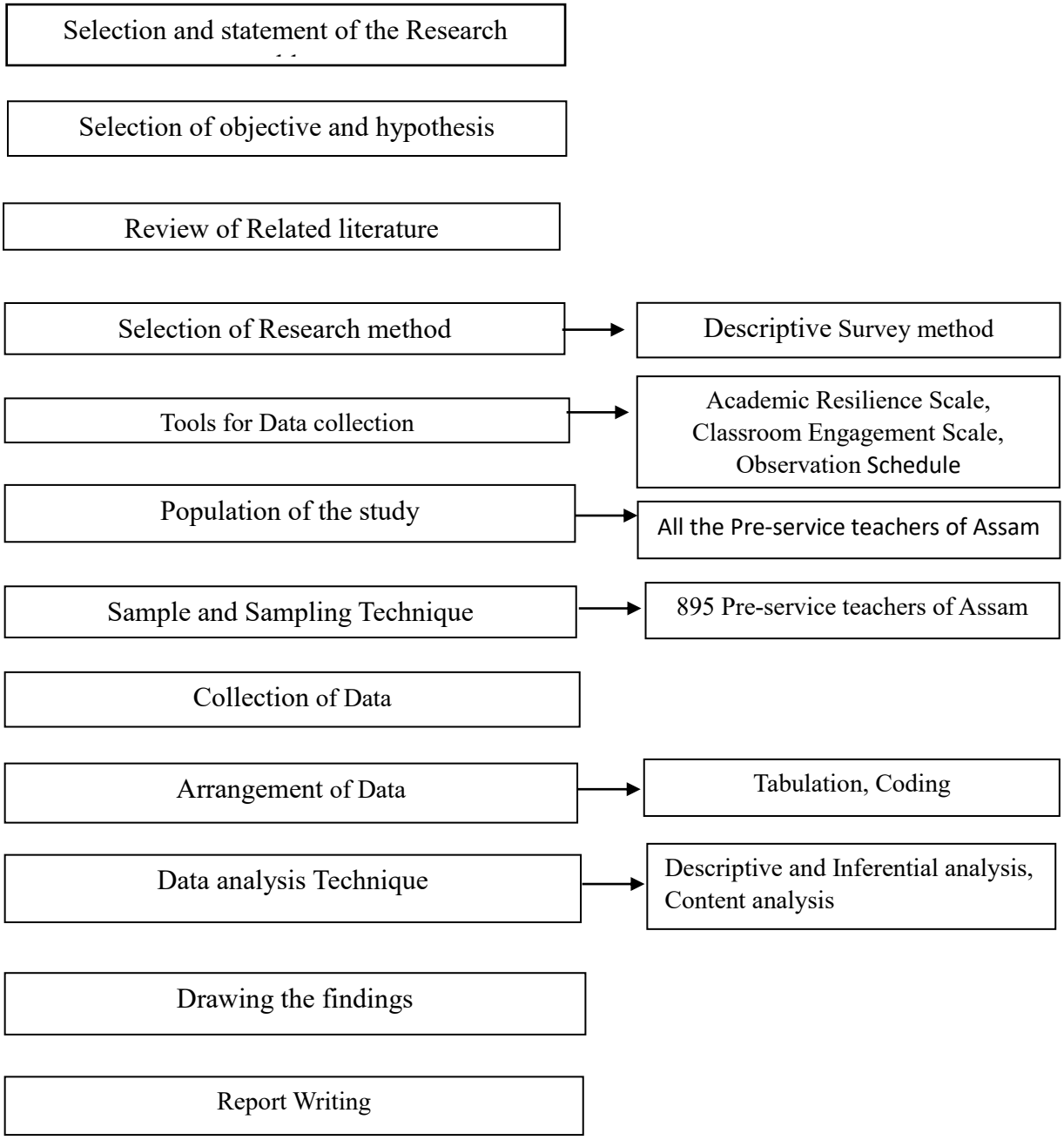

Figure no. 3.2: Research Design of the study

3.5 Variables involved in the study

The present study involved the following independent and dependent variables

Independent Variable: The independent variable is the variable that is serving as a factor or predictor that is suspected to correlate with the dependent variable. Academic Resilience and Classroom Engagement are the independent variables in this study.

Dependent Variable: Dependent variables are the outcomes or results that researchers aim to explain or predict through their studies. In this study, Academic Achievement is the dependent variable.

Demographic variable: Demographics are the characteristics of a population that have been categorized by distinct criteria, such as age, gender, and income, as a means to study the attributes of a particular group. In this study, gender, locality, stream, and types of institution are the demographic variables.

3.6 Population of the Study

Population refers to any group of people or objects that make up a research topic in a particular study and are similar in one or more ways. Best (1983) defined a population as a group of people with one or more characteristics that set them apart and interest the investigator. It may be all the individuals of a particular type or a restricted part of that group."

In the present study, the population consists of all the Pre-service teachers studying at different Teacher Training Institutions in Assam. It includes both Government and Private Teacher Training Institutions. There are total of 72 teacher Education Institutions in Assam, as per the official website of NCTE, approximately 7650 Pre-service teachers studying in all these Teacher Training institutions. So, the population consists of approximately 7650 individuals. The list of the Teacher Training Institutions and the number of Pre-service teachers of the year 2022-24 is collected from the Department of Secondary Education Assam, from the websites of different Teacher Training Institutions, and by visiting some physically.

3.7 Sample and Sampling Technique

Participation of a vast population in a single study is impossible. So, a subset, or a smaller and proper representation of the population, is reliable and feasible. A sample is any number of elements selected from the population as per some plan or rule. Inferences can be made about the characteristics of the universe by observing the characteristics of the sample (Best & Khan, 2018).

Teacher Training Institutes are spread across all districts of Assam, so the investigator has randomly selected six (6) districts: Jorhat, Sonitpur, Hojai, Nagaon, Sibsagar, and Dibrugarh. As per the NCTE data (2019), there are 72 Teacher Training Institution, from which 50 Private teacher Training Institutes and 22 Government Teacher Training Institutes are offering B.Ed. courses. As a result, a sample is chosen from each of these strata. Stratified random sampling is the method used for sampling. If a population is large and time-consuming, reaching everyone is difficult. In this situation, a sample of the desired population is carefully taken. For the current study, a sample of 895 Pre-service teachers from selected districts of Assam was chosen using a Stratified Random sampling technique, considering the cost, time, utility, and suitability. 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.

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

Where, n= sample size; N= population size that is 4650; e = the margin of error is 0.05

$7650/1+7650(0.05)^2 = 380.12$

(a) The researcher referred to the **Krejcie and Morgan (1970)** sample table to determine the sample size. They indicate that the smaller the number of cases there are in the population, the larger the proportion of that population must be that appears in the sample. **As the population has more cases, the sample can only include a smaller percentage of it (Cohen,2017).** As per the table the sample size for this study would have been 367 from a population of 7650.

Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*

According to Solvin's formula, the appropriate sample size for the study is 380.12. On the other hand, Krejcie and Morgan's table recommends a sample size of 367. But the researcher selected more than that for better representation of the entire population. Therefore, the sample of this study is 895 units. 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 List of the Colleges and number of Pre-service teachers selected for the present study

District	Management	Name of the institution	Total sample
Jorhat	Private	KBM college of education	83
		NEIMS	
	Government	DIET	
		Post graduate B. Ed college	
Dibrugarh	Private	Parijat Academy	157
		Chandrakanta Hazarika B.Ed college	
Sonitpur	Private	Biswanath college of Education	195
	Government	Sonitpur DIET	
		Tezpur B.Ed college	
		Tezpur University	
Nagaon	Private	Kaliabor college of Education	252
		Hum yak rural college	
		College of Education	
Hojai	Private	Nazir Ajmal B.Ed College	163
		Krishna Bora B.Ed college	
Sivsagar	Private	Sivsagar University of Teacher Education	45

The researcher has collected 895 valid responses from 16 Teacher Training Institutions of Assam.

3.8 Tools Used in the Study

Tools play a critical role in the research process. The objective and approaches of research projects are what distinguish them. Best (1986) stated, "Each research tool is appropriate in a given setting to accomplish a certain goal." The tool used to collect acceptable data comes in a wide range of styles. The nature or objective of the study might be used to assess the tool's effectiveness. Research studies are categorized on the basis of their purpose and method. There is a wide variety of tools used to collect relevant data. The choice of tools is crucial to successful research. The type or purpose of the research may determine the effectiveness of the tool. Various devices are used to collect new and anonymous research data for any problem. For each type of research, the researcher needs specific tools to gather new facts or to explore new areas. After obtaining the appropriate sample, the next task was to select the appropriate data collection tools. The choice of tools is based on a number of factors such as objectives, the ability to score points in the test and the interpretation of the outcome.

The following tools were used by the researcher to collect the data for the present study:

i. **Academic Resilience Scale** developed by Meghali D'Souza and Shefali Pandya (2017) for Pre-service teacher
ii. **Classroom Engagement Scale** developed by the researcher for Pre-service teacher
iii. **Observation schedule** developed by the researcher for Pre-service teacher

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

Table 3.3List of the Tools selected according to the objective for the present study

Sl. No	Objective	Tools constructed	Developed by
1.	To study the level of Academic Resilience of the Pre-service teachers of Assam	Academic Resilience Scale	Meghali D'Souza and Shefali Pandya(2017)
2.	To find out over all and dimension wise significant difference in Academic Resilience of the Pre-service teachers of Assam based on: i. Gender (Male and Female) ii. Locality (Urban and Rural) iii. Stream (Arts, Science,) iv. Types of institution (Private and Govt. TEIs)		
3.	To study the level of Classroom Engagement of the Pre-service teachers of Assam.	Classroom Engagement Scale	Researcher
4.	To find out overall and dimension-wise difference in Classroom Engagement among Pre-service teachers of Assam based on i. Gender (Male and Female) ii. Locality (Urban and Rural) iii. Stream (Arts, Science) iv. Types of institution (Private and Govt. TEIs)		
5.	To study the level of Academic Achievement of the Pre-service teachers of Assam	Final semester marks of the	

6.	To find out overall Academic Achievement among Pre-service teachers of Assam i. Gender (Male and Female) ii. Locality (Urban and Rural) iii. Stream (Arts, Science) iv. Types of institution (Private and Govt. TEIs)	
7.	To find out the relationship between Academic Resilience and Academic Achievement among Pre-service teachers of Assam	Academic Resilience Scale and Final semester marks of the Pre-service teachers
8.	To find out relationship between Classroom Engagement and Academic Achievement among Pre-service teachers of Assam	Classroom Engagement Scale and final semester marks of the Pre-service teachers
9.	To find out influence of Academic Resilience and Classroom Engagement on Academic Achievement of Pre-service teachers of Assam	Academic Resilience Scale Classroom Engagement Scale Final semester marks of the Pre-service teachers
10.	To find out different underlying factors and barriers faced by Pre-service teachers of Assam during classroom transaction	Questionnaire for the Pre-service teachers

11. To study different suggestive measures suggested by Pre- service teachers regarding barriers during classroom transaction	

Brief descriptions of all the tools used in the study are as follows:

3.8.1 Construction of Classroom Engagement Scale (CES)

The researcher had developed 5-point Likert scale to measure the Classroom Engagement of the Pre-service teachers of Assam. The main idea of constructing the Classroom Engagement Scale is to assess the Classroom Engagement of the Pre-service teachers and the relationship among the variables of the present study.

Need for development of CES

The present study is related to the Academic Resilience and Classroom Engagement of Pre-service teachers of Assam in relation to Academic Achievement. After reviewing the tools, the researcher found that few meet the study's needs or are suitable for the population she chose to study. In that case, the researcher felt there is a need to construct and develop tool that fulfil the objectives of the study. The tool would help them to assess the Classroom Engagement of Pre-service teachers.

Areas undertaken in the construction of CES

Classroom Engagement in this study is measured as a combination of Cognitive, Emotional, Behavioral, and Teaching skills Engagement of the Pre-service teacher.

Cognitive Engagement: Cognitive Engagement encompasses the commitment to learning, the significance attributed to learning (Corno, L., & Mandinach, E. B. (1983), the establishment of learning objectives, self-regulation and planning, mastery of tasks, and a preference for challenging activities. The task's nature, students' interest and motivation levels, and their prior knowledge and competencies have influence (Lajoie, 2008; Sitzmann & Ely, 2011; Sperling et al., 2004).

Emotional Engagement: Emotional Engagement refers to both positive and negative responses towards teachers, peers, academics, and the educational institution, and is believed to be associated with the institution and affect the motivation to engage in academic tasks. It pertains to students' emotional responses in the classroom,

encompassing interest, boredom, happiness, sadness, and worry (Fredricks et al. ,2004) and Blumenfeld et al. ,2005).

Behavioral Engagement: Behavioural Engagement encompasses study habits, school and class attendance, and involvement in class discussions. It fundamentally pertains to classroom activities, but campus extracurricular and social activities are also analysed within the framework of Behavioral Engagement (Fredricks et al. 2004).

Teaching Skills Engagement: Pre-service teachers are required to engage in Supervised Professional Experiences (SPEs) during their education programs. They must develop different skills related to teaching, participate as a member of school communities, interact with students, and demonstrate knowledge gained during coursework, which is generally met with enthusiasm.

Collection of pool of items

The investigator had gone through different scales to assess the Classroom Engagement of the Pre-service teachers. Earlier, Engagement of the student was considered to consist of four sub-scales: academic, cognitive, Behavioral, and psychological engagement. Further, some researchers also proposed a new dimension as agentic Engagement (Reeve & Tseng, 2011). However, it has been suggested that extensive research is required for robust validation of the four-dimensional structure of Engagement of the student with the new dimension: agentic engagement (Sinatra, Heddy, & Lombardi, 2015). Nevertheless, prior studies have considered the following four engagement sub-scales: Academic Engagement, Affective Engagement, Social Engagement with teachers, Social Engagement with peers, and Cognitive Engagement. Further, Pekrun and Linnenbrink-Garcia (2012) suggested the following five dimensions of student Engagement: Cognitive, motivational, behavioral, social-behavioral, and cognitive-behavioral engagement. Gordon et al. (2008) also proposed eight-dimensional measurement models. Therefore, the structural model of Classroom Engagement in terms of the number of sub-scales (dimensions) still remains under debate. After reviewing the related literature, the investigators selected 234 items in the beginning.

Construction and Development of the Tool

The review of the literature indicates that although standardized tools for the student engagement are readily available, yet no such tool as per my knowledge is available for Classroom Engagement for Pre-service teachers. In the present work, the investigator has prepared the Classroom Engagement scale for Pre-service teachers. The development of the Classroom Engagement scale typically entails a systematic procedure that encompasses several steps. These steps are discussed below:

Preparing the first draft of the scale

For the construction of the Classroom Engagement Scale, a broad survey of literature was made on Engagement. The researcher has done a detailed review on factors that foster Classroom Engagement. This was done for the selection of appropriate dimensions. Discussions with experts in the field of Psychology and Education were held with regard to justifying the appropriateness of the selected dimensions. An initial draft of 120 items was prepared at the first phase of the scale development.

Initial try out

The researcher conducted an individual try out with 40 Pre-service teachers from Tezpur University, and from the initial try out, 44 items were removed that were not found to be at a significant level, 15 items were modified, and some were changed in order to avoid ambiguity for obtaining more clarity among the respondents. Thus, the first draft of the Classroom Engagement scale included 76 items.

Preparation of second draft of the scale

The second draft was shown to experts, consisting of one international expert from Southern Cross University and five national experts in the disciplines of Psychology and Teacher Education. According to their suggestions and discussion with the supervisor, 10 items (e.g., I feel distracted during the classes while someone whispers) were deleted due to their ambiguity and lack of clarity with the respondents. Additionally, 5 items (e.g., I like to deal with the work myself rather than taking teachers suggestions in the class) were deleted due to not being related to the objective of the study. 11 items (e.g., the use of a reflective diary is very time-

consuming) were combined with other related elements to make it more concise and achieve greater clarity.

Re editing the second draft

Following the receipt of recommendations and insights from experts, 15 elements were eliminated from the preliminary draft, and 11 items were consolidated. Consequently, the second Draft of the Classroom Engagement measure comprised 50 items.

Preparation the third draft

Out of 76 items, 50 items were arranged into four components (Cognitive, Emotional, Behavioral, and Teaching Skills Engagement). Five response categories (almost always, often, sometimes, occasionally, and almost never) accompany the arrangement of all 50 items.

Pilot study

The second draft of the Classroom Engagement Scale was administered to 110 Pre - service teachers from Sonitpur, Assam. The draft has a total of 50 items. The study involved a random selection of Pre-service teachers 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.

Item Analysis

The next step in the standardization of the Classroom Engagement Scale, the researcher conducted item analysis so that she could weed out the weak items. The mechanism of item analysis is generally carried out in two ways: by determining the item's discrimination index and difficulty level. At first the individual scores of all the 110 Pre-service teachers were ranked from the highest to the lowest. Two groups, one with high scores and the other with low scores, were selected, and for this purpose, 27% of individuals from the highs 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). Subsequently, each item was analyzed individually to ascertain the number of students who selected responses such as Almost frequently,

Often, Sometimes, Occasionally, and Almost never for both the high and low groups independently. Consequently, for all 50 items, the number of students in each category was determined separately for both the high and low groups, and the discriminating power value for all 50 items was computed using a t-test. If the item's discriminating power value above 1.98 at the 0.05 significance level, the item was approved; otherwise, it was rejected.

Table 3.4: Item wise Discriminatory Power Value of the Classroom Engagement Scale

Serial No of Item	Discriminative value	Accept/Reject
1	**-.41**	**Reject**
2	**0.10**	**Reject**
3	2.11	Accept
4	2.69	Accept
5	**-.34**	**Reject**
6	**-0.44**	**Reject**
7	2.28	Accept
8	4.72	Accept
9	**-.34**	**Reject**
10	2.85	Accept
11	2.34	Accept
12	**0.06**	**Reject**
13	3.39	Accept
14	2.61	Accept
15	2.27	Accept
16	3.34	Accept
17	**0.06**	**Reject**
18	2.40	Accept
19	**-0.03**	**Reject**
20	**0**	**Reject**
21	2.85	Accept
22	**-0.17**	**Reject**
23	-0.10	Reject
24	4.3	Accept

25	2.52	Accept
26	**0.06**	**Reject**
27	3.9	Accept
28	2.92	Accept
29	**0.03**	**Reject**
30	2.74	Accept
31	2.5	Accept
32	4.67	Accept
33	2.82	Accept
34	3.31	Accept
35	**-0.24**	**Reject**
36	**-0.03**	**Reject**
37	**-0.37**	**Reject**
38	5.32	Accept
39	2.7	Accept
40	4.64	Accept
41	**-0.06**	**Reject**
42	**-0.27**	**Reject**
43	2.34	Accept
44	**-0.27**	**Reject**
45	**-0.06**	**Reject**
46	4.19	Accept
47	3.23	Accept
48	**-0.20**	**Reject**
49	**-0.31**	**Reject**
50	4.34	Accept

Note: Values marked in bold are non-significant and hence rejected

Final draft of the scale

Total 22 items were found rejected with non-discriminatory power value. Thus, in the final scale consist of 28 items out of which 16 items are positive and 12 items are negative.

Reliability of CES

A test is reliable to the extent that it measures it is measuring consistently. In test that has a high coefficient of reliability, errors of measurement have been reduced to a minimum (Best.278). Reliability of the scale had been measured by internal consistency to ensure that each item on a test is related to the topic. Reliability is presented in the table-

Reliability statistics

Cronbach alpha	.868
Split half	.934

Validity of CES

The content validity of the scale is determined by the degree to which statements or questions accurately reflect the topics they are intended to measure, as assessed by experts in the field (Pearson, 2007). In the present study, the Classroom Engagement scale is evaluated by a panel of six experts, consisting of one international expert, significant from Southern Cross University, and seven subject 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. The experts found certain grammatical errors and tried to improve the language structure of the scale. They also suggested modifying the sentence structure for clarity and eliminating some questions.

NORMS

It is very crucial to develop norms to provide a uniform criterion for comparing the performance levels of the students in an objective way. Without developing norms, the standardization of the tool remains incomplete. Based on the raw scores of students chosen for the pilot study, the dimension-wise and entire assessment tool grade norms were developed. Firstly, the raw scores were converted into derived scores, and then z-score norms were developed based on the statistical results that are provided in the table no 3.5.

Table3.5: Raw score expressed as Z score for knowing the Classroom Engagement as rated by Pre-service teacher

Raw Score	Z Score	Raw Score	Z Score	Raw Score	Z Score	Raw Score	Z Score	Raw Score	Z Score	Raw Score	Z Score
28.00	-1.70918	43.00	-1.58709	62.00	-.67146	86.00	.06104	110.00	.79355	134.00	1.52605
29.00	-1.67866	44.00	-1.55657	63.00	-.64094	87.00	.09156	111.00	.82407	135.00	1.55657
30.00	-1.64813	45.00	-1.52605	64.00	-.61042	88.00	.12208	112.00	.85459	136.00	1.58709
31.00	-1.61	46.00	-1.49553	65.00	-.57990	89.00	.15261	113.00	.88511	137.00	1.61761
32.00	-1.58	47.00	-1.46501	66.00	-.54938	90.00	.18313	114.00	.91563	138.00	1.64813
33.00	-1.55	43.00	-1.58709	67.00	-.51886	91.00	.21365	115.00	.94615	139.00	1.67866
34.00	-1.52605	44.00	-1.55657	68.00	-.48834	92.00	.24417	116.00	.97667	140.00	1.70918
35.00	-1.49553	45.00	-1.52605	69.00	-.45782	93.00	.27469	117.00	1.00719		
36.00	-1.46501	46.00	-1.49553	70.00	-.42729	94.00	.30521	118.00	1.03771		
37.00	-1.43449	47.00	-1.46501	71.00	-.39677	95.00	.33573	119.00	1.06824		
38.00	-1.40397	48.00	-1.09876	72.00	-.36625	96.00	.36625	120.00	1.09876		
30.00	-1.37345	49.00	-1.06824	73.00	-.33573	97.00	.39677	121.00	1.12928		
31.00	-1.34292	50.00	-1.03771	74.00	-.30521	98.00	.42729	122.00	1.15980		
32.00	-1.31240	51.00	-1.00719	75.00	-.27469	99.00	.45782	123.00	1.19032		
33.00	-1.28188	52.00	-.97667	76.00	-.24417	100.00	.48834	124.00	1.22084		
34.00	-1.25136	53.00	-.94615	77.00	-.21365	101.00	.51886	125.00	1.25136		
35.00	-1.22084	54.00	-.91563	78.00	-.18313	102.00	.54938	126.00	1.28188		

36.00	-1.19032	55.00	-.88511	79.00	-.15261	103.00	.57990	127.00	1.31240		
37.00	-1.15980	56.00	-.85459	80.00	-.12208	104.00	.61042	128.00	1.34292		
38.00	-1.12928	57.00	-.82407	81.00	-.09156	105.00	.64094	129.00	1.37345		
39.00	-1.70918	58.00	-.79355	82.00	-.06104	106.00	.67146	130.00	1.40397		
40.00	-1.67866	59.00	-.76303	83.00	-.03052	107.00	.70198	131.00	1.43449		
41.00	-1.64813	60.00	-.73250	84.00	.00000	108.00	.73250	132.00	1.46501		
42.00	-1.61761	61.00	-.70198	85.00	.03052	109.00	.76303	133.00	1.49553		

Table 3.6: Norms for interpretation of the levels of Classroom Engagement

Sl. No	Raw score range	Z score	Levels
1	119 and above	1.03 to above	Very high
2	96 to 118	0.35 to 1.02	High
3	73 to 95	-0.34 to +0.34	Average
4	50 to 72	-1.02 to -0.33	Low
5	49 and below	-1.03 & below	Very low

Administration

The rating scale is meant for Pre-service teachers to be administered personally in the classroom as per their convenience.

Scoring of Final Draft

Scoring is a very vital process in the field of assessment. The careful design of assessments should consider various factors. The process of scoring offers a systematic and impartial approach to assess one's proficiency. The practice should guarantee equity and uniformity when evaluating individuals or collectives. The absence of a scoring system in assessments would result in an over-reliance on subjective judgment, thereby increasing the likelihood of biases and inconsistencies. Each respondent Pre-service teacher is requested to indicate his/her response to each statement on a 5-point scale ranging from "Almost Always to Almost Never. The scoring for positive statements is made by giving weights of "5, 4, 3, 2, 1 in terms of being "Almost Always, Often, Sometimes, Occasionally, and Almost Never. The scoring pattern for negatively worded statements is reversed.

Table3.7: Five Point Likert scale

Statements	Almost Always	Often	Sometimes	Occasionally	Almost Never
Positive	5	4	3	2	1
Negative	1	2	3	4	5

Table 3.8: Dimensions wise distribution of items

Serial. No	Dimensions	Nature	Sl. No of Items	Total No of items	Total
1	Cognitive Engagement	Positive	4,7,8,11,19,22,25	7	11
		Negative	15,21,24,27	4	
2	Emotional	Positive	1,5,6,	3	

	Engagement				5
		Negative	9,18	2	
3	Behavioral Engagement	Positive	3,10,17,	3	8
		Negative	2,13,14,16,23	5	
4	Teaching skills Engagement	Positive	12,20,28	3	4
		Negative	26	1`	

3.8.2Academic Resilience Scale

Description about the tool

The tool was developed and standardized by Dr. Meghali D'Souza and Dr. Shefali Pandya (2017). The significantly focus on academic success among Indian school pupils predisposes them to feelings of worthlessness and insecurity. Students succumbing to this type of pressure frequently experience psychological issues such as stress, anxiety, and depression. Empowering students to confront disappointments and adversity in life is essential. Students are significantly influenced by their educators. Teachers must exemplify resilience to cultivate resilience in their students. Consequently, it is essential to examine the Academic Resilience of prospective educators (Pre-service teachers). The tool aimed to assess the Academic Resilience of Pre-service teachers. A comprehensive literature analysis on Academic Resilience facilitated the development of the tool and the determination of its dimensions. The instrument comprises two dimensions: Self-efficacy and Social Support & Social Competence.

Justification for adopting the Scale

The Academic Resilience scale is used to measure students' ability to overcome academic challenges and persist in their studies despite difficulties. M Dsouza and S Pandya prepare Academic Resilience scale specially for the B. Ed trainees consisting

32 items. The scale is divided into two factors: Self efficacy and social support and social competence. This scale was standardized and specifically meant for B.Ed trainees, so the researcher decided to adapt this scale to the target population of the present study, i.e., on Pre-service trainees without making any modifications or adding or subtracting any items.

Standardization of the scale

Discriminant validity

The researcher has ascertained the discriminant validity of the factors by computing the coefficient of correlation between pairs of the pairs of the factors of the scale

Table 3.9: Coefficient of Correlation between pairs of the factors of the scale

Factors	SE	SS&SC
Self-Efficacy	-	0.51
Social Support &Social Competence	0.51	-

Reliability

The reliability of the scale is established by calculating the internal consistency reliability and test-retest reliability.

Table 3.10 Internal consistency Reliability

Sl. No	Type of Reliability	Factor 1	Factor 2	Significance level
1	Cronbach's Alpha	0.89	0.78	.01
2	Split Half	0.87	0.72	.01
3	Spearman-Brown	0.93	0.84	.01
4	Test retest	0.87		.01

Scoring of the Academic Resilience Tool

The scoring is done using five-point rating scale. The tool comprises of both positively worded as well as negatively worded items. The scoring is done as follows

Table 3.11: 5-point Likert scale

Response category	Always True	Often True	Sometimes True	Rarely True	Not True at all
Positive items	5	4	3	2	1
Negative items	1	2	3	4	5

The following table shows positively and negatively item numbers.

Table3.12: List of Positive and Negative item numbers of Academic Resilience scale

Sl. No	Factor	Positive /Negative	Item number	Sub total	Total
1	SE	Positive	1,2,3,4,5,6,7,8,9,19,11,12,13,14,15,16,17,19,20,21,22	21	22
		Negative	18	1	
2	SS & SC	Positive	23,25,26,27,28,29,30,32	8	10
		Negative	24,31	2	
				Total	32

Table3.13: Statical results of Academic Resilience scale on the basis of the scores of 1000 protocols

N	Mean	SD	Range of scores
1000	94.50	25.04	32-60

Norms

Table3.14: Norms of Academic Resilience scale

Sl. No	Range of Raw scores	Range of Z scores	Grade	Level Of Academic Resilience
1	145 & above	+2.01 & above	A	Extremely high
2	127 – 144	+1.26 to + 2.00	B	High
3	108-126	+0.51 to +1.25	C	Above average
4	82-107	-0.50 to +0.50	D	Average
5	63-81	-1.25 to -0.51	E	Below Average
6	45-62	-2.00 to -1.26	F	Low
7	44 & below	-2.01 & below	G	Extremely low

3.8.3 Observation Schedule

The researcher developed an Observation Schedule to accurately document genuine and dependable Classroom Practices. The objective at this stage is to encompass all pertinent and notable observable activities related to classroom teaching approaches and student behaviour. Observation is a deliberate, systematic, and selected method of observing and listening to an interaction or phenomena as it occurs (Kumar, R. 2007). The formulation of the Observation Schedule often involves a methodical process comprising multiple stages.

These steps are discussed below:

Preparing the first draft

The first draft of the Observation Schedule was prepared after a thorough examination of relevant literature. The preliminary draft consists of 56 items collected from various publications, including books, journals, and articles.

Areas under consideration

The statements were divided into four separate dimensions. It primarily focuses on Professionalism, Active learning, learning environment, critical and creative thinking.

Professionalism: This dimension refers persons skills, knowledge, and conduct in a particular profession.

Active learning: Active learning is a pedagogical strategy encourage the students to produce thoughts and get feedback through interactive setting.

Learning Environment: The learning environment comprises the psychological, social, cultural, and physical setting in which learning occurs.

Critical and creative thinking: Critical and creative thinking involves students thinking broadly and deeply using skills, behaviours, and dispositions.

Deciding a format

The 5-point Likert Scale aims to assess Engagement of the Pre-service teachers in the classroom. The categories included in ratings adequately cover the range of behaviours or features of interest in the target group for observation (Cohen.2018).

Preparation of second draft

The next step is to validate the items. With regard to validity of observation, researchers have to ensure that the indicators of the construct under investigation are fair and operationalized (Cohen, 2018). Two experts related to the field of psychology and education reviewed the scale and expressed their opinions. The suggestions received from the experts are incorporated and thus editing was performed. With regard to reliability the indicators have to be applied fully consistently and securely with no variations in interpretations (Cohen,2018).

Out of 56 items total 20 items were arranged into four components. (Professionalism, Active learning, learning environment, Critical and Creative thinking)

Final Draft

The Final draft of observation schedule consists of four components i.e. Professionalism includes 2 items, Active learning includes 7 items, learning

environment includes 5 items, and critical and creative thinking includes 6 items. Thus, a total of 20 items were put in the final draft of observation schedule.

3.9 Questionnaire on barriers faced by Pre-service teachers of Assam

The researcher prepared a questionnaire to seek information about the barriers faced by the Pre-service teachers. The questionnaire consists of 14 statements that are related to different issues faced by Pre-service teachers that are related to Classroom transactions. The questions are presented in variety formats, including "multiple Answering Questions; and even open space for their suggestion regarding the barrier. 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.

3.10 Academic Achievement of the Pre-service teacher

The sample comprises of the 4th semester Pre-service teachers and for the variable Academic Achievement, their previous end term examination marks i.e. 3rd semester (2023) were collected from respective Teacher Education Institutions. The percentages of Pre-service teachers were collected from the heads of the institutions.

3.11 Procedure of Data Collection

The researcher personally visited 16 teacher training institutions to collect primary data for the study. Prior to conducting field research, due permission was obtained from the head of the department and the supervisor. The permission letter from the Department was submitted to the concerned faculty members of the study. The researcher obtained authorization from the principals of the selected teacher training institution to administer the test and observation schedule. Prior to performing field research, proper clearance is required from the head of department and the supervisor. The researcher has collected the list of Pre-service teachers earlier from the concerned office premises. The selected respondents were collected in a classroom on the day and at the time specified by the authorities and given adequate seating arrangements so that they could reply freely. After establishing rapport with the trainees, a brief description of the procedures to be followed in responding to the questionnaires was given, and they were observed. They were informed of the

purpose of the study. It was guaranteed that all learners understood the instructions fully. Respondents were also told that their responses would be kept strictly confidential and used purely for research reasons. The researcher began manually entering the acquired data for further examination.

3.12 Distribution of Questionnaire and Response Rate

1029 questionnaires were distributed, out of which 910 were filled and returned to the researcher. The remaining questionnaires were partially filled and, in some cases, not returned; thus, out of 910 returned questionnaires, the investigator selected responses from 895 questionnaires for analysis as per the sample size requirement.

3.13 Treatment of Data

For conducting research, the researcher has collected both quantitative and qualitative types of data. This research employed a descriptive 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 content analysis is utilized for the qualitative data analysis. The quantitative data were analysed through the use of SPSS software version 20.0 and MS Excel, while the qualitative analysis was conducted manually. The study used various statistical techniques to analysed the data collected, in accordance with the stated objectives.

3.13.1 Quantitative data analysis

As a consequence of counting or measuring certain characteristics, a quantitative approach is a collection of numerical observations. Statistical methods are implemented to evaluate the objectives. The statistical methods utilized in the study include regression, percentage, t-test, correlation matrix, mean, and standard deviation. Each of these techniques is briefly described below. By employing the Statistical Package for Social Science (SPSS) software, the entire analysis is conducted.

1. Mean score of Academic Resilience, Classroom Engagement and Academic Achievement has been computed for the entire group as well as separately for the sub groups.

2. The t-test has been applied to determine the significance difference in the mean score of overall and dimension wise of Academic Resilience of Pre-service teachers based on Gender, Locality, Stream, and Types of institution. Again, t-test has been applied to find out the difference in the mean score of overall and dimensions wise Classroom Engagement and Academic Achievement based on Gender, Locality, Stream, and types of institution.

3. Pearson's correlation technique has been used to know the relationship between the variable.

4. Regression analysis has been used to examine the relationship between two or more variable of interest.

5. To analyse the challenge faced by Pre-service teachers' percentage is used

3.13.2 Qualitative data analysis

Qualitative research is naturalistic inquiry through which researchers seek an in-depth understanding of people's experiences or perspectives and social phenomena, within naturally occurring contexts. Beyond the exploration of what is occurring, qualitative researchers are interested in why phenomena happen. Qualitative research has also been defined as a distinct methodological approach to inquiry that explores a social or human problem (Lahman,2025). The researcher builds a complex, holistic picture; analyses words; reports detailed views of participants; and conducts the study in a natural setting" (Creswell & Poth, 2018, p. 326). Qualitative methods are procedures including unstructured, open-ended interviews, questionnaires and participant observation that generate qualitative data" (Schwandt, 2015).

Content analysis is a method used to describe or analyse content collected from the interview, visuals and documents etc., (Showkat, N & Parveen, H,2017). In the present study, the data that has been gathered from the questionnaires were categorized as per the various pre-determined dimensions by checking its rationality. In the present study the six-step elements of the content analysis framework are used based on Krippendorff (2004). These components need not to be organized as linearly (Krippendorff,2004).

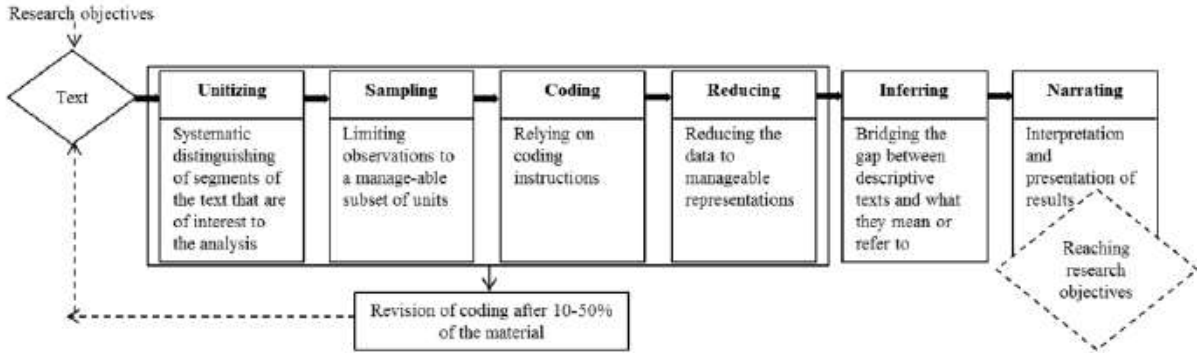

Figure 3.3 Six-elements of content analysis framework

3.15: Statistical techniques used for data analysis in connection with the objectives of the study

Normality of test	Mean, Median, Mode, Standard Deviation, Skewness and Kurtosis, Normal Q-Q plot, Histogram
To study the level of Academic Resilience of the Pre-service teachers of Assam	Percentage, Frequency
To find out over all and dimension wise significant difference in Academic Resilience of the Pre-service teachers of Assam teachers based on Gender, Locality, Stream, Types of institution	Mean and Standard Deviation, Inferential Statistics: t-test
To study Level of the Classroom Engagement of Pre-service teachers	Percentage, Frequency
To find out over all and dimension wise significant difference in Classroom Engagement of the Pre-service teachers of Assam teachers based on Gender, Locality, Stream, Types of institution	Mean and Standard Deviation, Inferential Statistics: t-test
To study the level of Academic achievement of the Pre-service teachers of Assam	Percentage, Frequency
To find out over all significant difference	Mean and Standard Deviation,

in Academic Achievement of the Pre - service teachers of Assam teachers based on Gender, Locality, Stream, Types of institution	Inferential Statistics: t-test
To find out the relationship between Academic Resilience and Academic Achievement among Pre-service teachers of Assam	Correlation
To find out the relationship between Classroom Engagement and Academic Achievement among Pre-service teachers of Assam	Correlation
To find out influence of Academic Resilience and Classroom Engagement on Academic Achievement of Pre-service teachers of Assam	Regression analysis
To find out different barriers and underlying factors faced by Pre-service teachers of Assam during classroom transactions	Percentage
To study different suggestive measures suggested by Pre-service teachers regarding barriers during classroom transaction	Content analysis

3.15 Conclusion

This chapter provides a detailed outline of the entire research methodology from research design, method, population and sample, sampling technique, tools used, variables of the study, data collection, and the statistical techniques. Thus, this chapter covers the description of every aspect that the researcher followed while conducting the study. The analysis and interpretation of data is detailed in the next chapter.