Chapter – IV

Research Design and Instrumentation
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RESEARCH DESIGN AND INSTRUMENTATION

4.1 Introduction

The methodology chapter is concerned with comprehensive descriptions of the methodological issues and practices in research. Measurement refers to the process of transforming the abstract into the concrete; it refers to the process of restating concepts as variables. Measurement concerns are pervasive throughout the research process, from study conception, through research design development, to data collection, and continuing through data analysis and reporting (Agostino, 2005). Apparently, there are two categories of research methods, they are quantitative and qualitative. A quantitative approach uses measurement as the most precise and universally accepted method for assigning quantitative values to the characteristics or properties of objects or events for the purpose of discovering relationships between variables under study (Koul, 2009). On the other hand qualitative methods are used when researchers wish to describe, interpret, or criticise phenomena that typically are not summarised numerically (Reinard, 2006). It often involves discussions of how people experience and feel about events in their lives.

Research design is a plan or proposal to conduct research, which involves the intersection of philosophy, strategies of inquiry and specific methods (Creswell, 2009). Thus, it is a plan that guides the decision as to, when and how often to collect data, what data to gather and how to analyze the data. Mixed methods research is a flexible approach where the research design is determined by what we want to find out rather than by any predetermined epistemological position. In mixed methods research, qualitative or quantitative components can predominate or both can have equal status (Mujis, 2004). Conducting mixed methods research involves collecting, analyzing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon (Onwuegbuzie &
Leech, 2006). Though educational researches often provide ad hominem data, mixed methods research adds to precision. This concept of using a multi-method approach in collecting data, information or evidence is often called triangulation (Wellington, 2015). Therefore, triangulation is a strategy for increasing the validity of evaluation and research findings (Mathison, 1988).

There are four different types of triangulation: They are

- **Data triangulation**: using different sources of data. This includes different times data collection, difference places data collection, and different people who shall be involved in research study.
- **Investigator/Analyst triangulation**: using several people (or at least more than one) in data gathering and data analysis processes.
- **Theory /Perspective triangulation**: approaching data with multiple theories or perspectives in mind.
- **Methodological triangulation**: two subtypes are noted – within-method and between-method for using more than one method to gather data.

(Denzin, 2002 as cited in Wilson, 2011)

Eventually, triangulation in a research study is more than scaling, reliability and convergent validation; as it captures a more complete, holistic and contextual portrayal of units under study (Holtzhausen, 2001). It also improves both internal consistency and generalizability through combining both quantitative and qualitative methods in the same study (Hussein, 2009).

In addition to that, Biber & Nagy (2010) emphasizes five reasons for increasing researches in using mixed methods in educational research as given by Greene, Caracelli and Graham (1989)

- Triangulation, especially the methods triangulation helps in increasing the credibility of research findings.
- Complementarity allows the researcher to gain fuller understanding of the research problem.
- Development of the research project by creating a synergistic effect, whereby the results from one method help inform or develop the other method.
- Initiation such as a study’s findings may raise questions or contradictions that will require clarifications.
- Expansion intends to increase the breadth and range of inquiry.

Hence it sounds eminently feasible to combine, say, observational fieldwork and interviews or focus groups in order to get a broader view (Barbour, 2001) for the main purpose of triangulation of data sources is to validate information obtained from one source by gathering information from another source (Martella, Nelson, Morgan et al., 2013). Harmonizing, Denzin’s categorisation on types of triangulation in research, Creswell (2009) has given three general mixed method strategies in his book on Research Design. They are

- **Sequential mixed methods** in which the researcher seeks to elaborate on or expand on the findings of one method with another method. It may begin with qualitative study with a view for exploratory purpose followed by quantitative survey or with a quantitative method in which a theory is tested followed by qualitative exploration.

- **Concurrent mixed methods** are those in which the researcher converges or merges both quantitative and qualitative data in order to provide a comprehensive analysis of the problem. The data is collected at the same using both the methods and integrated for analysis and interpretation of the overall results.

- **Transformative mixed methods** is in which the researcher uses a theoretical lens as an overarching perspective within a design that contains both quantitative and qualitative data.

In this study the investigator holds a pragmatic view, which in turn influences and shapes the choice of mixed methods as a strategy of inquiry.
Thus, the present study approves methodological triangulation embedded with concurrent mixed methods strategy. So it was decided to employ quantitative and qualitative methods at the same time to the same sample to attain the goal of this research that is the development of communicative competence through ICT enabled CLIL. As a result of this, the present study has two mediated variables. Firstly, the theoretical and conceptual ideas are to be translated to a course for delivery. Secondly, the tailored instruction should be monitored and assessed to ascertain its effectiveness. Hence, the study follows a diagnostic small scale quantitative study format with a focused qualitative investigation (the details of the diagnostic test are discussed in the third chapter) and is based on a practical classroom research, with an eclectic approach. In general the developed strategy for intervention was guided by the following objectives:

- Identification of learning objectives for any assessment to be valuable.
- Evaluation of skills attainment.
- Achievement of intended learning objectives.

4.1.1 Research Process of the Study

Research is a process and when researchers conduct a study, they proceed through a distinct set of steps (Creswell, 2012). The steps followed in the present study are given in the following diagrammatic representation (Figure 4.1).
Defining the Research Problem
Information Gathering from resources
Formulating Objectives & Hypothesis to be tested
Selecting Research Design
Developing Intervention Model
Pilot Study
Redesigning Intervention Model
Experimenting in real situations

Figure 4.1F Showing the Research Process of the Present Study
In this study, the investigator first defined the research problem. After, scrutinising the survey reports and research studies the investigator positioned the problem of study as developing capacity building programmes for outgoing graduates to build their communicative competence with the help of a ground-breaking language teaching method that cements the gaps of contemporaneous language teaching methods in India. To satisfy this purpose the investigator drilled the relevant studies as supportive documents to guide the research through. The literature resources both from primary and secondary sources were blended to frame the objectives and hypothesis of the study. Accordingly, experimental design complemented with semi-structured interviews as case study were recognized as suitable research methods to accomplish the realised objectives and hypothesis of the present study. Followed by, the intervention model was developed by the investigator that was mentioned on the literature reviews and the objectives of the present study. In order to verify the adequacy and appropriateness of the developed intervention model, a pilot test was done, and the changes were included. Accordingly, the intervention model was also redesigned. Finally, the developed intervention model was experimented in real classroom to ensure its effectiveness.

4.2 Appropriateness of Experimental Design

Experimental researchers test an idea (or practice or procedure) to determine its effect on an outcome (Creswell, 2012). It is a procedure for investigating cause-and-effect relationship by randomly assigning groups in which one or more independent variables are manipulated (Mcmilan & Schumacher, 2001). Experimental research is based on a methodology that meets three criteria: (a) random assignment—the subjects (or other entities) are randomly assigned to treatment groups, (b) experimental control—all features of the treatments are identical except for the independent variable (i.e., the feature being tested), and (c) appropriate measures—the dependent measures are appropriate for testing the research hypothesis (Odle, Teresa & Mayer 2009). Eventually, experimental research is generally recognized as the most
appropriate method for drawing causal conclusions about instructional interventions (ibid)

Experimental designs are broadly classified as Pre-experimental designs, True Experimental Designs, Factorial Designs, Quasi Experimental designs and Time series designs (Koul, 2009). Types of pre-experimental designs are One Shot Case Study, One Group Pre-test Post-test study and Static – Group Comparison Design (Best & Kahn, 2009). The one group pre-test-post - test design has control over the different teachers’ unique styles, skills and personalities and countless other factors that exist in a classroom which includes instructional settings such as room location, heating, ventilation, attractiveness and logistics (the day of the week, time of the day when classes are held). As the present study aims to assess the impact of the innovative strategy the one group design would be suitable design so as to reduce the sensitivity of the experimental inputs by preventing the influence of methods, expertise and resources used by another group. Moreover, in the context of the present study the subjects have already undergone a bridge course for a period of three months at the beginning of their college study in communication skills, trained by the English language educators of that college. Furthermore, there was no traditional teaching for competency building; hence single group design was adopted in the present study.

In a book written on *Empirical Methods for Evaluating Educational Interventions*, Levin(2005) regards a typical classroom intervention (instructional) given by a teacher comprises as a single treatment administration and it must also be regarded as the equivalent of administering the treatment to a single experimental participant because of the interdependence exists among a classroom’s constituent members. Finally, the nature of the research and the extent of information the investigator intend, provides the direction to select the research design.
4.3 Objectives of the Study

The formulation of research objectives is the first step in a research design for they determine the type of research to be undertaken along with what and how of a research problem. In that way, the present study is committed to accomplish the following objectives:

- To identify the areas of capacity building in communication scientifically that is set to enable the outgoing undergraduate students to deliver goods to job market.
- To explore the expectations of the job providers from the employees.
- To ascertain the set level of communicative competence in the perspective of job market among the outgoing undergraduate students.
- To diagnose the problems of the communicative competence of outgoing undergraduate students.
- To develop and validate capacity building programmes for outgoing undergraduate students to meet out the set level of communicative competence using ICT enabled Content and Language Integrated Learning.
- To identify the effect of attitude and motivation towards learning of English before and after the intervention.
- To assess the effectiveness of ICT enabled Content and Language Integrated Learning on building the communicative competence of the outgoing undergraduate students.
- To find out the relationship between Attitude and Motivation towards learning of English on the development of communicative competence
- To identify the influence of nature of discipline on the communicative competence of the undergraduate students.
- To evolve recommendations for policy decisions on communicative competence of the students to deliver goods to the job market.
4.4 Formulation of Hypotheses

Hypothesis framed for the present study can be classified as correlational and differential. The hypothesis contains the terms which must be operationally defined. These terms specify the kinds of phenomena that will be observed (Krathwohl, 1964). The operational CLIL definition implies the nature of hypothesis to be framed for the study. With the aim of verifying or refuting, the hypotheses are stated as follows

- There will be a statistically significant difference on the mean scores of communicative competence between the pre-test and the progress test one.
- There will be a statistically significant difference on the mean scores of communicative competence between the pre-test and the progress test two.
- There will be a statistically significant difference on the mean scores of communicative competence between the post-test and the progress test one.
- There will be a statistically significant difference on the mean scores of communicative competence between the post-test and the progress test two.
- There is statistically significant difference in gain scores in the communicative competence between the pre-test and post-test.
- Outgoing undergraduate students show a statistically significant difference on the mean scores of communicative competence between the pre-test and the post-test.
- The level of communicative competence of the undergraduate students in the post-test is average.
- There is a statistically significant difference between the nature of discipline and communicative competence of undergraduate students in the post-test.
- Students do not differ in their attitude and motivation towards English language learning between the pre-test and post-test.
• The undergraduate students have favourable attitude and motivation towards English Language Learning before and after the treatment.
• There is a statistically significant relationship between attitude and motivation towards English language learning and communicative competence in the pre-test.
• There is a statistically significant relationship between the attitude and motivation towards English language learning and communicative competence in the post-test.

4.5 Research Questions

The research questions for the present study were emerged out of the research gap identified in the literature and the ideas that emerged out of experts’ advice and the investigators personal experience. The three types of research questions are descriptive, correlational and causal (Postlethwaite, 2005). Research questions can be formulated based on theories, past research, previous experience, or the practical need to make data-driven decisions in a work environment. Thus, they serve as signposts for the reader, foreshadowing the specific details of the study (Onwuegbuzie & Leech, 2006).

This research study seeks answers to the following research questions; within this broad research questions some sub questions have been framed to investigate the main issue further. The main research question is attributed to difference in performance before and after intervention while the sub research questions are intended to investigate performance differences in relation to demographic variables.

General Research Question

• What is the effect of ICT enabled CLIL on communicative competence of outgoing undergraduate students?

Specific Research question

• Does ICT enabled CLIL intervention affect attitude and motivation towards language learning among undergraduate students?
What is the level of attitude and motivation of English language learning among undergraduate students?

What are the effects of ICT enabled CLIL on reading comprehension skills and writing skills of undergraduate students?

How does the discipline of the undergraduate students affect the achievement of communicative competence?

What are the strengths, weaknesses, opportunities and challenges for acquiring communicative competence among the outgoing undergraduate students?

Can the ICT enabled CLIL intervention meet the requirements of job market with special reference to communicative competence?

Thus the study was guided by these research questions and the desired outcome was that it gave a comprehensive and holistic scrutiny of the intended problem under study. The study aims to respond to the research questions of qualitative and quantitative nature, hence data collection & analysis techniques for both the methodologies were implemented. The mixed methods approach employed in the study enriches the investigation carried out. At the same instance, the methods be described and explored clearly in the particular research context. Further, the research questions were explored focusing on multiple levels of analysis such as interviews, and case analysis. In this study the scores in the Communicative Competence Scale (CCS1 & CCS2) is the indicator of a measure of communicative competence attainment.

4.6 Type of investigation

Measures were taken cognizance on the basis of how well they provide useful information for testing hypotheses (Mayer, 2005). Multileveled set of measures provide richer version of how to improve educational practices (ibid.,) Quantitative research is a genre which uses a special language which appears to exhibit some similarity to the ways in which scientists talk about
how they investigate the natural order – variables, control, measurement, experiment (Bryman & Burgess 1994).

Concurrent triangulation approach was used for data collection. In a concurrent triangulation approach, the researcher collects both quantitative and qualitative data concurrently and then compares the two databases to determine if there is convergence, differences, or some combination (Creswell, 2011). An experiment is defined as a test under controlled conditions that is made to demonstrate a known truth or examine the validity of a hypothesis (Mujis, 2004).

Quasi experimental studies have an advantage over true experimental designs which is that they are studied in natural educational settings (Mujis, 2004). Furthermore, for the purpose of affirming accuracy, authenticity, validity and reliability triangulation of data was also done in the study. Also, an experiment provides a controlled environment to explore the research questions. Eventually, the present study is experimental in nature as it finds out the cause - effect of ICT enabled CLIL in developing communicative competence.

4.7 Design of Investigation

4.7.1 Quantitative Techniques Adopted

- Survey

A survey is concerned with the present attempt to determine the status of the phenomena under investigation (Avdhesh, 2014). It is also known as descriptive empirical studies. The study adopted descriptive survey to analyse the situation at two different instances before and after the experimentation. Attitude and Motivation towards English Language Learning were tested through English Language Learning Attitude Assessment Scale (ELLAAS) which was developed by the investigator. The questionnaire approach was adopted for the following reasons:
It gives a direct response from the participants with factual information.
It takes less time compared to interviews and observations.
The participants feel free from pressure and anxiety to provide their response.
The responses provide scope for open ended questions and also structure questions.

Test of achievement
Test data feature centrally in the experimental model of research; additionally they may feature as part of a questionnaire, interview and documentary material (Cohen, Manio, Morrison, 2008). A test is an instrument or tool of measurement that helps in the assessment of learner’s achievement at the end of the course or class or at while it is ongoing. Hence the test of achievement is used as an instrument in the present study to assess the communicative competence of the subjects in the pre-test, progress tests and post-tests. The pre-test, test of achievement is named as Communicative Competence Scale 1 and Post-test, test of achievement is named as Communicative Competence Scale 2.

4.7.2 Qualitative Techniques Adopted

Case Analysis: The term case analysis refers to a systematic process of examining all the available information related to the case. It is often used in management studies. In the present study the investigator identified three cases (individuals) randomly and conducted semi structured interviews and a mock selection test. The results were analysed then.

Semi structured Interviews: Interviews are used to gather information regarding an individual’s experiences and knowledge; his or her opinions, beliefs, feelings and demographic data. It can be asked to determine past or current information as well as predictions for the future (Best & Kahn, 2009). Therefore in the study interviews were used to supplement the data obtained through other sources such as achievement test and observation.
Interviews give a description of the similarities and contradictions in the obtained data and it also provides triangulation of data by eliciting the same data. The interview helped the investigator to confirm that whether the CLIL embedded class were helpful in improving the learners’ communicative competence. Finally, it helps to bridge the gap in other sources of data. The interview protocol included semi structured open ended questions which focused on classroom experiences, perceived advantages in the class; suggestions for improving the instruction and the role of teacher in the classroom.

- **SWOC Analysis:** Another source of qualitative data was the SWOT analysis done while the experimentation was ongoing. SWOC is an acronym for Strengths, Weaknesses, Opportunities and Challenges. It constitutes internal analysis such as strengths and weaknesses and external analysis such as opportunities and challenges of the problem under study. The recognition of these four aspects of a problem gives a comprehensive picture of the problem and it leads to strategic analysis. In this study SWOC analysis is used in individuals self perceived Strengths, Weaknesses, Opportunities and Challenges in learning of English. The data were also collected from the subjects and analysed later.

4.8 **Research Design**

The research design refers to the overall strategy that a researcher chooses to integrate the different components of the study in a coherent and logical way, thereby, ensuring he/she will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data (Trochim, 2006). It helps the researcher find solution to the identified logically and critically. The research design of the present study is given below:
Figure 4.F.2 Showing the Research Design Employed in the Present Study

Research Design

Mixed Methods (Concurrent Triangulation)

Sample (Purposive Stratified Random Sampling)

Variables

Independent Variable
- ICT Enabled CLIL

Dependent Variable
- Communicative Competence

Intervening variables
- Attitude and Motivation

Tools

Undergraduate students N = 30

Diagnostic test & Questionnaire (ELLAAS)

Communicative Competence scales (CCS 1 & CCS 2)

Analysis

Parametric Tests

Descriptive

Mean & Standard Deviation

Inferential & Correlational

Paired ‘t’ test
ANOVA
Pearson ‘r’
Effect size
Gain ratio

Survey

Quantitative

Case Analysis

Semi Structured Interviews

Pre Experimental

SWOC Analysis Mock Test

Qualitative

Survey

One Group pre -test post - test design
4.9 Ethical Considerations

Much social research necessitates obtaining the consent and cooperation of subjects who are to assist in investigations and of significant others in the institutions or organisations providing the research facilities. (Routledge textbooks cited in Cohen, Manion and Morrison, 2008). Therefore the informed consent was obtained from the subjects under study. Thus the investigator described the research under study to the subjects. The researcher contacted higher educational institutions having heterogeneous group of students hailing from rural, semi urban and urban areas in diverse disciplines for experimentation. One of such institutions at Tiruchirappalli namely, Nehru Memorial College has enthusiastically called upon the researcher to conduct the experimentation for the good cause. Confidentiality of the obtained data is another ethical consideration. The investigator maintained the privacy of the subjects and used the data solely for research purpose. The subjects were not coerced to participate in the study, they were left free to make their own choices whether to participate or withdraw. Another major ethical consideration as given by American Psychological Association is that the research participants must be free to terminate at any stage of the experimentation. In the present study the participants were given freedom to drop out from the experiment at any stage, but their data were not taken for statistical analysis.

4.10 Components of the Experimental Method

4.10.1 Research Variables

Variables are empirical representations of concepts. It is an element in a research project that, when measured, can take on more than one value. Empirical research attempts to find relations between variables (Quene, 2010). Independent variables (IV) reflect manipulated variables used for creating groups to compare; Dependent, or measured, variables (DV) reflect variables that are either pre-existing or are the result of manipulation of the independent variable.
Independent Variable or Experimental Variable: In the present study, the design and implementation of 30 hours of teaching that was modelled and delivered based on the principles of CLIL with technology as an enabler. Hence the ICT enabled CLIL strategy is the independent variable.

Dependent Variable or Outcome Variable: The enhancement of students’ communicative competence which is intended to be measured through accomplishment of the given tasks on the administration of the Communicative Competence Scale (CCS1 & CCS2).

Intervening Variables
The following variables are identified as intervening variables:

- Attitudes towards learning of English.
- Motivation towards learning of English.

4.10.2 Operational Definition of the Terms
Theoretical or Nominal definitions are those that clarify a concept by offering synonyms for that concept which underscores the importance. The best empirical counterpart between theoretical definitions and empirical embodiments of concepts is referred as operationalisation. Operational definitions specify the exact steps or procedures employed when carrying out the measurement procedure.

Capacity building is an ongoing process through which individuals, groups, organizations and societies enhance their ability to identify and meet development challenges (UNCED 1992). Capacity building programme refers to the intervention model developed by the investigator using ICT enabled CLIL to develop the communicative competence of the outgoing undergraduate students in relation to the placement tests.

CLIL in this study refers to the language teaching method based on 4C framework namely Content, Communication, Cognition and Culture in which
English is taught through general themes that are of interest and relevance to the undergraduate students.

**ICT enabled CLIL** refers to the use of power point slides imbibed with appropriate and validated videos and pictures on the CLIL theme as a complement for teaching of English in a CLIL classroom to achieve the intended instructional objectives.

**Communicative Competence** is the total score obtained by the participant in the Communicative Competence Scale (both CCS1 and CCS 2) that test their reading comprehension skill and writing skill in English.

### 4.10.3 Research Context and Subjects

A major consideration in designing any experiment in an educational setting is to ensure that experimental procedures are not too obtrusive or disruptive of normal class procedures (McGowan, 2011). Mixed ability grouping is a core feature in CLIL contexts where it can be demanding to place a cohort of students on any given development continuum (Marsh, 2012). Initially, 35 subjects (participants in an experimental design are termed as subjects) participated in the experimentation but later on due to experiment mortality the final sample were 30 subjects.

The study was conducted where the majority of the students were characterised as rural learners or first generation learners. The study followed Purposive Stratified Random sampling. This is a basic mixed methods sampling strategy. The stratified nature of this sampling procedure is the characteristic of probability sampling, whereas the small number of cases typically generated through it, is the characteristic of purposive sampling. In this technique, the researcher first divides the group of interest into strata (For e.g., above average, average, below average students) and then selects a small number of cases to study intensively within each strata based on purposive sampling techniques. This allows the researcher to discover and describe in
detail characteristics that are similar or different across the strata or subgroups (Teddlie and Yu, 2007). In the present study, the subjects were first stratified on the basis of nature of discipline. They were categorised as Physical Science, Biological Science, Computer Science, Languages and Managerial Science. The aspirants of a job who had an inclination towards writing selection test were first identified as qualified subjects for the CLIL intervention, facilitating homogenisation. Finally, the subjects were randomly selected since; a well-designed randomized experiment is the best method for establishing efficacy of any intervention, be it medical, behavioral, or educational in nature (McGowan, 2011). Randomised subjects were then assigned to experimental conditions, in which their achievement value of the dependent variable is then observed. The observations of the dependent variable are based on the experimental conditions defined by the independent variable.

The appropriate levels of treatment are an important aspect of experimental design. With the careful examination of the reviews the investigators decided to give 30 hours of instruction with 20 CLIL themes. Each class was set to last for 1 ½ hours in which the instruction was given for one hour followed by half an hour of follow up activity at the end of the class. With thirty hours of instruction through ICT Enabled CLIL, the improvements of the undergraduate students in their communicative competence were assessed.

4.11 Development and Validation of the Research Instruments

A tool helps a researcher understand information that is generated to organize large amount of information in a succinct manner (Beins, Bernard & Carthy, 2012).

4.11.1 Designing and Development of Communicative Competence Scales (CCS1 and CCS2)

The communicative competence scale was developed by the investigator with concrete theoretical foundation and literature reviews. Thus, conceptualisation validation of the Communicative Competence Scale was
done through past researches. It was created as a procedure for providing valid and reliable observations of the appropriateness of undergraduate students’ communication behaviour within the placement tests setting. Research focused on the assessment of competence has attempted to specify particular context, in which communicative competence can be found and measured. Focusing on appropriateness, however allows examination of behaviour within a context, this is a more generalised, other-centered approach (Rubin, 1975). There are many different methods of measuring reading comprehension, including multiple choice questions after short passages, fill-in-the-blanks cloze tests, constructed short answer response tests and much longer constructed responses such as text retelling and summarising (Ecalle Jean, Bouchafa Houria, Potocki Anna and Magnan Annie, 2013). The investigator used the open-end question answer format as they do not limit the creativity and expression of the subjects. Language is for expression of ideas and open-ended questions suits this purpose well. Reading Comprehension assessed using writing tasks are valid form of assessment which is discussed earlier in the conceptual chapter and the review of literature chapter. Some examples of integrative proficiency tests include tests (or subtests) described as: (a) written dictation; (b) cloze procedure completion of sentences; (c) written composition; (d) oral interviews; (e) reading aloud; and (f) multiple choice tests of reading comprehension requiring inference (Oller & Perkins, 1980) as cited in (Rivera Charlene, 1984). Real life communicative writing tasks, on the other hand, are letter-writing, form filling, report writing and so on (Javed, Juan, & Nazli, 2013). Such tasks were included in the Communicative Competence Scale. The final draft of the Communicative Competence Scale consists of thirteen open ended questions with intended communicative tasks. The subjects have to record the responses in the space given below each questions. The number of words in which the answers are expected by the investigator was clearly defined, to structure the open-ended essays.
4.11.2 Validation of the Communicative Competence Scales (CCS1 & CCS2)

Validity, Reliability and Generalisability are three major concerns of quantitative research that are associated with the quality of measurement done in a study. Validity is a multidimensional construct, and the three types of validity such as content validity, criterion validity and construct validity are not mutually exclusive. Hence it is important to demonstrate all the three in a study (Muji, 2005). Through the investigators desk review of previous question papers and experts interview, the specific communication skills needed for placement test were identified. A wide range of communicative situations exist within a placement test setting which was identified, analysed and evaluated by the experts panel. The experts belong to the field of English language teaching, Education, recruiters of companies, human resource managers and question paper setters of competitive exams. Thus, the content validity was established on the expert panel’s advice on the adequacy and appropriateness of skills tested in the communicative competence scale. The first step in validating is conceptual validation. The communicative competence scale was examined for clarity, and lack of bias. It was also validated by the experts for clearly worded. The congruence between the construct that is the communicative competence and the task given to measure was evaluated by the experts. Thus conceptual validation was also established. They also amended that CCS Scale one and CCS two measures both the reading comprehension and writing skills and are parallel in nature.

In the second step operationalisation validation was done. To assess this type of validity, one can produce several methods or tests, indicate similar measures of the same or a similar construct, elicit different responses to the same stimulus set or inter- correlate the items on the test to provide an internal consistency measure (Rubin, 1975). Since operationalisation is concerned with the best method of measuring the construct. The study adopted two
methods for operationalised validation through parallel forms of questions in the communicative competence scale.

- Number of tasks were given to identify the same construct.
- Different responses were elicited for the same sub skills tested.

The criteria for analysing the validity of the teacher made tests such as Consequences, Fairness, Transfer and Generalizability, Cognitive Complexity, Content Quality, Content Coverage, Meaningfulness, Cost and Efficiency (Linn, Baker, & Dunbar, 1991) was also examined by the experts panel.

Another major concern in experimentation and instrumentation is the establishment of reliability. Reliability is an indicator of consistency, i.e., an indicator of how stable a test score or data is across applications or time. A measure should produce similar or the same results consistently if it measures the same “thing.” A measure can be reliable without being valid. It also gives the error of measurement in a given test. There are four types of reliability. They are Test- Retest Reliability which is also called stability, Parallel forms reliability which is also called equivalence, internal consistency reliability and Inter-rater reliability. Research that establishes consistency is the necessary first step in establishing the validity of teacher-made tests (Parr, 2006). In this study the researcher established test retest reliability for CCS1 and CCS 2. The cron bach alpha is \textbf{0.669}. Pearson ‘r’ values were also calculated and analysed.

\textbf{4.11.3 Construction of English Language Learning Attitude Assessment Scale (ELLAAS)}

Based on Gardner’s (1985) Socio-Educational Model and Wenden (1985) description of the three components of attitude are

- cognitive component, i.e. beliefs, perceptions or information about an object;
- an affective component, in the sense that the object of an attitude can evoke feelings of pleasure or displeasure, acceptance or refusal, agreement or disagreement;
Karahan (2007) postulates that the sub categories such as social & instrumental value, Cultural Identity of English Language, Orientation towards English, Intrinsic value of English Language and English based culture together constitute Attitude towards English Language. On the other hand, Martinez (2013) experimented that attitude towards the English teacher, English language textbooks, attitude towards English language tasks and English language class together determines learner’s attitude towards English language. Together with these categories the use of English in an educational context decides the attitude towards English learning (Tamini & Munir, 2009). Images associated with English and Exposure to English outside school also constitutes English language attitude (Kobayashi, 2010). Jafre, Abidin and Alzware (2012) has assessed attitude on the cognitive, behavioural and emotional aspects. Gardner believes that the learner’s attitude towards L2 and their integrativeness have the strongest impact on the level of motivation (Hosseini & Pourmandnia, 2013). Hence, the scale is an amalgamation of attitude and motivation towards English language learning. On the synthesis of the various subcategories of attitude from the reviews, the investigator identified the following sub categories of attitude and motivation to be used in the study, since these were repeatedly explored in the said studies:

- English Learning Activities
- Perceptions about studying English in an academic environment
- Images associated with English Language
- Interest in target culture & Ethnocentrism
- Social & Personal Value
- Instrumental Motivation
- Integrative Motivation

The sub categories of the Attitude scale and the statements included in each dimension are given in the diagrammatic representation below.
Figure 4.F.3 Showing the Attitudinal statements of the ELLAAS tool
Content validity refers to whether or not the content of the manifest variable is right to measure the latent concept that is intended to measure (Mujis Daniel, 2005). It also refers to the adequacy of items in a tool reflecting the theoretical & empirical dimensions of attitude and motivation in relation to English Language Learning. If the researcher intends test scores to indicate the degree to which an examinee mastered a specific body of knowledge and skills, content validity evidence alone might suffice (Agostino, 2005). In the present study attitude was conceptualised and operated as a disposition towards English Language Learning upon cognitions, affective reactions and behavioural intentions. Motivation is operated as the need to learn the English language for the accomplishment of a goal. The ELLAAS were intended to represent the same. The initial draft of the tool contained 67 items. The dimensions were derived from literature reviews and discussions with experts.
such as English language teachers, researchers and practitioners of education. The rating given by them for the relevance and salience of the dimensionality and the items to the content of the study were also considered. The items were assessed for face validity, clarity, readability, precision, ambiguity and redundancy. Based on the opinion the items were rephrased, reworded, retained or removed. The language classroom should be clear from inhibitions. They should provide supporting and accepting atmosphere for learning.

A five point likert type scale ranging from 1 for strongly disagree, 2 for disagree, 3 for Neutral, 4 for Agree and 5 for strongly agree was used for each attitudinal item in the questionnaire which were positively worded. Since, both positively and negatively worded items were included in the questionnaire for the convenience of statistical analysis reverse scoring was performed for negatively worded items. That is for negatively worded items 5 was given for strongly disagree, 4 for disagree, 3 for neutral, 2 for agree and 1 for strongly agree.

The developed ELLAAS were also used to achieve the classification of participants into favourable, unfavourable and neutral attitude. Test-retest reliability was used for assessing the reliability of the ELLAAS tool. The reliability coefficient of this tool is 0.591.

4.11.5 Description and Organisation of the Questionnaire

The questionnaire was divided into two parts. The first part has open form or unrestricted type of questions. It contains questions regarding personal information such as name, gender, age, parental education, discipline and medium of instruction at primary, secondary and higher secondary levels. The information on medium of instruction were sought to identify the English language learning background of the participants that helps to ascertain the language instruction they might have had during schooling.
The second part, English Language Learning Attitude Assessment Scale (ELLAAS) contains 50 statements that reflect the attitude towards learning of English and motivation towards learning of English. Ten Statements are unfavorable in nature to test the consistency and reliable response from the respondents (in survey we refer the subjects as respondents). They are question nos. 1, 2, 20, 23, 25, 27, 28, 30, 31 and 49. Altogether 38 statements were based on five subcategories of attitude towards English Language Learning and 12 statements focus on motivation towards English Language Learning with two sub categories as Instrumental Motivation and Integrative motivation.

4.11.6 Administration of the Questionnaire (ELLAAS)

The questionnaire was administered twice before and after the intervention. Detailed instructions were given in the questionnaire to help the respondents. The investigator ensured that all the statements were answered by the respondents to avoid missing data. The questionnaire was structured with simple and clear language. After the survey the experimentation was done.

4.12 Experimental Phases

One approach to the issue of the relation between the quality of design and implementation and a study’s results is to investigate the matter empirically (Valentine & Cooper, 2005). In experimental studies the researcher is manipulating the treatment so the problem of extraneous variables causing a relationship is less strong in experimental research than in any other type of research because the experimenter can control the environment and ensure that as few extraneous factors are involved as possible (Mujis, 2004). Randomisation process helps to avoid bias in selection of the subjects for there is exactly equal chance of being in experimentation.
4.12.1 Initiation or Analysis Phase

The single most effective strategy to minimise problems associated with instrumentation is piloting (Mujis, 2004). Hence the developed questionnaire and the CLIL model was piloted with the similar sample. Based on the observations and experts advice the intervention model was modified. The initial stage was an analysis of the needs and current status of the subjects in language skills. This analysis was done through a diagnostic test. The description of the diagnostic test is mentioned in this chapter earlier. The results of the diagnostic test were used to prepare the instructional objectives and materials for the CLIL classroom. The diagnostic test provided the investigator with the skill status of the undergraduate students.

4.12.2 Designing, Developing, Creating and Execution Phase

In the second phase the investigator designed, developed and created the instructional goals, objectives and outcomes along with content of instruction, materials to accomplish the task, supporting media and activities to aid instruction was also done.

The experimentation began with an introductory explanation on the classes they are going to have. In this introductory class the ELLAAS tool was administered to the subjects. The subjects who require assistance on the filling up the questionnaire were assisted by the investigator. It was then succeeded with the administration of Communicative Competence Scale. Time duration of two hours were given to complete the ELLAAS Tool and Communicative Competence Scale (CCS).

This phase can also be termed as treatment phase. To begin with the pre-test was given to the subjects, along with the ELLAAS questionnaire. Then teaching was done by the investigator guided by the developed model. Though whole group was used initially to deliver the content, assignments were given individually and collaboratively. These assignments were used to review, reinforce and practice concepts. In every class, when the classroom...
work was completed, it was decided to exchange ideas. The subjects were divided into small groups, they were expected to produce short written texts on the real communicative tasks. This practice gives reinforcement of the skill learnt and transfer of the same in varied contexts.

**Implementation of Learning Activities**

The third phase was the implementation phase. Lesson design and learning activities that were designed are given in the appendix. The intervention was given to the subjects at their regular classrooms inside the college campus. Every day in the beginning of the each session, the investigator had some informal talks with the subjects to develop a rapport with the subjects. With the help of an LCD projector, the classes were taken, so that the videos displayed were visible to everyone. CLIL teacher is expected to constantly provide the students with language scaffolding, repetition, rephrasing, use of synonyms and antonyms, circumlocution, questions, elicitation and feedback (Liubinienë, 2009) the activities were planned in such a way to accommodate the said activities. With a view of one lesson per day twenty lessons were taken for 20 days. The lessons were planned in such a way that one leads to the other for easy acquisition. At the end of the study, post - tests were given. The test was based on the CLIL classes taken by the investigator. The pre-test and the post - test measured the same sub skills of reading comprehension and writing.

**4.12.3 Closure or Assessment Phase**

The needs of assessing the outcome of learning have led to the developments of tests of achievement and proficiency. The Communicative Competence Scale 2 (CCS 2) was used for assessment of the subjects or the exit behaviour at the end of the ICT Enabled CLIL based intervention. Therefore in this phase the subjects were given the post - test and a delayed post - test. As part of case study, the interview was conducted after the post - test. Since the investigator had a good rapport with, the interviewees, they felt comfortable and welcomed. The investigator also ensured the confidentiality.
of the participants in the study and also the confidentiality of the data, collected were used only for research purpose. The interviewees were given time to express their own views without hesitation. The interviews were tape recorded by the investigator along with field notes. Later on both the obtained data were decoded, transcribed and analysed. The three interviewees were interviewed separately. After the delayed post-test, the mock placement test was conducted, to the selected cases that formed the sample for the semi-structured interviews.

4.13 Threats to Internal Validity

Internal validity relates to the degree to which causal inferences can be drawn from the covariation among variables (Agostino, 2005). It is the degree to which an experiment is designed so that a causal relationship between the independent and dependent variable is demonstrated without interference by extraneous variables (Beins, Bernard & Carthy, 2012). There are certain threats associated with experimental designs they are discussed below.

<table>
<thead>
<tr>
<th>Type of Threats to Internal Validity</th>
<th>Description of Threat</th>
<th>Control Measures Taken to minimise the impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>Because time passes during an experiment, events can occur that unduly influence the outcome beyond the experimental treatment.</td>
<td>Since there was no experimental group, the cases experienced the same treatment.</td>
</tr>
<tr>
<td>Maturation</td>
<td>Participants in an experiment may mature or change during the experiment, thus influencing the results.</td>
<td>The selected cases for the experiment belong to same age and all had twelve years of schooling and two years of college education.</td>
</tr>
<tr>
<td>Regression</td>
<td>Participants with extreme scores are selected for the experiment. Naturally, their scores, over time, regress toward the mean.</td>
<td>The pre-test scores display that cases were selected including all types of scores.</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Selection</td>
<td>Participants can be selected who have certain characteristics that predispose them to have certain outcomes.</td>
<td>Randomisation was used in selecting the cases, so that the characteristics have the probability of being equally distributed among the cases.</td>
</tr>
<tr>
<td>Mortality</td>
<td>Participants drop out during an experiment due to many possible reasons.</td>
<td>Though there were drop outs in the experimental study, the researcher did not account their results in the study.</td>
</tr>
<tr>
<td>Testing</td>
<td>Participants become familiar with the outcome measure and remember responses for later testing.</td>
<td>The pre-test and post-test administered had different items for testing with similar skills and objectives were tested.</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>The instrument changes between a pre-test and post-test, thus impacting the scores on the outcome.</td>
<td>Attitude and Motivation were tested using the same instrument before and after treatment.</td>
</tr>
</tbody>
</table>

* source for description of threats (Creswell, 2011).

### 4.14 Threats to External Validity

External validity is the degree to which research conclusions generalize across populations, settings, time, treatment variations, or outcomes
(Agostino, 2005). It arises when experimenters draw incorrect inferences from the sample data to other persons, other settings, and past or future situation (Creswell, 2011). Hence, external validity is the property of data such that research results apply to people and situations beyond the particular sample of individuals observed in a single research setting.

<table>
<thead>
<tr>
<th>Type of Threats to External Validity</th>
<th>Description of Threat</th>
<th>Control Measures Taken to minimise the impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction of selection and treatment</td>
<td>The narrow characteristics of participants in the experiment, affects generalisation to individuals who do not have the characteristics.</td>
<td>The study was done among normal population and the claims are restricted to groups for which it can be generalised.</td>
</tr>
<tr>
<td>Interaction of setting and treatment</td>
<td>The characteristics of the settings of participants in an experiment a researcher is prevented from generalising to individuals in other settings.</td>
<td>The experiment was conducted in normal classroom settings.</td>
</tr>
<tr>
<td>Interaction of history and treatment</td>
<td>The experiment results are time bound so the researcher cannot generalise to the results to past or future situations.</td>
<td>The researcher conducted a delayed post - test and the study discussed current situation.</td>
</tr>
</tbody>
</table>

* source for description of threats (Creswell, 2011).
4.15 Description of Tests

Current efforts at educational reform favour essay writing, in-class presentations, and other more holistic assessments of learner competence (Savignon, 2002). The measures of reading comprehension and writing need to be expanded to include writing tasks such as sentence production, writing compositions, and free writing and reading-comprehension tasks such as reading paragraphs and graded readers (Webb, 2008). Therefore, the devise for data collection was created consisting of four tests administered in the following order. The pre-test which is also known as assessment test was used to identify the entry behaviour and the linguistic proficiency of the participants with reference to reading comprehension skills and writing skills was administered first. Followed by two progress tests namely progress test 1 and progress test 2 were imposed to gauge the level of improvement among the participants. These progress tests also served as control measures such that assessed effectiveness of ICT enabled CLIL on communicative competence was attributed to the intervention given. Finally, the post-test also known as achievement test was performed particularly to judge the effectiveness of the given intervention. Moreover, the achievement tests administered in the present study seems pedantic to two functions. First, function is concerned with recording attainment, that is what the student has already achieved or learned, and the second function is concerned with assisting the progression of learning.

4.15.1 Pre-test or Assessment Test (CCS 1)

For the development of communicative competence, however, research findings overwhelmingly support the integration of form-focused exercises and meaning-focused experience (Savignon, 2002). Communicative language tests are intended to be a measure of how the testees are able to use language in real life situations (Kathleen, & Kenji, 1996). The pre-test assessment consisted questions of open ended responses. The participants have to read the questions, understand, comprehend and then to respond. The test questions
were structured with meaning focused, form embedded response. For e.g.: A passage of a newspaper clipping was given where the participants have to grasp the gist of the passage and write a suitable title using passive voice. A total of 13 open ended questions were given that induces responses exhibiting the reading comprehension sub skills along with different types and forms of writing. The functional English, for example stating the expressed emotions by the pictures were also tested. They reflect the task based exercises with pictures as contextual support. This provided testing through guided exercises with little exposure to contextual vocabulary that were displayed along with pictures. The visual representation besides the context given as text was an added support to the learners.

4.15.2 Progress Test

The progress test one which is a written form of assessment was given at the end of seven days of instruction. It included the language content taught in the class using multiple choice questions, form based exercises and summary writing. The progress test 2 was administered at the end of fourteenth class. The components tested and the method of testing was the same as progress test one.

4.15.3 Post - Test or Achievement Test (CCS 2)

A communicative test should require test takers to show their ability of combining language skills as in real life communication situations (Nguyen & Le, 2013). The post assessment test was the same as pre-test but with different questions that is parallel form of questions were used. The objectives of testing remained same for pre-test and the post - test. Thus, the degree of improvement was ascertained using an achievement test at the end of the course. The entry level test which is termed as pre-test in the present research design ascertained the entry behaviour of the subjects. This test was administered to examine the communicative competence of the sample after the intervention.
4.15.4 Delayed Post - Test or Post - Test 2

The durability of the learning should be examined using delayed post-tests as well as immediate post-tests (Webb, 2008). After one week a delayed post-test was conducted. CCS 2 was used for the delayed post-test.

4.15.5 Mock Selection Test

A mock written test for selection was conducted for three cases selected. It was done to answer the research question, Can the ICT enabled CLIL intervention meet the requirements of job market? Based on the selection test conducted by the job market the question paper was structured. It tests their reading comprehension skills with multiple choice questions and writing skill with an open ended question. This test was administered after the delayed post-test.

4.16 Scoring Procedure

The design of the tests as a number of interconnected, contextualized communicative tasks, likely to be encountered in real life communication, intends to diminish students’ performance stress and thus ensure person-related reliability (Valdivia, 2012). So the tasks were selected on the basis of tasks encountered by the undergraduate students in their placement test context. Such testing of communicative task based assessment is functional in nature. Conversely, functional goals imply global, qualitative evaluation of learner achievement as opposed to quantitative assessment of discrete linguistic features. So a holistic scoring would be better than the assessment that focuses distinct linguistic features such as grammar, vocabulary, content, organisation etc. Therefore, the investigator employed holistic scoring for evaluating the subjects’ ability on the accomplishment of the communicative tasks given. Though scored holistically the investigator considered the dimensions of writing such as content or ideas appropriateness with organisation and writing conventions (Spelling, Punctuation and Grammar) as dependent measures for an appropriate holistic score. Thus, to judge the efficacy of the CLIL instruction various writing tasks with intended
communicative tasks were given. Since the skills, reading comprehension and writing mingle with each other for goal accomplishment in a communicative task, goal accomplishment (communicatively achieved) can be regarded as another possible criterion to judge how successful communication has been (Knapp, Seidlhofer, & Berlin, 2008).

The Communicative competence Scale (CCS1 & CCS2) had thirteen questions. Based on the elicited responses and questions types scoring was done. The scores of individual questions against the total score of 100 is given below.

<table>
<thead>
<tr>
<th>Q.No</th>
<th>Component Tested</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Summarising, Identifying Main idea &amp; communicative value of sentences and utterances</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>Understanding explicitly information &amp; Compare &amp; Contrast essay</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Understanding expressions</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Relating information to background knowledge &amp; Using cohesive lexical cohesion devices</td>
<td>8</td>
</tr>
<tr>
<td>5.</td>
<td>Identifying &amp; Expressing Main idea from supporting details</td>
<td>10</td>
</tr>
<tr>
<td>6.</td>
<td>Trans coding Information from diagrammatic display &amp; Letter writing</td>
<td>10</td>
</tr>
<tr>
<td>7.</td>
<td>Trans coding Information from diagrammatic display &amp; Dialogue Writing</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>Understanding &amp; Expressing cohesion between parts of a text through grammatical cohesive devices</td>
<td>5</td>
</tr>
<tr>
<td>9.</td>
<td>Drawing inference</td>
<td>5</td>
</tr>
<tr>
<td>10.</td>
<td>Understanding Grammatical structures (Modals) &amp; Expressing salient points</td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>Narrative Writing using dialogues</td>
<td>5</td>
</tr>
<tr>
<td>12.</td>
<td>Indicators in discourse &amp; using grammatical structures (Imperatives)</td>
<td>7</td>
</tr>
<tr>
<td>13.</td>
<td>Understanding the context &amp; Persuasive writing</td>
<td>10</td>
</tr>
</tbody>
</table>
4.17  Completion rates

Completion rates are the percent of test takers completing the entire test. Examining completion rates can be useful for determining the perceived speediness (percentage of test takers completing the entire test) and or difficulty of the test, both of which are characterised by low completion rates. Completion rates are one of the characteristics of SAT (Scholastic Aptitude Test) along with establishment of reliability and difficulty levels of questions asked. For instance, The SAT is a norm-referenced measure that incorporates both “power” and “speed” components (Stickler, 2007). The power component is concerned with the correct answers and speed component is concerned number of questions answered by the test takers.

4.18  Conclusion

The contra positioning of both qualitative and quantitative methods is frequent when the quantitative data and the qualitative data complements each other to produce quantity and quality research study. The research data were collected through pre experimental with single group pre-test post design with quantitative data for statistical treatment. An ICT enabled CLIL course embedded assessment was utilised. The analysis of the data is discussed in the ensuing chapter.