

## **RESEARCH METHODOLOGY**

Research is the process of finding the truth or a path to find the reality. Research brings new knowledge in the previous once. This research study was aimed at analyzing the National Science Curriculum Chemistry at Secondary Level in Pakistan. The researcher took various steps to complete this research.

This study may be categorized as the descriptive historical study. The researcher had to depend upon the literature available and structured questionnaires which were available for the chemistry teachers and the experts of the science and chemistry education. The researcher made an extensive study for the literature on problem under study. Literature was nice on the topic but there was lack of research studies on the topic in Pakistan. The researcher collected the opinions from the curriculum experts and from the teachers through the questionnaires. The main target of the study was four elements of the curriculum i.e. Objectives, Content, Teaching Methods and Evaluation.

This section includes a description of the population, sample, sampling method, instruments used to collect data, their construction, and refinement, the method of data collection and analysis of data.

### 3.1 POPULATION

All the experts of national science curriculum working in the Ministry of Education Islamabad, Curriculum Bureau in provinces and working teachers of the chemistry at secondary level in the Pakistan constituted the population of the study. Also all the policy documents, five year plans, chemistry curricula, revision reports and research studies were the population of the study.

### 3.2 SAMPLE

#### 3.2.1 Sample of Experts

Random and convenient sampling procedures were adopted for the selection of experts to administer the questionnaire. So the division of the experts will be as follows:

1. Curriculum experts working at Ministry of Education Islamabad	10
2. Curriculum experts from Curriculum Bureax in provinces	12
a) Curriculum research and Development Centre, Lahore	05
b) Bureau of Curriculum and Extension Jamshoro Sind.	02
c) Bureau of Curriculum and Extension Quetta.	02
d) Bureau of Curriculum development and Extension Services Abbotabad, N.W.F.P.	03
3. Research Officers of Board of Intermediate and Secondary Education	10
a. Federal Board of Intermediate and Secondary Education	02
b. Board of Intermediate and Secondary Education Lahore	02
c. Board of Intermediate and Secondary Education Multan	02
d. Board of Intermediate and Secondary Education Karachi	02

e.	Board of Intermediate and Secondary Education Peshawar	01
f.	Board of Intermediate and Secondary Education Faisalabad	01
4.	Curriculum experts from Textbook Boards	08
a.	Federal Textbook Board	02
b.	Punjab Textbook Board	03
c.	Sind Textbook Board,	01
d.	NWFP Textbook Board	01
e.	Balochistan Textbook Board	01

### 3.2.2 Sample of Chemistry Teachers

Eight hundred chemistry teachers from 800 schools of Pakistan were randomly selected as a sample of the study. The description of the sample is as follows:

<b>Total Number of Teachers = 800</b>					
	<b>Urban</b>		<b>Rural</b>		
	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>Islamabad</b>	10	10	10	10	40
<b>Punjab</b>	100	100	100	100	400
<b>N.W.F.P.</b>	30	30	30	30	120
<b>Sind</b>	30	30	30	30	120
<b>Baluchistan</b>	30	30	30	30	120
<b>Total</b>	200	200	200	200	800

### 3.3 RESEARCH INSTRUMENTS

For the collection of data following research instruments were developed and administered. Questionnaire is more efficient in that it requires less time, less expensive and permits collection of data from much large sample. (Best and Kahn, 1992)

Questionnaires were prepared based on the objectives of the study. Following questionnaires were developed:

Questionnaire for teachers (Questionnaire No.1).

The questionnaires consisted of items with personal data in Part 1, Part 2 was related to the clarity of objectives of chemistry education, Part 3 was related to the content, subject matter and textbook Part 4 was related to the teaching methodology, Part 5 was related to the testing and grading, Part 6 was related to the general information's and Part 7 was related to the open ended questions. In part 8 there was focus on subject matter, its presentation, application of the concepts, possibility of understanding the concept, development of the interest, exercises at the end of chapters and level of difficulty of the chapters. All of the items were five-point scale

Questionnaire for experts of science education (Questionnaire No.2).

The questionnaires consisted of items with personal data in Part 1, Part 2 was related to the clarity of objectives of chemistry education, Part 3 was related to the content, subject matter and textbook Part 4 was related to the teaching methodology,

Part 5 was related to the testing and grading, Part 6 was related to the general information's and Part 7 was related to the open ended questions.

After preparing the questionnaires, these were distributed among experts and teachers for the collection of data.

### **3.4 DATA COLLECTION**

The researcher distributed the questionnaires in self, where possible, to the respondent and through other where required and collected and received the response. Shelved data or information was obtained from policy document, five-year plans, science education reports, and economic survey of Pakistan, related books, statistical index and previous researches.

#### **3.4.1 Pilot Testing**

The pilot testing of the research instruments was conducted in the Islamabad. Questionnaires were developed, distributed and administered among the five Experts, which includes to from Ministry of Education to from federal board and one Experts from federal college of Education. Also 20 teachers were selected from 10 schools of Islamabad for pilot testing of instrument. Based on the difficulties of the respondents, the questionnaires were improved. The language and text was then modified accordingly.

### **3.5 DATA ANALYSIS**

The questionnaires received from the respondents were analyzed. Each statement had five responses: (i). Strongly agreed (ii) Agreed (iii) Undecided (iv)

Disagree (v) strongly disagreed While in the case of analysis of book it was Excellent, Very good, Good, Better and bad.

Data collected on the above mentioned five-point scale was analyzed by using percentage, Standard Deviation and Chi Square test. Chi Square test was applied for items of questionnaires at 0.05 Significance level. The formula for calculating chi-square ( $\chi^2$ ) is stated as:

$$\chi^2 = \sum \frac{(fo - fe)^2}{fe}$$

Where

fo = frequency of observed or experimentally determined facts

fe = expected frequency of occurrence on hypothesis (Garrett, 1997)

Each questionnaire contains two open-ended questions, the respondents were asked to give their opinions about the drawbacks in the existing curricula and the suggestions to improve those draw backs.

The problem regarding the science education and chemistry education described by different respondents were listed and the frequency of the respondents identifying each problem was given against each problem.

On the basis of the analysis and interpretation of data conclusions were drawn and recommendations were made.