TABLE OF CONTENTS Page Numbers Certificate ii Acknowledgment ii Table of Contents v List of Tables viii List of Tables viii List of Frames ix List of Frames ix List of Figures x List of Plates xii Acronyms xii Chapter One: Conceptual Framework 01-36 1.0 Introduction 01 1.1.1 Science, Technology and Development 02 1.2 Importance of science and technology on society 03 1.3 Importance of science as a school subject 04 1.2.1 Meaning and nature of science 05 1.2.2 Science Education in Ancient Period in India 07 1.3.1 Science Education in Ancient Period in India 08 1.3.2 Science Education in Ancient Period in India 08 1.3.3 Science Education in India 10 1.4.1 Objective of science teaching at secondary level 13 1.4.2 <			COMON.
CertificateiAcknowledgmentiiTable of ContentsvList of TablesviiiList of TablesviiiList of GraphsixList of FramesixList of FiguresxList of PlatesxList of AnnexurexiAcronymsxiiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.2Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.3.3Science Education in India071.3.4Efforts to vitalize Science Education in post independent India081.3.3National Science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching in India131.4.3National Science Teaching in India131.5.2Secondary Pre-service Teacher Education in India161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.4Status of Teaching of Science at B.Ed. Level26		TABLE OF CONTENTS	
AcknowledgmentiiiTable of ContentsvList of TablesviiiList of TablesviiiList of GraphsixList of FramesixList of FiguresxList of PlatesxList of AnnexurexiAcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.2Impact of science and technology on society031.3Importance of science051.2.2Science as a product041.2.3Science as a product061.3.4Science Education in India071.3.5Science Education in Medieval & pre independence period in India081.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching in India131.5.4Status of Science Teacher Education in India211.5.4Status of Teaching of Science at B.Ed. Level26	Content		Page Numbers
Table of ContentsvList of TablesviiiList of TablesviiiList of GraphsixList of FramesixList of FiguresxList of PlatesxList of AnnexurexiAcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.3.3Science Education in India071.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching in India131.4.3National Science Teaching is the ducation in India131.5.1Teacher Education in India131.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	Certificat	te	
List of TablesviiiList of GraphsixList of FramesixList of FiguresxList of PlatesxList of AnnexurexiAcronymsXiiChapter One: Conceptual Framework01-361.0Introduction1.1Science, Technology and Development1.2Importance of science as a school subject1.3Importance of science1.4.1Meaning and nature of science1.5Science Education in India1.3.2Science Education in India1.3.3Science Education in India1.3.4Efforts to vitalize Science taching at secondary level1.3.4Efforts to vitalize Science Education in post independent India1.3.4National Science Teaching in India1.3.5Science Teaching in India1.4.3National Science Teaching in India1.5.4Status of Teaching of Science at B.Ed. Level26		-	ii ii
List of GraphsixList of FramesixList of FiguresxList of PlatesxList of AnnexurexiAcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.1.2Importance of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science Education in India071.3.1Science Education in Ancient Period in India081.3.3Science Education in Medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching in India131.4.3National Science Teaching in India131.4.3National Science Teaching in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26			V
List of FramesixList of FiguresxList of PlatesxList of PlatesxiAcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.2Impact of science and technology on society031.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.3.3Science Education in India071.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching at secondary level131.4.3National Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	List of T	ables	
List of FiguresxList of PlatesxList of AnnexurexiAcronymsXiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.3.3Science Education in India071.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching at secondary level131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.4Status of Teaching of Science at B.Ed. Level26		•	
List of PlatesxList of AnnexurexiAcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a product061.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26			ix
List of AnnexurexiAcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching in India131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26		-	Х
AcronymsxiiChapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching at secondary level131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	List of P	ates	Х
Chapter One: Conceptual Framework01-361.0Introduction011.1.1Science, Technology and Development021.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Macient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching at secondary level131.4.2Status of Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Science at B.Ed. Level26	List of A	nnexure	xi
1.0Introduction011.1.1Science, Technology and Development021.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a product061.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science Teaching in India131.4.2Status of Science Teaching in India131.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.4Status of Teaching of Science at B.Ed. Level26	Acronyn	18	xii
1.0Infoduction021.1.1Science, Technology and Development021.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science Education in India071.3.1Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.4Status of Teaching of Science at B.Ed. Level26	Chapte	r One: Conceptual Framework	01-36
1.1.1Defender, recumpting and better principation1.1.2Impact of science and technology on society031.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Science at B.Ed. Level26	1.0	Introduction	01
1.1.2Imput of science and technology of sciency041.1.3Importance of science as a school subject041.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.4Status of Teaching of Science at B.Ed. Level26	1.1.1	Science, Technology and Development	02
1.1.5Importance of science as a science backet051.2.1Meaning and nature of science051.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.1.2	Impact of science and technology on society	03
1.2.1Interforming und nature of science1.2.2Science as a product061.2.3Science as a process071.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.1.3	Importance of science as a school subject	04
1.2.2Science as a process071.2.3Science Education in India071.3.1Science Education in Ancient Period in India081.3.2Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Science at B.Ed. Level26	1.2.1	Meaning and nature of science	05
1.2.5Science as a process1.3.1Science Education in India071.3.2Science Education in Ancient Period in India081.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.2.2	Science as a product	06
1.3.1Science Education in Ancient Period in India081.3.2Science Education in Marcient Period in India091.3.3Science Education in medieval & pre independence period in India091.3.4Efforts to vitalize Science Education in post independent India101.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.2.3	Science as a process	07
1.3.2Solution Education in Anticipate Fore an interact1.3.3Science Education in medieval & pre independence period in India1.3.4Efforts to vitalize Science Education in post independent India1.4.1Objective of science teaching at secondary level1.4.2Status of Science Teaching in India1.4.3National Science Teaching Standards (United States of America)1.5.1Teacher Education in India1.5.2Secondary Pre-service Teacher Education in India1.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level	1.3.1	Science Education in India	07
1.3.5Before Education in Interpolation of provide a	1.3.2	Science Education in Ancient Period in India	08
1.3.1Entoris to thanke betenet Education in peet interpendent mater1.4.1Objective of science teaching at secondary level131.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.3.3	Science Education in medieval & pre independence period in l	ndia 09
1.4.2Status of Science Teaching in India131.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.3.4	Efforts to vitalize Science Education in post independent India	10
1.4.3National Science Teaching Standards (United States of America)161.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.4.1	Objective of science teaching at secondary level	13
1.5.1Teacher Education in India181.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.4.2	Status of Science Teaching in India	13
1.5.1Federation in India211.5.2Secondary Pre-service Teacher Education in India211.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.4.3	National Science Teaching Standards (United States of Americ	ca) 16
1.5.2Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.5.1	Teacher Education in India	18
1.5.3Innovative Programmes for Secondary Teacher Education221.5.4Status of Teaching of Science at B.Ed. Level26	1.5.2	Secondary Pre-service Teacher Education in India	21
1.5.4Status of Teaching of Science at B.Ed. Level26		2	22
•			26
	1.6.1	Activity Based Learning	28
1.6.2Activity Based Science Teaching29			29
1.6.3 Activity Based Science Teaching at B.Ed. level 30		•	30
1.7.1The Maharaja Sayajirao University of Baroda, Vadodara31			
1.7.2Faculty of Education and Psychology31		• • • •	
1.7.3Department of Education (CASE)32		•	32
1.7.5Department of Education (Criticity)1.7.4Bachelors of Education programme at CASE32		•	
1.7.4Difference331.7.4.1Objectives of Bachelors of Education Programme33		• -	
1.7.4.1Objectives of Datherors of Education Programme1.7.4.2Admission criteria for the B.Ed.33			
1.7.5The course 'Teaching of science'34			

Chapter	r Two: Review of Related Literature	37-66
2.0	Introduction	37
2.1.1	Studies related to science teaching at secondary level	38
2.1.2	Observations and implications	43
2.2.0	Studies related to Teacher Education for secondary Level	45
2.2.1	Studies conducted on teacher education programmes and in-	45
	service teachers.	
2.2.2	Studies conducted on Teaching of Science at pre service teacher	49
	education level.	
2.2.3	Observations and implications	54
2.3.1	Studies related to Activity Based Teaching at various levels.	57
2.3.2	Observations and Implications	62
2.4	Implications of the related literature on the present study	63
Chapte	r Three: Research Methodology	67-91
3.0	Introduction	67
3.1	Rationale	67
3.2	Research questions	73
3.3	Title of the Study	73
3.4	Objectives of the study	73
3.5	Hypotheses	74
3.6	Operationalization of the terms	74
3.7	Delimitation of the study	75
3.8	Limitation of the study	75
3.9	Methodology	75
3.9.1	Design of the study	75
3.9.2	Population	79
3.9.3	Sample	79
3.9.4	Data required for the study	80
3.9.5	Sources of Data	80
3.9.6	Tools and techniques of Data Collection	81
3.9.7	Development of tools	82
3.9.8	Data collection	87
3.10	Data Analysis	91
Chapte	r Four: Data Analysis and Interpretation	92-165
4.0	Introduction	92
4.1	Data Analysis and interpretation	92
4.2	Development of an Activity Based Science Teaching Programme	92
4.3	Implementation of an ABST Programme	98
4.4	Effectiveness of an Activity Based Science Teaching Programme	129
4.4.1	Difference between the achievement score of student teachers'	129
	before and after the treatment	
4.4.2	Difference between the mean score of performance test of student	130
	teachers' before and after the treatment	

4,4.3	Difference between the mean score of nature of science Scale obtained by student teachers' before and after the treatment	131
4.4.4	Difference between the mean score obtained by student teacher on STQ scale before and after the treatment	132
4.4.5	Analysis of student teachers' responses on a Science Pedagogy Questionnaire	133
4.4.6	Student teachers immediate responses about each of the activities during the implementation of ABSTP	136
4.4.7	Student teachers' responses about each of the activities at the end of the Implementation of ABSTP	158
Chapter	Five: Findings and Discussion	166 -176
5.0	Introduction	166
5.1	Major Findings	166
5.2	Discussion	170
Chapter Six: Summary and Implications		177-192
6.0	Introduction	177
6.1	Title of the study	178
6.2	Objectives of the study	178
6.3	Hypotheses	179
6.4	Operational Definition of the Terms	179
6.5.1	Delimitation of the study	180
6.5.2	Limitation of the study	180
6.6.0	Methodology	181
6.6.1	Design of the study	181
6.6.2	Population	181
6.6.3	Sample	181
6.6.4	Tools and Techniques of Data Collection	182
6.6.5	Data collection	183
6.6.6	Data analysis	185
6.7	Major findings	186
6.8	Implications of the study	189
6.9	Suggestions for further studies	190
6.10	Conclusion	191

-

Bibliography

Annexure