Opinion of Senior Secondary School Students about their Science curriculum in Uttar Pradesh

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Abstract:

Students' opinion about their science curriculum was sought. The items in the questionnaire were related to physics, chemistry and biology textbooks and curriculum. It covered all aspects of curriculum. The results were found in terms of the percentage of frequency of responses. Findings of the study have been presented. The conclusion has been given based on the findings. *Index Terms:* Science curriculum, secondary school education, text books, syllabus

I. **Introduction:** Science text books occupy an important place in the secondary school curriculum. A country's development depends much upon scientific developments. At senior secondary school level, science includes subjects like physics, chemistry and biology. Students willingly opt subjects at senior secondary school level. The difficulty level of courses increase on moving from secondary school level to senior secondary school level. The study aims to find out the difficulty level of science text books for XI and XII students of science. It is based on the information collected from the students regarding science text books based on the questionnaire given to them. In the end findings are presented.

II. Objectives of the study:

(i) To find out the difficulty level for students regarding textbooks of physics, chemistry and biology for classes XI and XII in Uttar Pradesh

(ii) To suggest measures for improvement based on the findings of the study.

III. Methodology of the study:

The study is based on the data collected from English medium schools following CBSE curriculum from Agra, Aligarh, Lucknow, Allahabad and Bareilly. The total respondents were 600 students of science stream from PCB group (physics, chemistry and biology). They were given questionnaires which contained items related to science text books. The items covered different aspects of syllabus in the text books of Physics, Chemistry and Biology. Analysis of data was done based on the percentage of responses. Then finally the findings regarding the science text books are given.

IV. Given below are the responses of class XI students of PCB towards the statements given in the questionnaire about Physics, Chemistry and Biology Curriculum.

(1) The content of the textboo	k is:
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Students' response towards	Easy		Difficult		Apt (understandable)	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	148	24.667	250	41.667	202	33.667
Chemistry	148	24.667	146	24.333	306	51.000
Biology	73	12.167	129	21.500	398	66.333
Total	369	20.5	525	29.166	906	50.333

Subject matter in the textbook is (2)

(2) Subject m	natter in the te	extbook is				
Students'	Interes	sting	Not very in	teresting	Bori	ng
response towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	210	45.000	267	44.500	123	20.500
Chemistry	212	35.333	268	44.667	120	20.000
Biology	421	70.167	158	26.333	21	3.500
Total	843	46.833	693	38.5	264	14.667

(3) Textbooks are

Students'	Lengthy		Short		Appropriate	
towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	257	42.833	43	7.167	300	50.000
Chemistry	292	48.667	92	15.333	216	36.000
Biology	396	66.000	06	1.000	198	33.000
Total	945	52.5	141	7.833	714	39.666

(4) Curriculum is

Students' response	Wide & comprehensive		Narrow and limited		Heavy and burdensome	
towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	264	44.000	89	14.833	247	41.167
Chemistry	312	52.000	67	11.167	221	36.833
Biology	399	66.500	05	0.833	196	32.667
Total	975	54.166	161	8.944	664	36.888

(5) Textbooks are

Students'	Cheap		Affordable		Costly	
response towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	42	7.000	363	60.500	195	32.500
Chemistry	175	29.167	227	37.833	198	33.000
Biology	150	25.000	292	48.667	158	26.333
Total	367	20.388	882	49.000	551	30.611

(6) Division of course into semesters for class XI is

Students' response towards	Beneficial		idents' Beneficial Not very beneficial sponse wards		Semester pattern and annual pattern of studies are equally good	
	Frequency of response	%age of response	Frequency%age ofof responseresponse		Frequency of response	%age of response
Physics	216	36.000	203	33.833	181	30.167
Chemistry	284	47.333	229	38.167	87	14.500
Biology	296	49.333	208	34.667	96	16.000
Total	796	44.222	640	35.555	364	20.222

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(7) Your syllabus is integrated with Information Technology

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	216	36.000	315	52.500	69	11.500
Chemistry	244	40.667	284	47.333	72	12.000
Biology	170	28.333	394	65.667	36	06.000
Total	630	35.000	993	55.166	177	09.833

(8) Physics, Chemistry and Biology curriculum is mutually correlated

Students'	Yes		No		Can't say	
response towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	286	47.667	261	43.500	53	8.833
Chemistry	316	52.667	218	36.333	66	11.000
Biology	191	31.833	363	60.500	46	7.667
Total	793	44.055	842	46.777	165	09.166

Students'	Yes		No		Can't say	
response towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	367	61.167	220	36.667	13	2.167
Chemistry	513	85.500	70	11.667	17	2.833
Biology	292	48.667	258	43.000	50	8.333
Total	1172	65.111	548	30.444	80	04.444

(9) Textbooks provide you with sufficient material on the subject

(10) Time frame of the school is sufficient enough to cover the course content of the textbooks.

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	234	39.000	343	57.167	23	3.833
Chemistry	370	61.667	205	34.167	25	4.167
Biology	172	28.667	400	66.667	28	4.667
Total	776	43.111	948	52.666	76	04.222

(11) Curriculum is sufficient enough to develop scientific attitude and skills required at senior secondary school level

Students'	Yes		No		Can't say	
response towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	413	68.833	172	28.667	15	2.500
Chemistry	555	92.500	40	6.667	05	0.833
Biology	417	69.500	170	28.333	13	2.167
Total	1385	76.944	382	21.222	33	01.833

(12)	Curriculum	is compl	ete in itself
	Curriculum	15 compi	cic m noch

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	407	67.833	170	28.333	23	3.833
Chemistry	463	77.167	118	19.667	19	3.167
Biology	526	87.667	33	5.500	41	6.833
Total	1396	77.555	321	17.833	83	04.611

Curriculum is community based (13)

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	316	52.667	265	44.167	19	3.167
Chemistry	261	43.500	331	55.167	08	1.333
Biology	276	46.000	220	36.667	104	17.333
Total	853	47.388	<mark>81</mark> 6	45.333	131	07.277
(14) Curricul	um encourage	s learning l	by doing	Ľ		

Curriculum encourages learning by doing (14)

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	444	74.000	149	24.833	07	1.167
Chemistry	373	62.167	193	32.167	34	5.667
Biology	241	40.167	230	38.333	129	21.500
Total	1058	58.777	572	31.777	170	09.444

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	473	78.833	127	21.167	00	0.000
Chemistry	443	73.833	152	25.333	05	0.833
Biology	416	69.333	168	28.000	16	2.667
Total	1332	74.000	447	24.833	21	01.166

(15) The language of textbook is lucid, simple and precise

(16) The textbooks contain necessary examples, figures, graphs, etc.

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	396	66.000	201	33.500	03	0.500
Chemistry	322	53.667	255	42.500	23	3.833
Biology	358	59.667	79	13.167	163	27.167
Total	1076	59.777	<mark>535</mark>	29.722	189	10.500

(17) Prescribed curriculum increases curiosity and power of reasoning and observation

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	526	87.667	55	9.167	19	3.167
Chemistry	314	52.333	260	43.333	26	04.333
Biology	246	41.000	290	48.333	64	10.667
Total	1086	60.333	605	33.611	109	06.055

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	319	53.167	258	43.000	23	3.833
Chemistry	307	51.167	280	46.667	13	2.167
Biology	407	67.833	156	26.000	37	6.167
Total	1033	57.388	694	38.555	73	04.055

(Q18) Experiments given in the textbooks are feasible to be performed in your school laboratory

Q19.The new course is sufficient enough to help you compete All India Medical, Engineering and other entrance examinations

Students'	Yes		No		Can't say	
towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	506	84.333	82	13.667	12	2.000
Chemistry	289	48.167	284	47.333	27	4.500
Biology	329	54.833	213	35.500	58	9.667
Total	1124	62.444	579	32.166	97	05.388

V. Given below are the responses of class XII students of PCB towards the statements given in Questionnaire about Physics, Chemistry and Biology Curriculum.

(1) The content of the textbook is

Students' response towards	Easy		Difficult		Apt (understandable)	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	186	31.000	178	29.667	236	39.333
Chemistry	84	14.000	113	18.833	403	67.167
Biology	117	19.500	42	7.000	441	73.500
Total	387	21.50	233	12.944	1080	60.000

Subject matter in the textbook is (2)

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Students' response towards	Interes	sting	Not very interesting		Boring	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	316	52.667	256	42.667	28	4.667
Chemistry	270	45.000	233	38.833	97	16.167
Biology	439	73.167	141	23.500	20	3.333
Total	1025	56.944	630	35.000	145	08.055

(3) **Textbooks are**

Students' response towards	Lengthy		Short		Appropriate	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	216	36.000	66	11.000	318	53.000
Chemistry	217	36.167	76	12.667	307	51.167
Biology	423	70.500	18	3.000	159	26.500
Total	856	47.555	160	08.888	784	43.555

(4) Curriculum is

Students' response	Wide & comprehensive		Narrow and	d limited	Heavy and burdensome	
towards	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	301	50.167	106	17.667	193	32.167
Chemistry	349	58.167	58	9.667	193	32.167
Biology	396	66.000	28	4.667	176	29.333
Total	1046	58.111	192	10.666	562	31.222

(5) Textbooks are

Students' response towards	Chea	ap	Afford	able	Costly		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response	
Physics	93	15.500	378	63.000	129	21.500	
Chemistry	186	31.000	301	50.167	113	18.833	
Biology	210	35.000	312	52.000	78	13.000	
Total	489	27.166	<mark>99</mark> 1	55.055	320	17.777	

(6) Division of science course into semesters classes XI and XII is

Students' response towards	Benef	icial	Not very beneficial		Semester pattern and annual pattern of studies are equally good	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	312	52.000	82	13.667	206	34.333
Chemistry	263	43.833	178	29.667	159	26.500
Biology	251	41.833	246	41.000	103	17.167
Total	826	45.888	506	28.111	468	26.000

Students' response towards	Ye	S	No		Can't	Can't say		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response		
Physics	122	20.333	406	67.667	72	12.000		
Chemistry	231	38.500	273	45.500	96	16.000		
Biology	196	32.667	369	61.500	35	5.833		
Total	549	30.500	1048	58.222	203	11.277		

(7) Your syllabus is integrated with Information Technology

(8) Physics, Chemistry and Biology curriculum is mutually correlated

Students' response towards	Ye	s	No		Can't say		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response	
Physics	312	52.000	225	37.500	63	10.500	
Chemistry	347	57.833	194	32.333	59	9.833	
Biology	176	29.333	373	62.167	51	8.500	
Total	835	46.388	792	44.000	173	9.611	

(9) Textbooks provide you with sufficient material on the subject

Students' response towards	Ye	S	No	No Can't sa		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	401	66.833	170	28.333	29	4.833
Chemistry	401	66.833	176	29.333	23	3.833
Biology	273	45.500	283	47.167	44	7.333
Total	1075	59.722	629	34.944	96	05.333

Students' response towards	Ye	5	No		Can't say		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response	
Physics	321	53.500	252	42.000	27	4.500	
Chemistry	311	51.833	272	45.333	17	2.833	
Biology	398	66.333	175	29.167	27	4.500	
Total	1030	57.222	699	38.833	71	03.944	

(10) Time frame of the school is sufficient enough to cover the course content of the textbooks.

(11) Curriculum is sufficient enough to develop scientific attitude and skills required at senior secondary school level

Students' response towards	Ye	s	No		Can't	say
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	328	54.667	243	40.500	29	04.833
Chemistry	423	70.500	128	21.333	49	08.167
Biology	297	49.500	285	47.500	18	03.000
Total	1048	58.222	656	36.444	96	05.333

(12) Curriculum is complete in itself

Students' response towards	Ye	S	No		Can't say		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response	
Physics	350	58.333	191	31.833	59	09.833	
Chemistry	482	80.333	107	17.833	11	01.833	
Biology	432	72.000	129	21.500	39	06.500	
Total	1264	70.222	427	23.722	109	06.055	

(13)	Curriculum is community based	
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Students' response towards	Ye	S	No Can't s			say
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	268	44.667	305	50.833	27	4.500
Chemistry	206	34.333	317	52.833	77	12.833
Biology	251	41.833	271	45.167	78	13.000
Total	725	40.277	893	49.611	182	10.111

(14) Curriculum encourages learning by doing

Students' response towards	Ye	s	No	IR	Can't say		
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response	
Physics	572	95.333	15	2.500	13	2.167	
Chemistry	317	52.833	227	37.833	56	9.333	
Biology	287	47.833	251	41.833	62	10.333	
Total	1176	65.333	<mark>493</mark>	27.388	131	07.277	

(15) The language of textbook is lucid, simple and precise

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	498	83.000	91	15.167	11	01.833
Chemistry	450	75.000	123	20.500	27	04.500
Biology	423	70.500	164	27.333	13	02.167
Total	1371	76.166	378	21.000	51	02.833

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	217	36.167	360	60.000	23	3.833
Chemistry	271	45.167	277	46.167	52	8.667
Biology	404	67.333	164	27.333	32	5.333
Total	892	49.555	801	44.500	107	05.944

(16) The textbooks contain necessary examples, figures, graphs, etc.

(17) Prescribed curriculum increases curiosity and power of reasoning and observation

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Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	328	54.667	207	34.500	65	10.833
Chemistry	308	51.333	260 <u>-</u>	43.33	32	05.333
Biology	286	47.667	254	42.333	60	10.000
Total	922	51.222	721	40.055	157	08.722

(18) Experiments given in the textbooks are feasible to be performed in your school laboratory

Students' response towards	Yes		No		Can't say	
	Frequency of response	%age of response	Frequency of response	%age of response	Frequency of response	%age of response
Physics	345	57.500	227	37.833	28	04.667
Chemistry	301	50.167	285	47.500	14	02.333
Biology	448	74.667	129	21.500	23	03.833
Total	1094	60.777	641	35.611	65	03.611

VII. Findings of the Majority of Students of class XI and XII about their NCERT Science textbooks and Science curriculum

Opinion about Physics textbooks and Curriculum:

- 1. Class XI students had an opinion that content of Physics textbook is difficult. Whereas class XII students found the Physics textbooks apt i.e. according to their mental level.
- 2. Class XI students found the subject matter in the textbook not very interesting. Whereas, class XII students found it to be interesting.
- 3. They found the textbooks neither lengthy nor short but appropriate.
- 4. They found the curriculum to be wide and comprehensive.
- 5. Textbooks were found to be neither cheap nor costly but affordable.
- 6. Division of course into semesters for classes XI and XII is beneficial for the students.
- 7. Their syllabus was not integrated with Information Technology, that is no use of IT was made for the study of Physics.
- 8. The curricula of Physics, Chemistry and Biology are mutually correlated.
- 9. Physics textbooks provided them with sufficient material on the subject.
- 10. Class XI students felt that course content in the books is too much and it cannot be covered within the school hours. Whereas, class XII students felt that course content of Physics textbook was sufficient enough to be covered within the timeframe of the school hours.
- 11. They also felt that Physics curriculum is sufficient enough to develop scientific attitude and skills required at senior secondary school level.
- 12. Curriculum was found to be complete in itself. This is a requirement for a good curriculum.
- 13. According to them curriculum was community based i.e. it is related to the needs of the community and related to community life.
- 14. They also had an opinion that Physics curriculum encouraged learning by doing.
- 15. They found the language of the textbook to be lucid, simple and precise.
- 16. Class XI students said that the textbooks contained necessary examples, figures, graphs etc. But class XII students felt that it did not have necessary examples, figures, graphs etc.
- 17. Both class XI and XII students felt that the prescribed curriculum increases curiosity and power of reasoning and observation.
- 18. They said that the experiments given in the textbooks were feasible to be performed in their school laboratory.
- 19. They also said that the new course was sufficient enough to help the students compete All India Medical, Engineering and other entrance examinations.

VIII. Opinion about Chemistry and Biology textbooks and curriculum:

- 1. Both class XI & XII students found the contents of the Chemistry and Biology textbooks to be neither easy nor difficult but apt. i. e. it was according to their mental level.
- 2. Class XI students found the subject matter in the Chemistry textbook not very interesting, whereas the class XII students found it to be interesting. But they found Biology textbooks quite interesting.
- 3. Class XI students found the Chemistry textbooks lengthy, whereas class XII students found them neither lengthy nor short but appropriate. Biology textbooks of class XI & XII were found to be lengthy by them.
- 4. Both Chemistry and Biology curriculum was found to be wide and comprehensive.
- 5. Chemistry as well as Biology textbooks according to the students were neither cheap nor costly but affordable.
- 6. Division of Chemistry and Biology course into semesters for class XI and XII was found to be beneficial for them.

- 7. Their syllabus of Chemistry and Biology was not integrated with Information Technology, that is no use of IT was made for the study of Chemistry and Biology.
- 8. The curriculum of Chemistry is correlated with that of Physics and Biology. But the curriculum of Biology is not correlated with Physics and Chemistry.
- 9. Chemistry textbooks provided them sufficient material on the subject. Class XI students found that their Biology textbook provided sufficient material on the subject, but class XII students said that it did not provide sufficient material on the subject.
- 10. Course content in the Chemistry textbooks was sufficient enough to be covered within the timeframe of the school. Class XI students found that Biology course was too much and it couldn't be covered within the school hours, but class XII course was sufficient enough to be covered within the school hours.
- 11. Chemistry and Biology curriculum was found to be sufficient enough to develop scientific attitude and skills required at senior secondary school level.
- 12. Chemistry and Biology curriculum was found to be complete in itself.
- 13. Chemistry curriculum according to them was not community based i.e. it was not organically related to community life. Class XI students found the curriculum in Biology to be community based, but class XII students said that it was not community based i.e. it was not related to community life.
- 14. The Chemistry and Biology curriculum encouraged learning by doing.
- 15. The language of the Chemistry and Biology textbooks was found to be lucid, simple and precise.
- 16. Class XI students found that the Chemistry textbook contained necessary examples, figures, graphs etc. whereas, a majority of class XII students found that their book did not contain necessary examples, figures, graphs etc. But they found both Biology class XI and XII textbooks contained necessary examples, figures, graphs etc.
- 17. They found that the prescribed Chemistry curriculum increases curiosity and power of reasoning and observation. Whereas class XI students said that Biology syllabus did not increase curiosity and power of reasoning and observation, but class XII course increased curiosity and power of reasoning and observation.
- 18. They also said that the experiments given in the Chemistry and Biology textbooks were feasible to be performed in their school laboratory.
- 19. According to them new course in Chemistry and Biology was sufficient enough to help them compete Medical, Engineering and other entrance examinations.

IX. Conclusion:

Based on the above findings, some changes can be brought about in the science textbooks that is physics, chemistry and biology textbooks prescribed for senior secondary classes in Uttar Pradesh.

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