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An Analysis of Intermediate Level Chemistry Students' Observations Regarding the Current Teaching Practices in Classroom

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ABSTRACT

To learn scientific concepts and to develop problems solving ability, students should be presented to an environment where inquiring and investigation is encouraged through interactive teaching approaches. To this consequence, a quantitative study is conducted to analyze intermediate level chemistry students' observations regarding the current teaching practices in classroom. 680 students, 40 from eight Government Higher Secondary Schools (GHSSs) and 45 from eight Government Degree Colleges (GDCs) were selected randomly from all of Government Higher Secondary Schools and Degree Colleges. The study prevails the practice of traditional method while interactive approaches and use of audio-visual aids are more or less ignored consequently inquiry based interactive learning environment has not been achieved in classroom. Lack of accountability of teachers' performance and shortage of required teachers in government institutes makes the situation worse. It has been suggested that interactive approaches and use of audio- visual aids should be promoted in order to develop problems solving ability in a science classroom. Dutifulness among teachers should be ensured through proper check, so as need to overcome shortage of teachers.

Introduction

The teaching method is a formal structure of the sequence of acts commonly denoted by instruction (Faize, 2011; Broudy, 1963). Henderson (1992) pointed out that there are three basic principles (3S's) of teaching for independent learning. Among the three the most important is subject learning. In this, subject matter is generously offered to students that lead to maximum learning. The second principal is self-learning, wherein students are involved in reproductive and creative activity. Third one is social-interaction that motivates students toward social interaction for better learning and high achievement.

Similarly, Sharma (2004) mentioned that teaching method is a way of the delivering lesson in teaching learning process. There are two main styles of teaching, one is autocratic and the other is permissive style. Autocratic style is conventional style of teaching that concentrated on content and is teacher-centered. In this style of teaching students are passive receivers of knowledge. The focus of this style is on the cognitive domain that involves the development of intellectual skills and

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knowledge. It is limited to memorization or recognition of facts and concept. Teaching approach for autocratic style is lecture method, demonstration and programmed instruction. Permissive Style is up-to-date method of teaching. It is learner centered. The role of teacher in this style is of a guide or facilitator. Students play active role in learning process. It emphasize on the affective objective.

Learner centered curriculum comprise of variety of teaching methodologies such as inquiry, discovery, problem solving and project method. These methods are based on constructive approach. The distinction of these methods are that students play active role in learning process. They acquire knowledge through observation and hands-on activities. These activities are performed by students either individually or in group (Bashiruddin et al., 2012).

So for the teaching of science subjects are concerned, Sridevi (2008) stated that science is taught at secondary and higher secondary level as a body of facts and knowledge collected through various means and teachers emphasize on rote learning rather than the method of acquiring knowledge. At higher secondary level students are passive listener as there is one way communication. Teacher act as a medium to convey his opinion and meaning to the students which he drew from the textbook. It is quite difficult for students to develop critical thinking and logical reasoning in such a restricted environment.

In Pakistan teaching learning process is mostly based on textbook, which is insufficient to elaborate and describe scientific concept comprehensively. As a result teacher encourages pupils to memorize textbook material rather than to develop rational and critical thinking. Teachers and students both prefer to find answer to 'What' instead of 'Why' and 'How' (Tajik et al., 2012).

In Peshawar classroom teaching is dependent on delivery of facts and a set of knowledge with the hope that the same will be imitated by the students during examination. Unfortunately, modern method of teaching has not been adopted yet. Little interaction has been found among pupils and teacher. Fewer opportunities are given to pupils for asking questions and participation in an activity. Teachers usually do not encourage asking questions. Pupils behave as passive listener. Another alarming situation is provision of notes by the teacher, these notes are slightly amended time to time by them. The main cause of this situation is heavy work load of teachers, congested classroom and rigid timetable (Jaffer et al., 2012).

With respect to the inquiry based teaching learning approaches the use of audio visual aids are very helpful and essential. It arouses interest of students and motivates them towards learning and support better understanding of scientific concepts. Unfortunately, there is a limited use of instructional materials in our country due to scarcity of Audio Visual aids and minimum fund allocated for it. It is recommended to encourage teacher to construct simple and cheap instructional material, to take full advantage of those materials and to increase its use in the classrooms for better learning (Moegiadi, 1997).

To learn scientific concept and to solve problems students should be presented to such environment where asking questions, formulation of research questions, searching answer, inquiring and investigation is encouraged (Schneider et. al, 2000). Science students should be motivated to utilize rational thinking for understanding of natural phenomena. The best mean of acquiring scientific knowledge is learning by doing (Klahr& Nigam, 2004). Study has shown that apart from achievement in science, scientific attitude of students are also improved, when they are exposed to some activity or are encouraged to participate in the classroom. Scientific attitude is a quality that make human objective, open minded and good observer. It also develops rational and critical thinking. It is therefore, suggested that at secondary and inter level teachers should assumed such methodology that enable students to understand and evaluate information. Thus main focus of teacher should be preparation of independent learner (Smitha, 2013; Kalra, Gupta, 2012).

Objectives of the Study

i. To explore the observations of students regarding teaching practices opted for chemistry subject at intermediate level.

ii. To compare gender wise opinion of students regarding teaching practices chosen for chemistry subject at intermediate level.

iii. To compare institute wise opinion of students regarding teaching practices opted for chemistry subject at intermediate level.
iv. To point out short coming of teaching practices and give suggestions for its improvement.

Hypotheses

The following hypotheses were tested:

i. Mean scores of female students of GHSSs & GDCs and Male students of GHSSs & GDCs do not significantly differ on construct Method of Teaching.
ii. Mean scores of students of GHSSs & of students of GDCs do not significantly differ on construct Method of Teaching.

Methodologies and Procedures

A descriptive study was designed to the current study in order to provide an analysis of intermediate level chemistry students understanding regarding the current teaching practices in classroom.

Population

Population of the study comprised of 30 Government Higher Secondary Schools (19 for boys and 11 for girls) and 17 Government Degree Colleges (09 for boys and 08 for girls). The total number of students enrolled in chemistry subject at Government Higher Secondary Schools and Government Degree Colleges of district Peshawar were 9030. Out of which 1668 students (1003 boys and 665 girls) were enrolled in the subject of Chemistry at Government Higher Secondary Schools and 7362 (5715 boys and 1647 girls) at Government Degree Colleges in district Peshawar.

Sample Size and its Distribution

The sample of the study was comprised of eight (04 Males & 04 Females) Government Higher Secondary Schools (GHSSs) and eight (04 Males & 04 Females) Government Degree Colleges (GDCs) of district Peshawar. Students sample comprised of 680 students. 320 students of chemistry subject were selected from GHSSs and 360 students from GDCs. The 40 participants from each of the eight (08) GHSSs and 45 from eight (08) GDCs were selected randomly.

Data Collection Instrument

The data was collected through “Five Point Likert Scale” questionnaire based on 11 items.

Results and Discussion

The collected data was tabulated and analyzed through Frequency distribution, Percentage method and Independent sample t-test.

Table 1. Distribution of the Responses of Students on Construct Method of Teaching

S.No	Items	SA (f)	A (f)	UD (f)	D (f)	SD (f)
1.	Which of the following methods are used by teachers for teaching chemistry:					
	i. Lecture	363 (53.4%)	288(42.4%)	04 (0.6%)	12 (1.8%)	13 (1.9%)
	ii. Lecture cum demonstration	86 (12.6%)	80 (11.8%)	20 (2.9%)	187 (27.5%)	307(45.1%)
	iii. Discussion	107 (15.7%)	105(15.4%)	15 (2.2%)	253 (37.2%)	200(29.4%)
	iv. Activity oriented (Laboratory, problem solving, project and discover method)	40 (5.9%)	59 (8.7%)	18 (2.6%)	218 (32.1%)	345(50.7%)
2.	Difficult concepts are repeatedly explained by science teacher	92 (13.5%)	207(30.4%)	18 (2.6%)	192 (28.2%)	171(25.1%)
3.	Variety of teaching techniques are used by teachers for clarification of difficult concepts	88 (12.9%)	222(32.6%)	20 (2.9%)	157 (23.1%)	191(28.1%)
4.	Audio Visual Aids (charts, models etc) are properly used by chemistry teachers where required	23 (3.4%)	41 (6%)	17 (2.5%)	406 (59.7%)	192(28.2%)

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5.	Teacher use multiple books for teaching chemistry	55 (8.1%)	84 (12.4%)	26 (3.8%)	281 (41.3%)	232(34.1%)
6.	Teacher commonly relate text book knowledge with everyday examples	154 (22.6%)	136 (20%)	10 (1.5%)	309 (45.4%)	70 (10.3%)
7.	Teacher encourage discussion in class	158 (23.2%)	118(17.4%)	12 (1.8%)	323 (47.5%)	68 (10%)
8.	Chemistry teacher encourage students to ask questions during teaching learning process	164 (24.1%)	126(18.5%)	09 (1.3%)	138 (20.3%)	241(35.4%)
9.	Proper answer is usually received from teacher when question is asked by students.	161 (23.7%)	155(22.8%)	10 (1.5%)	173 (25.4%)	179(26.3%)
10.	English is suitable medium of instruction	125 (18.4%)	111(16.3%)	24 (3.5%)	112 (16.5%)	305(44.9%)
11.	In your opinion appropriate method for teaching the subject of chemistry is:					
	i. Lecture	221 (32.5%)	193(28.4%)	10 (1.5%)	179 (26.3%)	75 (11%)
	ii. Lecture cum demonstration	351 (51.6%)	262(38.5%)	21 (3.1%)	22 (3.2%)	22 (3.2%)
	iii. Discussion	207 (30.4%)	422(62.1%)	12 (1.8%)	17 (2.5%)	20 (2.9%)
	iv. Activity oriented (Laboratory, problem solving, project and discovery method)	449 (66%)	171(25.1%)	25 (3.7%)	13 (1.9%)	18 (2.6%)

SA= Strongly Agree, A= Agree, UD=Undecided, D=Disagree, SD Strongly Disagree

The item 1.1 in the above table depicted responses of students regarding in practice teaching methodologies. Item 1.1.i to 1.1.iv indicated that Lecture method, Lecture cum demonstration method, Discussion method and Activity oriented methods are used in classroom. The percentage of students accepted the use of above mentioned methods in classroom is 95.6%, 24.4%, 31.1% & 14.6% respectively. While the respondents disagreeing with the use of those methods are 3.7%, 72.6%, 66.6% & 82.8% respectively and 0.6%, 2.9%, 2.2% & 2.6% remained undecided.

Items 2, 3 & 4 showed that 43.9% respondents were of the opinion that difficult concepts are repeatedly explained by science teacher, 45.5% respondents were of the opinion that Variety of teaching techniques are used by teachers for clarification of difficult concepts and 9.4% respondents were of the opinion that Audio Visual Aids (charts, models etc) are properly used by chemistry teachers where required, while 53.3%, 2.6% & 87.9% disagree with item 2, 3 & 4 in that order. 2.6%, 2.9% & 2.5% respondents remained undecided about statements concerned.

It is evident from items 5, 6, 7,8 ,9 & 10 that the teachers use multiple books for teaching chemistry, commonly relate textbook knowledge with everyday examples, encourage discussion in class and encourage students to ask questions during teaching learning process, proper answer is usually received from teacher when question is asked by students. Further English is suitable medium of instruction. Referring items 5, 6, 7,8 ,9 & 10 the rate of respondents that agree with referred items is 20.5%, 42.6%, 40.6%, 42.6% , 46.5% & 34.7% respectively, while 3.8%, 55.7%,57.5%, 55.7% ,51.7% &61.4% disagree and 3.8%, 1.5%, 1.8%, 1.3%, 1.5% & 3.5% respondents remained undecided.

Items 11.i to 11.iv indicated that appropriate method for teaching the subject of chemistry is Lecture, Lecture cum demonstration method, discussion method and activity oriented method. The percentage of students that were in coherence with the statement is 60.9%, 90.1%, 92.5%,91.1% respectively. However 37.3%, 6.4%, 5.4% & 4.5% disagree with the items and 1.5%, 3.1%, 1.8% & 3.7% remain undecided.

Ho1: Mean scores of female students of GHSSs & GDCs and Male students of GHSSs & GDCs do not significantly differ on construct Method of Teaching.

Table-2: Gender Wise Comparison of Opinion of Chemistry Students of GHSSs & GDCs on Construct Method of Teaching of Chemistry Curriculum.

Construct	Gender	N	Mean	Std. Deviation	P-Value
Method of Teaching	Male	340	5.3355	17.78859	.639
	Female	340	4.7694	13.33306	
Independent samples t-test			t= 0.47	df =678	

The table 2 indicated that P > 0.05, thus average score on construct Method of Teaching for male students (M= 5.3355, SD=17.78859, N= 340 is insignificantly different than female students (M= 4.7694, SD=13.33306, N= 340) opinion scores. Hence the two groups on the basis of gender could be treated as equal on construct Method of Teaching and null hypothesis (Ho1) ‘‘Mean scores of female students of GHSSs & GDCs and Male students of GHSSs & GDCs do not significantly differ on construct Method of Teaching’’ is accepted.

Ho2: Mean scores of male, female students of GHSSs & male, female students of GDCs do not significantly differ on construct Method of Teaching.

Table-3: Institute Wise Comparison of Opinion of Chemistry Students on Construct Method of Teaching of Chemistry Curriculum.

Construct	Gender	N	Mean	Std. Deviation	P-Value
Method of Teaching	GHSSs	320	4.5048	12.16823	.392
	GDCs	360	5.5392	18.29620	
Independent-samples t-test			t = -0.857	df = 678	

Table: 3 indicated that P > 0.05, thus average score on construct Method of Teaching for GHSSs students (M= 4.5048, SD= 12.16823, N= 320) is insignificantly different than GDCs students (M= 5.5392, SD= 18.29620, N=360) opinion scores. Hence the two groups on the basis of institutes could be treated as equal on construct Method of Teaching and null hypothesis (Ho2) ‘‘Mean scores of male, female students of GHSSs & male, female students of GDCs do not significantly differ on construct Method of Teaching’’ is accepted.

Discussion

The respondents mentioned that the conventional method of teaching is still in practice at intermediate level. There is one-way communication in classroom. In certain cases active participation of students is encouraged by teachers by incorporating discussion method. However, question answer technique or raising question in classroom is to greater extent forbidden phenomena. Use of Audio-Visual Aids and accountability of teachers on behalf of their teaching method, competency, punctuality and attitude is more or less absent. Likewise, a study by Khandai, Khan & Bhatti (2012) criticize the utilization of traditional method of teaching in classroom. Faize (2011), study outcomes is compatible with this study that approves the existence of conventional teaching methodology in classrooms. Similar to other studies absence of utilization of modern teaching methods and techniques were considered objectionable in education sector (Johnstone, 2000; Tsaparlis 2000). A similar study also support lack of accountability of teachers (Ahmad,

Rehman, Ali, Khan & Akber, 2014).

Conclusion

The analysis of data displays that lecture method is most frequently used method in government institutes. In some cases teachers also opt discussion method, however lecture-cum-demonstration and activity base learning is mostly ignored. It was inferred from the data that teachers mostly avoid repetition of difficult concepts and prefer traditional method of teaching, instead of incorporating latest techniques and methodology during delivery of lesson. Audio- Visual aids are rarely used by teachers in the classroom. It was also highlighted by the data that single book is followed for teaching chemistry subject. Half of the number (50%) of students express opinion that teachers relate textbook knowledge with daily life examples. Students were not encouraged in discussion and question answer sessions in the classroom. Furthermore, proper response or answer is also not received from teachers, when question is asked by students. Most of the students prefer that medium of instruction should be national language instead of English. Some teachers do not effectively teach chemistry subject as well as don't observe punctuality hence, government should take steps to keep check on the performance and punctuality of the teachers.

Recommendations

1. Modern methods of teaching that lead to brain storming need to be encouraged in present education system. Multiple methods should be used for teaching chemistry subject. Teachers should teach topic with the help of practical examples and should encouraged students for participation in class activity.
2. Summary of topic should be presented diagrammatically through multimedia at the end of each topic. Audio-visual aids are an effective mean of imparting information, hence it should be frequently utilized. Use of writing board is very effective in learning therefore teacher should use the board during delivery of lesson. Further interactive approach should be used in the classroom so, as to keep the students attentive and motivated towards study.
3. Lecture-cum-demonstration method should be incorporated for better learning of chemistry subject. Discussion method should also be incorporated while delivering lecture. Daily life problems related to chemistry subject should be discussed in classroom and the suitable remedy available in the subject concerned should be explained to the students.
4. Accountability of teachers is necessary. Head of institutes should keep check on the performance and method of teaching of teachers and should take serious action against the defaulter.

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