



**RESEARCH PAPER**

**Analysis of Pedagogical Content Knowledge of Secondary School  
Science Teachers in Students' Perspective**

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**PAPER INFO      ABSTRACT**

<b>Received:</b> March 17, 2021	<p>This research study was conducted with an objective to analyze the Pedagogical content knowledge of Physics teachers in students' perspective. The sample of the study was comprised of 710 9<sup>th</sup> grade Physics students selected from 30 different schools of the Hazara division. Data were collected with the help of researcher made questionnaire. Analysis of data revealed that Physics teachers of the sample had high level in the pedagogical content knowledge of student difficulties, curriculum, assessment and teaching strategies/OTS. But the following deficiencies were highlighted by the students in the teaching of Physics teachers. Physics teachers do not consider the difference in intelligence level of students during their teaching. Physics teachers solve all numerical questions. Physics teachers use limited variety of examples and very much limited from daily life and during the class of Physics, the only activity of students is listening carefully because they mostly use lecture method</p>
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**Introduction**

PCK is the knowledge and action of teacher which facilitates him to understand that why he is planning and how he has to implement his planning in the class of particular students to teach the particular topic properly (Gess-Newsome and Carlson 2013). PCK is an exclusive concept of knowledge which can be helpful to improve the abilities of both novice and practicing teachers because it informs the teachers about the attributes of good teacher and good teaching (Abell, 2008; Kind, 2009b). The knowledge of teacher which is implemented by him during the teaching practice is defined as pedagogical content knowledge (Kind, 2009). Hence it can be inferred that the knowledge and skill of a teacher which permits him to convert subject matter into lesson and make it easily comprehensible for all the students is the pedagogical content knowledge of teacher (Boesdorfer, 2012).

The model developed by Magnusson et al. (1999) is considered as extremely reliable model to analyze the PCK of science teachers (Boesdorfer, 2012). Magnusson et al. (1999) covers the following four areas: (1) Orientation towards Science and the

knowledge about instructional strategies. (2) Knowledge about students' understanding of specific science topics. (3) Knowledge of assessment. (4) Knowledge about science curriculum.

As argued by Jang (2010), in traditional classrooms teachers can have self-centered thinking as they are the authority in such classrooms so it is not probable for the teacher to get the clear picture of his teaching and make appropriate decisions about the accomplishment or failure of his teaching. Therefore in such cases the perception of the students; based on their daily observations of the teaching of their teacher can be used to appreciate and inspect the teaching of their teacher (Senocak 2009). Students' perception about the teaching of their teacher can help the teacher to make up their deficits in teaching and improve their teaching according to the necessities of the students. Hence it can be said that PCK of teacher cannot be measured only in teachers, perspective but it can also be measured in students' perspective which may help the teachers to grow and polish their PCK for students' learning. PCK is said to contribute to effective teaching, PCK of science teachers effect the students' knowledge and can be inspected in teachers' as well as in students' prospective (Halim, Abdullah, & Meerah, 2013). The PCK of teacher can be developed and refined by teacher for students' learning when it is measured in students' perspective. To quantify the PCK in students' perspective is an existent way to comprehend the PCK of teachers (Halim et al. 2013). While measuring the PCK of teachers in students' perspective it is assumed that that students note the style, method and strategies used by the teacher during his teaching and students store these facts in their minds and the facts stored in the memories of the students are used for the collection of data (Adediwura and Tayo 2007). Teacher's pedagogical content knowledge in students' perspective is the knowledge of the teacher which is applied by him and observed by the students during the class room practice therefore it can be said as the enacted pedagogical content knowledge of the teacher. This shows that the classroom observation of the teachers is vital to comprehend their PCK and how they alter their knowledge during the classroom practice (Boesdorfer, 2012).

## **Material and Methods**

This research study was conducted to analyze the PCK of 9<sup>th</sup> grade Physics teachers in students' perspective, the following steps were taken to accomplish this task.

### **Population**

All (2851) 9<sup>th</sup> grade male Physics students, who has been studying in thirty selected schools of the Hazara division.

### **Sample**

Nine hundred (900) 9<sup>th</sup> grade students were selected as sample of study initially from thirty selected schools of Hazara division. It was decided to choose

thirty students from each school but due to the variations in the enrolment and lack of cooperation from some students, the sample was reduced to 710 9<sup>th</sup> grade Physics students.

### Research Instrument

To judge the PCK of teacher the researcher relied on the observations of his students. The questionnaire having the reliability of (0.813) and was implemented to judge the following categories of Physics teachers PCK in students' perspective.

1. Knowledge of Physics Curriculum
2. Knowledge of Teaching Strategies/OTS
3. Knowledge of students' difficulties
4. Knowledge of Assessment in Physics

The questionnaire was consisted of both negative and positive statements.

### Data Collection

Data was collected with the help of reliable and valid research tool. To collect data, the researcher personally visited the selected secondary schools. In some cases the researcher collected the data with the help of his friends and associates.

### Data Analysis and Interpretation

Data was analyzed with the help of Statistical Package for Social Sciences SPSS. As the data were quantitative in nature therefore the Chi Square ( $X^2$ ) test was implemented to compare the percentage of student who accepted the statement with the percentage of students who rejected it.

### Results and Discussion

The pedagogical content knowledge of 9<sup>th</sup> grade Physics teachers in students perspective has been analyzed as the respondents were given a questionnaire containing five point Likert scales (i.e. Strongly agree, Agree, Undecided, Disagree, Strongly disagree) to respond according to their practices. For the analysis chi-square test has been applied and the scores of all respondents with their percentages are given in the subsequent tables.

**Table 1**  
**Physics teachers' PCK about students difficulties in students' perspective**

No	Statements	SA	A	UD	DA	SDA	Total	df	X <sup>2</sup>	p
1	Our Physics teacher always investigate pupils' prior knowledge before teaching.	443 62.39%	208 29.29%	25 3.52%	17 2.39%	17 2.39%	710 100	1	78.03	0.00

2	Connect the new information with the previous knowledge.	280 39.43%	298 41.97%	74 10.56%	45 6.33%	12 1.69%	710 100	1	59.87	0.00
3	Uncover the misconceptions of the students.	349 49.15%	228 32.11%	70 9.85%	50 7.04%	13 1.83%	710 100	1	57.60	.000
4	Ask questions from every student of the class.	111 15.63%	188 26.47%	134 18.87%	140 19.71%	137 19.29%	710 100%	1	.111	0.739
5	Do not consider the difference of intelligence level and family background of students.	226 31.83%	149 20.98%	123 17.32%	142 20%	70 9.89%	710 100	1	5.762	.016
6	Have lower ability to pose proper questions and correct misconceptions.	74 10.42%	112 15.77%	187 26.33%	225 31.69%	112 15.77%	710 100	1	6.041	0.014
7	Unable to identify, which pupils have trouble in learning.	77 7.32%	118 16.61%	175 24.64%	248 34.92%	92 12.95%	710 100	1	8.000	.005
8	Allow only few of the students to discuss their Physics related difficulties.	137 19.29%	140 19.71%	131 18.45%	185 26.05%	117 16.47%	710 100	1	0.195	.659

Table 1 shows that significant majority of students ( $X^2 = 78.01$ ,  $p < 0.05$ ) accept that Physics teachers explore prior knowledge of students before teaching. Significant majority of students ( $X^2 = 59.87$ ,  $p < 0.05$ ) accept that the Physics teachers connect new knowledge with the previous knowledge of students. Significant majority of students ( $X^2 = 57.60$ ,  $p < 0.05$ ) accept that Physics teachers uncover misconceptions of the students. The majority of students ( $X^2 = .111$ ,  $p > 0.05$ ) who accept that Physics teachers ask questions from every student of the class is not significant. Significant majority of students ( $X^2 = 5.762$ ,  $p < 0.05$ ) accept that Physics teachers do not consider the difference in intelligence level of students. Significant majority of students ( $X^2 = 6.041$ ,  $p < 0.05$ ) refuse that Physics teachers have lower ability to pose proper questions. Significant majority of students ( $X^2 = 8.000$ ,  $p < 0.05$ ) refuse that Physics teachers are unable to identify students who has trouble in learning. The majority of students ( $X^2 = .195$ ,  $p > 0.05$ ) who refuse the statement that Physics teachers allow only few students to discuss their problems is not significant.

**Table 2**  
**Physics Teachers' Pedagogical Content Knowledge of Curriculum in students' perspective**

No	Statements	SA	A	UD	DA	SDA	Total	df	X <sup>2</sup>	p
1	Have got good command over the different topics.	453 63.80%	156 21.97%	44 6.19%	29 4.08%	28 3.94%	710 100	1	64.723	.000
2	Know the topics and the areas of topics difficult for students.	313 44.08%	188 26.47%	115 16.19%	64 9.01%	30 4.22%	710 100	40.048	1	.000
3	Always develop and	285	250	101	52	21	710	49.706	1	.000

	follow clear learning objectives.	40.14%	35.21%	14.36%	7.32%	2.95%	100			
4	Provide pictures, charts and other required material to students and ask to explore the ideas of Physics	236 33.23%	216 30.42%	151 21.26%	73 10.28%	34 4.78%	710 100	30.392	1	.000
5	Have lower ability to adopt appropriate sequence while using, helping material.	61 8.59%	92 12.95%	170 23.94%	234 32.95%	153 21.54%	710 100	13.474	1	.000
6	Always depend on text book and prevalent audio visual aids	209 29.43%	195 27.46%	155 21.83%	101 14.22%	50 7.04%	710 100	16.615	1	.000
7	Usually fail to achieve learning objectives.	85 11.97%	253 35.63%	62 8.73%	218 30.70%	92 12.95%	710 100	.174	1	.677
8	Some time it is felt that Physics teachers do not have clear concept about the topic	63 8.87%	88 12.39%	125 17.60%	252 35.49%	182 25.63%	710 100	19.512	1	.000

Table 2 portrays that significant majority of students ( $X^2 = 64.723$ ,  $p < 0.05$ ) accept that Physics teachers have got good command over different topics of Physics. Significant majority of students ( $X^2 = 40.048$ ,  $p < 0.05$ ) accept that the Physics teachers knows the areas of topic difficult for students. Significant majority of students ( $X^2 = 49.706$ ,  $p < 0.05$ ) accept that Physics teachers always develop and follow clear learning objectives. Significant majority of students ( $X^2 = 30.392$ ,  $p < 0.05$ ) accept that Physics teachers provide pictures, charts and other required material to students. Significant majority of students ( $X^2 = 13.474$ ,  $p < 0.05$ ) refuse that Physics teachers have lower ability to use helping material in proper sequence. Significant majority of students ( $X^2 = 16.615$ ,  $p < 0.05$ ) accept that Physics teachers always depend on textbook. The majority of students ( $X^2 = .174$ ,  $p > 0.05$ ) who refuse the statement that Physics teachers usually fail to achieve learning objectives is not significant. Significant majority of students ( $X^2 = 19.512$ ,  $p < 0.05$ ) refuse that Physics teachers do not have clear concept of the topic.

**Table3**  
**Physics Teacher's Pedagogical Content Knowledge of assessment in students' perspective**

No	Statements	SA	A	UD	DA	SDA	Total	df	X <sup>2</sup>	p
1	Provide hands-on activities for pupils to judge their level of attainment	237 33.38%	261 36.76%	79 11.12%	82 11.54%	51 7.18%	710 100	1	31.562	.000
2	Provide correct answers and guide the students to reach it.	164 23.09%	206 29.01%	61 8.59%	242 34.08%	37 5.21%	710 100	1	1.857	.173

3	Questions asked by Physics Teachers allow the student to understand their level of achievement.	315 44.36%	248 34.92%	87 13.66%	27 3.80%	23 3.23%	710 100	1	60.279	.000
4	At the end of teaching ask many questions from students.	287 40.28%	264 37.18%	70 10%	72 10.14%	17 2.39%	710 100	1	43.615	.000
5	Solve all the mathematical questions themselves	262 36.90%	216 30.42%	64 9.01%	126 17.74%	42 5.91%	710 100	1	1.488	.000
6	Questioning techniques of Physics Teachers in the classroom are of low level.	73 10.28%	133 18.73%	196 27.60%	212 29.85%	96 13.52%	710 100	1	2.722	.099
7	Discourage the students to answer the questions of their fellow students.	93 13.09%	138 19.43%	175 24.64%	183 25.77%	121 17.04%	710 100	1	1.316	.251
8	Finish their teaching without taking the evaluation	69 9.71%	103 14.50%	98 13.80%	278 39.15%	162 22.81%	710 100	1	16.791	.000

Table 3 portrays that significant majority of students ( $X^2 = 31.56$ ,  $p < 0.05$ ) accept that Physics teachers provide hand-on activities to judge the level of attainment of students. The majority of students ( $X^2 = 1.857$ ,  $p > 0.05$ ) who accept that the Physics teachers provide correct answer of the question and guide the students to reach that answer while solving problems in the class room is not significant. Significant majority of students ( $X^2=60.279$ ,  $p < 0.05$ ) accept that questions asked by Physics teachers allow them to judge their level of achievement. Significant majority of students ( $X^2=43.615$ ,  $p < 0.05$ ) accept that Physics teachers ask many questions at the end of teaching. Significant majority of students ( $X^2=1.488$ ,  $p < 0.05$ ) accept that Physics teachers solve all numerical questions. The majority of students ( $X^2=2.722$ ,  $p > 0.05$ ) who refuse that Physics teachers has low level of questioning technique is not significant. The majority of students ( $X^2=1.316$ ,  $p < 0.05$ ) who refuse the statement that Physics teachers discourage the students to answer the questions of their fellow students is not significant. Significant majority of students ( $X^2=16.791$   $p < 0.05$ ) refuse that Physics teachers finish their teaching without evaluation.

**Table 4**  
**Physics teacher's Pedagogical Content Knowledge of teaching strategies in students' perspective**

No	Statements	SA	A	UD	DA	SDA	Total	df	X <sup>2</sup>	p
1	Pose many questions during the teaching of Physics and encourage everyone to answer	355 50%	237 33.38%	50 7.04%	38 5.35%	30 4.22%	710 100	1	57.301	0.00
2	Arrange discussions about the topic of study.	324 45.63%	226 31.83%	88 12.39%	39 5.49%	33 4.64%	710 100	1	51.598	0.00
3	Allow the students to observe and think deeply about the topic.	300 42.25%	251 35%	82 11.54%	41 6.17%	33 4.64%	710 100	1	49.500	0.00
4	Allow the students to explain their understanding before the class.	223 31.40%	210 29.57%	146 20.56%	88 12.39%	43 6.05%	710 100	1	23.405	0.00
5	Try to elaborate the concept with help of questions when students present their group activity.	219 30.84%	262 36.90%	109 15.35%	79 5.77%	41 2.95%	710 100	1	45.208	0.00
6	Usually perform the activities before the class and ask the students to figure out the result.	199 28.02%	312 43.94%	106 14.92%	63 8.87%	30 4.22%	710 100	1	40.953	0.00

7	Mostly convey lesson content to pupils through lectures	196 27.60%	279 39.29 %	94 13.23 %	99 13.94 %	42 5.91%	710 100	1	25.391	0.00
8	Provide activities that involve pupils but of limited participation.	146 20.56%	153 21.54 %	98 13.80 %	245 34.50 %	68 9.57%	710 100	1	.047	0.829
9	It seems from the teaching of Physics teachers that they cannot develop practical skills in their students	51 7.18%	85 11.97 %	132 18.59 %	279 39.29 %	163 22.95 %	710 100	1	22.827	0.00
10	During the class the only activity for students is listening carefully	223 31.40%	197 27.74 %	81 11.40 %	146 20.56 %	63 8.83%	710 100	1	10.227	0.001

Table 4 portrays that significant majority of students ( $X^2 = 57.301$ ,  $p < 0.05$ ) accept that Physics teachers pose many questions and encourage all students to answer. Significant majority of students ( $X^2 = 51.598$ ,  $p > 0.05$ ) accept that the Physics teachers arrange discussions about the topic of study. Significant majority of students ( $X^2 = 49.500$ ,  $p > 0.05$ ) accept that the Physics teachers allow the students to observe and think deeply about the topic to be studied. Significant majority of students ( $X^2 = 23.405$ ,  $p < 0.05$ ) accept that Physics teachers allow the students to explain their understanding before the class. Significant majority of students ( $X^2 = 45.208$ ,  $p < 0.05$ ) accept that Physics teachers try to elaborate the concept with help of questions. Significant majority of students ( $X^2 = 40.953$ ,  $p < 0.05$ ) accept that Physics teachers usually perform activities before the class and ask the students to figure out the result from those activities. Significant majority of students ( $X^2 = 25.391$ ,  $p < 0.05$ ) accept that Physics teachers mostly use lecture method. The majority of students ( $X^2 = 0.047$ ,  $p < 0.05$ ) who refuse that Physics teachers provide activities and involve students but limited participation as most of the tasks perform themselves is not significant. Significant majority of students ( $X^2 = 22.827$ ,  $p < 0.05$ ) refuse that Physics teachers are unable to develop practical skills in students. Significant majority of students ( $X^2 = 10.227$ ,  $p < 0.05$ ) accept that during the class of Physics teachers the only activity of students is listening carefully.

## Findings and Discussion

This research study was conducted to analyze the Pedagogical Content Knowledge of 9<sup>th</sup> grade Physics teachers in students' perspective. Results of the study are discussed below.

### Teachers' Pedagogical Content Knowledge of student difficulties

Significant majority of students ( $X^2 = 78.01$ ,  $p < 0.05$ ) admitted that Physics teachers inspect prior knowledge of students before teaching. Significant majority of students ( $X^2 = 59.87$ ,  $p < 0.05$ ) admitted that the Physics teachers joint new knowledge with the previous knowledge of students. Significant majority of students ( $X^2 = 57.60$ ,  $p < 0.05$ ) admitted that Physics teachers uncover misconceptions of the students. Significant majority of students ( $X^2 = 8.000$ ,  $p < 0.05$ ) refused that Physics teachers are unable to identify students who has trouble in learning. These results are in line with

the results of the study of Adedoyin (2011) but against the results of the study of Jang (2010). The majority of students ( $X^2=.111$ ,  $p>0.05$ ) who accept that Physics teachers ask questions from every student of the class is not significant. This result is not matching with the result of the study of Adedoyin (2011). Significant majority of students ( $X^2=5.762$ ,  $p<0.05$ ) accepted that Physics teachers do not consider the difference in intelligence level of students. Significant majority of students ( $X^2=6.041$ ,  $p<0.05$ ) refused that Physics teachers have lower ability to pose proper questions. Majority of students ( $X^2=.195$ ,  $p>0.05$ ) who refused the statement that Physics teachers allow only few students to discuss their problems is not significant.

### **Physics teachers' pedagogical content knowledge of curriculum**

Significant majority of students ( $X^2 = 64.723$ ,  $p< 0.05$ ) accepted that Physics teachers have got good command over different topics of Physics. Significant majority of students ( $X^2 = 40.048$ ,  $p<0.05$ ) accepted that the Physics teachers knows the areas of topic difficult for students. These results are consonant with the study of Adedoyin (2011). Significant majority of students ( $X^2= 49.706$ ,  $p<0.05$ ) accepted that Physics teachers always develop and follow clear learning objectives. Significant majority of students ( $X^2=30.392$ ,  $p<0.05$ ) accepted that Physics teachers provide pictures, charts and other required material to students. These results are in line with the results of the study of (Krisan, Saney & Ubuz, 2013). Significant majority of students ( $X^2=13.474$ ,  $p<0.05$ ) refused that Physics teachers have lower ability to use helping material in proper sequence. Significant majority of students ( $X^2=16.615$ ,  $p<0.05$ ) accepted that Physics teachers always depend on textbook and prevalent helping material. This result is against the result of the study of Adedoyin (2011). The majority of students ( $X^2=.174$ ,  $p>0.05$ ) who refused the statement that Physics teachers usually fail to achieve learning objectives is not significant. Significant majority of students ( $X^2=19.512$ ,  $p<0.05$ ) refused that Physics teachers do not have clear concept of the topic.

### **Physics teachers' Pedagogical content knowledge of assessment**

Significant majority of students ( $X^2 = 31.56$ ,  $p< 0.05$ ) accepted that Physics teachers provide hand-on activities to judge the level of attainment of students. Majority of students ( $X^2 = 1.857$ ,  $p>0.05$ ) accepted that the Physics teachers provide correct answer of the question and guide the students to reach that answer while solving problems in the class room is not significant. Significant majority of students ( $X^2=60.279$ ,  $p<0.05$ ) accepted that questions asked by Physics teachers allow them to judge their level of achievement. Significant majority of students ( $X^2=43.615$ ,  $p<0.05$ ) accepted that Physics teachers ask many questions at the end of teaching. These results are also in line with the results of the study of Adedoyin (2011). Significant majority of students ( $X^2=1.488$ ,  $p<0.05$ ) accepted that Physics teachers solve all numerical questions. These results are against the results of the study of the Adedoyin (2011) Majority of students ( $X^2=2.722$ ,  $p>0.05$ ) who refused that Physics teachers has low level of questioning technique is not significant. Majority of students ( $X^2=1.316$ ,  $p<0.05$ ) who refused the statement that Physics teachers discourage the students to answer the questions of their fellow students is



not significant. Significant majority of students ( $X^2=16.791$   $p<0.05$ ) refused that Physics teachers finish their teaching without evaluation.

### **Physics Teachers, Pedagogical content knowledge of teaching strategies/Orientations towards teaching of science**

Significant majority of students ( $X^2 = 57.301$ ,  $p< 0.05$ ) accepted that Physics teachers pose many questions and encourage all students to answer. Significant majority of students ( $X^2 =51.598$ ,  $p>0.05$ ) accepted that the Physics teachers arrange discussions about the topic of study. Significant majority of students ( $X^2 =49.500$ ,  $p>0.05$ ) accepted that the Physics teachers allow the students to observe and think deeply about the topic to be studied. These results are in line with the results of the study of Adedoyin (2011). Significant majority of students ( $X^2=23.405$   $p<0.05$ ) accepted that Physics teachers allow the students to explain their understanding before the class. Significant majority of students ( $X^2=45.208$ ,  $p<0.05$ ) accepted that Physics teachers try to elaborate the concept with help of questions. Significant majority of students ( $X^2=40.953$ ,  $p<0.05$ ) accepted that Physics teachers usually perform activities before the class and ask the students to figure out the result from those activities. Significant majority of students ( $X^2=25,391$ ,  $p<0.05$ ) accepted that Physics teachers mostly use lecture method. This result is in line with the result of the study of Jang (2010). Majority of students ( $X^2=0.047$ ,  $p<0.05$ ) who refused that Physics teachers provide activities and involve students but limited participation as most of the tasks perform themselves is not significant. Significant majority of students ( $X^2=22.827$ ,  $p<0.05$ ) refused that Physics teachers are unable to develop practical skills in students. The significant majority of students ( $X^2=10.227$ ,  $p<0.05$ ) accepted that during the class of Physics teachers the only activity of students is listening carefully.

Above whole discussion shows that Physics teachers of the sample got very high level of PCK in students' perspective but some of the results shows very different and probably much real picture, being in line with the previous studies. All these negative result shows that Physics teachers implement teacher centered approaches during their teaching and avoid student centered approach during their class room practices they prefer delivering lecture on topics instead of using activity based teaching. These finding are in line with the study of Chapoo, Thathong & Halim (2013) as mentioned below.

The three teachers did not have enough knowledge of PCK and they were not capable to practice it in the class room. They were unable to elicit the previous knowledge of the students and they were willing to implement teacher centered learning approaches instead of student centered approaches. They were expecting the student to learn the concepts of science from the lectures, text book and explanations given by teachers (Chapoo, Thathong & Halim, 2013, p. 46).

## **Conclusions**

It is concluded from the findings of the study that Physics teachers of the sample have high level of pedagogical content knowledge of students' difficulties. But due to some reasons Physics teachers treat all the students equally and they implement same method of teaching for low and high achievers, although they have the ability to change the method of teaching for the students who are not getting the concept but in case of low achievers they do not do so hence low achievers are not given appropriate importance by the teachers which should be given to them. Similarly Physics teachers sometime ask questions from every student of the class and allow all students to discuss their problems but they do not do so regularly.

It is concluded from the findings of the study that Physics teachers of the sample have high level of pedagogical content knowledge of curriculum. They have good knowledge of the subject and has the ability to prepare and use proper audio visual aids but some time they cannot transfer their knowledge to students because mostly they do not prepare and utilize proper audio visual aids according to the requirements of the topic and mostly they depend upon text book and other prevalent helping material like white board and markers etc.

It is concluded from the findings of the study that Physics teachers' Pedagogical content knowledge of assessment is high, Physics teachers are able to judge the level of attainment of students with the help of different techniques but in case of numerical questions they do not apply these techniques. Although sometimes they provide correct answer of the question and guide the students to reach that answer while solving problems in the class room but mostly they do not ask the students to solve the numerical questions instead of this they solve all the numerical questions themselves.

It is concluded from the findings of the study that Physics teachers of the sample have high level of pedagogical content knowledge of teaching strategies and their purposes/OTS. Physics teachers have all the abilities to implement students centered teaching techniques but unfortunately they do not implement student centered or activity based teaching strategies most of the time. They prefer to apply a lecture method and usually do not encourage to the student participate in learning process actively so the only activity of students in the class is to listen carefully.

## **Recommendations**

In the light of findings and conclusions of the study it is recommended that Physics Teachers should ask questions from every student of the class and give consideration to the variations in abilities and family background of the students while dealing with them. Furthermore all students should be encouraged to ask questions and take part in class discussions. In addition heads of schools and department should issue instructions to the teachers to stray from text book and do not depend only on text book and other prevalent audio visual aids. Physics teachers are suggested to adopt student centered strategies and allow the student to learn through activities. Especially teachers should avoid solving all mathematical questions themselves and selecting lecture method every time.

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