



Analysis of the Content and Pedagogical Competencies Management of Secondary School's Science Teachers

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ABSTRACT:

This study aimed for comparative analyses of the competencies of public and private secondary school teachers in Pakistan. The study population consisted of all the students of 10th class. Multi-stage sampling was used to collect data from 400 students through simple random. Data was analyzed in SPSS. The study focused on two levels of competencies of the science i.e., content knowledge and the pedagogical skills in context of public and private school science teachers. The study found significant difference of opinions among the respondents. It was found that science teachers in the public schools were competent enough with regard to subject content knowledge inter alia marginally better in the pedagogical skills.

Keywords: Content Competency, Pedagogical Skills, Science Teachers, Public and Private Schools



Introduction

To cope with the fast pace of scientific developments in the world, institutes are to be modernized with respect to science syllabus, pedagogical techniques etc. In schools, SSC level makes the foundation of science education. Science teacher plays the key role for developing scientific aptitude and interest of students towards sciences. A teacher is the person whom education authority has been accepted as eligible for education and upbringing of youth and adults. (Pedagogika Encyclopedia, 1989: 103). A child can learn from the books what is written in it only while teacher educates him or her (Jarrar Ahmad & Khan (2016). According to NAEP 2003, the good results of a school mostly depend upon the competency management level of its teachers. The Encyclopedic Dictionary of Education, (1997), defines competence as “the state of having and demonstrating skills, abilities or aptitudes in the satisfactory execution of a learning task” (Paramanik & Barman, 2019). Angeline and Rani, 2019 stated in their studies that competency is a set of measurable knowledge, skills, and personal qualities that increase the performance level and finally bring success to an organization.

According to Arshad (2007: 54), a competent teacher is one who possess in-depth knowledge of his subject together with strong verbal and non-verbal command, and accomplish his or her assignment timely. Like a good manager, he or she makes timely decisions in time; aligned to all situations, eager for research, ability to takes initiatives, cooperate with colleagues and students, and parents as well as with the school management ((Noordin, 2023; Hayat, Imran, & Taous, 2023; Saadat, Shah, Tauqeer, Ullah, & Fatima, 2023). Good teachers can draw from experiences and overcome discrepancies between pedagogical theories, professional knowledge, and practice (Darling-Hammond *et al.*, 2020). According to Vavral (2013: 5) the competent teacher is “one who effectively and efficiently accomplishes a task (instructs) in a given context (in classroom) using appropriate knowledge, skills, attitudes, and abilities that have adjusted and developed with time and needs” ((Mughal & Malik, 2023; Imran, Ali, & Taous, 2023; Ejaz *et al.* 2012). While Nayyar (2016) wrote in an article that teaching of science needs a focused attention and special training of teachers in the methods of science teaching that creates reasoning and curiosity in students (Daily Dawn: March 4, 2016). Science education also requires textbooks so that students can make scientific knowledge understandable. The exercises present at the end of chapters in the textbooks should not ask recall questions only. It should demand understanding of the concepts, reasoning and analysis. Similarly, in tests and examinations, the question papers should carry most of the conceptual and analyzing questions”.

Private sector is also contributing the cause of education in parallel to the public sector. Public schools are more traditional in teaching style (more teacher-directed and lecture based) while private schools tend to use modern techniques (more student-centered and inquiry based). According to Awan & Saeed (2014), private educational schools are playing important part in enhancing the academics of students as well as teachers through a better academic environment. Quynh Nguyen & Dhushyanth Raju (2014) shared the similar option. Since few years public education system lost the trust and support of parents as reported by Alif Ailan, it claimed that 69% parents prefer private school for their child education since they provide better facilities and learning outcomes using English medium in addition to better care of the child. The reports further states that an increased in private schools i.e., 26% in 2003 to 38% in 2014, it was also recorded as high as 42% in 2019.

National Center for Education Statistics (NCES) published a study containing a fact that public school students are performing better than private school students do. They concluded this result after the data analyses. According to Abdul Ghafoor Awan (August 2020), public school has an advantage of having qualified teachers, standard buildings, labs, and playground over the private schools. A competent science teacher is the basic need of a school whether it belongs to public sector or private. Mianwali is a backward district so, ratio of private schools with respect to public schools was found to be low. Similarly, number of students in private schools was found very. The facts and figures are given through following table 1:

Table 1

Comparative facts of Public and Private Schools

	Public Schools			Private Schools		
	Male	Female	Total	Male	Female	Total
Schools	81	49	130	22	08	30
students	8254	4713	12967	973	681	1654

Source: District Education Office, Mianwali

The problem understudy was to conduct a comparative analyses the science teacher’s competency level in public and private secondary schools in district Mianwali to know the difference of opinion between them. The study tested the following proposed hypotheses:

H₀₁: There is no significant difference in the perceptions of students about content competency of public and private school science teachers at secondary level.

H₀₂: There is no significant difference in the perceptions of students regarding pedagogical skills of public and private school science teachers at secondary level.

Method

This study used quantitative method with descriptive research design. The population included Science students of class 10th from public and private schools of district Mianwali were taken as target population. Multistage sampling technique was adopted for taking samples that are more purposeful. In first stage, a sample of 400 students of class 10th was taken on simple random method (using LR Gay formula). In the next stage, 80 schools were selected as sample using convenient sampling for 160 schools including 130 public and 30 private schools. Likewise, in the third stage, a proportionate sampling was employed. To collect responses for the student’s perceptions concerning science teacher’s competencies a self-administered questionnaire on 5-point scale with options i.e., always, often, sometime, rarely, never was used. The instrument validity was checked, and reliability was checked using Cronbach’s alpha testing. The collected data was arranged and analyzed through descriptive and inferential statistics.

Findings and Discussion

Table

Multistage Sampling

	Stage	Status	Students	Total students	LR Gays
Multistage Sampling through simple random method	01	Public	8254 Boys 4713 Girls Total=12967	12967+1654= 14621	400 number of students as per formula >5000)
		Private	973 Boys 681 Girls Total=1654		
	Stage	Status	Schools	Total schools	LR Gays
Multistage Sampling through convenient sampling method	02	Public	81 Boys schools 49 Girls schools	81+49+22+08=160 schools	80 number of schools as per formula 50%)
		Private	22 Boys schools		

	Stage	08 Girls schools				Total Students	Students	
		Tehsil schools	wise	Schools			public	private
				Public	private			
Multistage Sampling through simple proportionate sampling method	03	Mianwali 40 Schools		32	08	200	160	40
		Piplan 25 Schools		20	05	125	100	25
		Isa Khel 15 Schools		12	03	75	60	15

This research analyzed the science teacher competencies in public and private secondary school. A five-point Likert scale questionnaire was used to collect responses of the respondents including demographic data. Population consisted male and female science students of 10th classes. Out of 400, 372 (93%) properly filled were used in data analysis, while 7% were not returned. The result for each category is given bellows:

Table 3

Response Rates of Stakeholders

Category of Stakeholders	Received Questionnaires	Response	Rate in Percentage
Public Schools	320	299	93.4%
Private school	80	73	91.2%
Total:-	400	372	93%

Descriptive analyses were carried out for comparative analysis of the teacher’s competencies in public and private schools. The codes used for descriptive analysis are as follows:

- PB= Public School
- PR= Private School
- A= Always
- O=Often
- S= Sometime
- R=Rarely
- N=Never

If we look into the results given in table 3 it was recorded that 53 percent teachers from the public schools in contrast to 44 percent private school teachers’ fall in the category of a better content competency with strong command on their subject. The findings of M. Shahid and Shafa’at Hussain in their studies “Exploring Teaching Competency in Government and Private Primary School January 2017” endorsed the finding of the researcher. They noted, “It is very much clear that the government teachers possess significantly better teaching competency than private teachers. It may be due to the fact that government schools appoint the well qualified and trained teachers by following some criterion and norms while it has been noticed that there is so much flexibility in the appointment procedure of teachers in private schools”. The high qualification of public teachers was the basic reason of their better subject command. The same finding was also endorsed by an article posted by Syeda Sadia Shahid on July 2, 2020 on the topic “The Role of Private Sector Education in Pakistan”. She said, “In most of the private schools there is the untrained staff. Most of the teachers are untrained or sometimes less educated”. According to Darling-Hammond et al. (2017), “the standard of teaching depends on the information and expertise of the teacher. However, knowledge of a teacher's subject and commitment also play a significant role”. This study also described the importance of subject knowledge command of a teacher, which was significantly high in public school science teachers of District Mianwali with respect to this study. In a research article published by different organizations in 2015, “private schools are subjective in the demand for teachers to be certified, some do not require certification, and others may require certification. Public schools require teachers must be certified by the state where they teach”. Teachers from public sector gave concepts in more easy way as 66% public school teachers were found better in comparison with 47% private school teachers.

Regarding content command, the public-school teachers were better as compared to private schools teachers i.e., 40 percent teachers in public sector and 34 percent in private sector were noticed explaining the topic through common life examples. Rashmitha & Jashmin (2018), described in their studies “A comparative study on public and private funded schools in Chennai” concluded that the parents prefer private sector schools as compared to the public sector schools as they believe that the public schools have less educational facilities and think that professionally less efficient teachers are working in public schools”. In contrast, with reference to district Mianwali, public teachers were found professionally more efficient, experienced, and qualified, so they had well professional competency. As per government policy, no one will be allowed to become a teacher in the government sector without professional degrees of B.Ed. or M.Ed.” This finding was also supported by a study conducted by Baier *et al.* (2019), determined that the student’s academic results, progress and development were directly linked with the teachers’ professional competency. It was found that public school teachers are competent enough concerning equations derivations and formulae on the blackboard, 60% teachers at public school were applying this technique against 42% of their counterparts from private sector. The finding was inconsistent with that Liaqat (2009). The reason of variation could be the methods of induction of teachers which different in both sectors. Our arguments have the support from Dr. Abdul Ghafoor Awan (August 2020), according to him public schools have advantage edge the over private schools since their teachers qualified with standardized buildings, laboratories, and recreational facilities. I years further recorded that they had the required professional knowledge than teachers in the private schools.

Table 3
Content competency of science teachers in view of science students

Statements	A PB-PR	O PB-PR	S PB-PR	R PB-PR	N PB-PR
The Teacher					
1 Has a strong grip over the subject matter.	7.3-7.8	52.8-43.5	31.2-37.9	8.7-10.8	0- 0
2 Provide the scientific concepts in simple and easy way.	1.8-1.1	65.6-47.3	25.2-29.8	6.9-21.5	0.5-0.3
3 Give examples of common life to explain the topic.	7.8-4.6	40.4-34.7	36.2-33.3	14.2-19.1	1.4-8.3
4 Derive the formulas and equations on the board.	2.3-4.6	60.1-42.2	21.1-26.3	7.8-21.2	8.7-5.6
5 Explain the side boxes present in the textbook.	3.2-1.9	28.9-19.6	33.0-31.5	29.4-39.0	5.5-8.1
6 Link the topic from previous class topics.	0.5-0.3	5.0-4.6	42.2-36.0	34.4-36.8	17.9-22.3
7 Avoid/skip teaching difficult topics from the textbook.	0-1.3	2.2-2.7	17.5-22.4	36.9-39.4	43.3-33.7
8 Uses book reading method for teaching.	9.6-10.2	26.1-26.9	30.3-30.6	32.6-30.1	1.4-2.2
9 Appreciate asking about modern innovations in sciences.	2.7-3.2	17.9-17.2	19.7-28.8	37.2-33.3	22.5-17.5

As for subject command is concerned both were found equally competent 33% from public schools and 31% teachers from private sectors were capable to explaining the side box information of the textbooks. However, public school teachers were slightly more competent. It was found that 42% teachers in public sector were able to link their topics to previous topics/ lessons as compared to 36% from private sector. It was noted that 43% of teachers from the public sector in comparison with 33% from private sector did not avoid difficult parts of their topics to teach the students. The reason behind the fact was the better subject grip of public-school teachers and thus they had better subject knowledge. So, most of them did not drop difficult topics to teach. This aspect was also supported by Ahmad *et al.* (2016), according to them Teachers in public schools are much competent than the private sector. With respect to book reading method in learning process, both public as well as private sector teachers showed equal competence, it

was found that 30% teachers of both the sectors used this conservative method of study. It was supported by the study of (Nadeem *et al.*, 2020) that described that in Pakistan, teachers had conservative mindset and they depend more on the content knowledge of books. Both types of teachers observed the same sort of approach, and they were least interested to teach inquiry based or activity-based learning. Mumtaz (2010) described in his study that private school teachers appreciated their students more to ask questions. In contrast, it was observed that science teachers of both the sectors almost equally encourage their students to ask questions as 37% public school teachers were found appreciating their students for asking questions about innovations in sciences as compared to 34% teachers from private sector.

Table 4
Pedagogical Competency of Science Teachers in view of science students

S#	STATEMENT	A PB-PR	O PB-	S PB-P	R PB-PR	N PB-PR
1	Use easy language and vocabulary in the class.	11.0- 5.2	50.0-24.7	28.9-54.7	10.1-20.8	0-0
2	Use the white/black board neatly.	8.3- 3.9	30.3-48.7	36.7-31.8	24.8-15.6	0-0
3	Encourage students during learning process.	4.1-12.3	22.0-19.5	49.5-29.9	16.5-24.7	6.0-13.6
4	Write the meaning of difficult words on board.	0-0	12.4-15.6	37.6-27.3	30.7-36.4	19.3-20.8
5	Appreciate students to ask questions.	11.5-3.9	45.4-22.1	29.8-41.6	10.1-16.9	3.2-15.6
6	Use AV aids during learning process.	0-0	00-6.5	18.3-25.3	55.0-31.8	26.6-36.4
7	Listen the students with patience and reply softly.	14.7-9.7	46.8-23.4	32.1-45.5	6.4-11.7	0-9.7
8	Encourage students to take part in science exhibition.	0-0.6	4.6-16.2	21.1-30.5	39.4-32.5	34.9-20.1
9	Use oral lecture method.	10.1-12.3	47.7-37.0	33.0-33.8	9.2-16.9	0-0

Jan (2016) reported a significant difference between private and government schoolteachers based on competence in teaching method whose findings are consistent with findings of this study. With reference to use of easy language and vocabulary, results indicate 50% teachers in public sector in contrast to 24% in private sector teachers were more skillful. It was reported that 37% public sector and 32% private sector schools adequately use black/white boards in neat and clear manner, which is evident on their similar pedagogical skills. As for encouragement of students is concerned, the results show that 50% in public and 30% in private schools were doing this practice. The studies of deTalance (2017) have revealed the contrasting finding that contract/ private teachers show out class teaching performance than the regular teachers in rural Pakistani schools. This finding of deTalance is highly contrary with this study. In fact, the history of private schools at SSC level in district Mianwali was not much old. So, most of the teachers were untrained and pedagogically less skilled. Likewise, concerning writing the meaning of difficult words on the blackboards, 38% of teachers in public sector teachers were found using this technique in comparison to 27% teachers in private sector. Public school teachers were found with better teaching skills i.e., 45% as compared to 22% in private sector. They appreciate questions from the students during instructions delivery. Ahmad & Khan (2016) revealed that there was significant difference between private and government schoolteachers with respect to their teaching competency and government teachers were better in teaching skills. So, the findings of this study were again endorsed. Public school teachers were found more competent with respect to using AV aids as 55% of them as compared to 32% private teachers were found practicing this method. In contrast, Mumtaz Ahmad (2010) reported that classroom management shows the quality of teaching, which is again recorded better in private schools than the public schools. Learning materials and AV aids are well organized in private school classrooms". The reason for this variation might be related to the conservative approach and orthodox views of investors of private schools. They did not provide teaching facilities properly and hire untrained, non-experienced teachers on low salaries. Good teachers

can learn from their experience, could control deficiencies in the pedagogical approaches, professional-knowledge inter alia their teaching practice (Darling-Hammond *et al.*, 2020). Public teachers were good in experience, pedagogical approach, and professional knowledge due to their service length and periodical trainings. Further, 47% public school teachers were noted much patience to listen their students and replying to them softly as compared to 23% teachers of private sector. This humbleness and politeness were an indicator of their professional competency, which made public teachers pedagogically better. Public school teachers were slightly better as 39% of them were found encouraging students to take part in science exhibition in contrast to 33% teachers of private sector. Iqbal, (2006) is of the view that teachers in private schools use multiple methods for teaching along supply of enough instructional material than that of the public sector teachers besides arranging regular science exhibitions and projects. They provide better co-curricular activities too while public sector lacks such activities. How this study observed inverse situation to the findings of Iqbal (2006) in District Mianwali, for example, they lack adequate science rooms, laboratories, or science clubs. Second, science teachers in private sector also lack facilities and permission to attend refresher courses and trainings to develop the pedagogical skills. This is why they found weak in pedagogical competencies in compared to their counterparts in public sector. With reference to use of oral lecture method, 48% public school teachers and 38% private school teachers were found using this teaching method. As both the sectors were working under the influence of traditional education system of talk and chalk, so they were following oral lecture method.

Conclusion and Recommendations

This study was conducted in District Mianwali to compare the levels of science teacher's competency i.e., content competency and pedagogical competency in public and private sector. Based on review of the literature and findings of the results it is concluded that science teachers in the public schools are more competent than the private sector. This is evident in the content competency and command on the subject matter, and pedagogical skills. Similarly, the findings lead us to infer that reasons of more competency in public sector might be higher qualification, length of service and tenured service and the period of school existence inter alia and effective teacher's training programs. While private sector depends heavily on the advertisements and cosmetic attractions. It was hypothesized that the science teachers in the private schools were more competent. This study based on findings suggests that 16 years education be made compulsory for appointment of teacher along with professional degree/ diploma in education for both sectors. The science may be provided access to advanced learning material for which physical sources and online sources be made available to enhance their content knowledge inter alia institution of a regular training programs in the area of their professional qualification and nature of job to improve their pedagogical skills so they can use modern means of teaching and learning.

Limitations and Future Implications

This study was conducted in one district of the Punjab province, so one cannot confidently generalize the findings on other institutions in different parts of the country, therefore, it is suggested that in future the researchers can undertake similar studies throughout the province of Punjab. Furthermore, they can conduct research using other kinds of competencies for example, classroom management, laboratories/ practical competencies, and assessment competencies. Similarly, studies can also include respondents from other subjects as well besides considering the teaching experience in comparative analysis of public and private school teachers.

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