



Research Article

Analysis of the Training Needs for Science Teachers in Classroom Assessment at Secondary Level

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ABSTRACT

The purpose of the study was to explore the perception of Science teachers and school Principals about the training needs of science teachers in classroom assessment practices at the secondary level in two sampled districts of Malakand division. The population of the study comprised the science teachers and principals of two districts Swat and Malakand. The study was descriptive and quantitative. The data were collected by using survey questionnaires and analyzed by using appropriate statistics through SPSS version 26. The results indicated that both science teachers and principals were not satisfied with science teachers' classroom assessment practices and added that they may need intensive training in classroom assessment practices at the secondary level. Therefore, it was recommended that the science teachers should be trained in theory and classroom assessment practices for continuous formative assessment and feedback.

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INTRODUCTION

Conducting a training needs assessment and analysis for classroom assessment practices among science teachers in Khyber Pakhtunkhwa involves identifying the specific areas where teachers require support and improvement in assessing students' learning effectively (Farooq et al., 2020). To conduct such an assessment and analysis clearly defined objectives of the training needs analysis are needed and to identify key stakeholders involved in science education (Mustafa et al., 2022) and to understand the expected outcomes and assessment criteria for further identifying

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any gap or areas where teachers may require additional support (Lam & Tsui, 2013).

Surveys and interviews are conducted to gather information from science teachers about their current assessment practices, the areas where they feel the need of further training and asking about frequency of assessment, alignment with curriculum standards, perceived effectiveness, and any barriers to implementing effective assessment practices (Benzehaf, 2016). By analysing the data, identify common themes and patterns regarding classroom assessment practices and hence looking for knowledge or skills, such as designing assessments, providing constructive feedback, or using assessment data to inform instruction and curriculum modification, changes and development (Mussawy et al., 2021). Reviewing research literature can best improve to design effective Students' Learning Outcomes (Dunlosky et al., 2013). Comprehensive training plan in the form of workshops, seminars and on-line platform can address the identified needs of science teachers in assessment (Draghici et al., 2019).

By following the steps as discussed above, education authorities in Khyber Pakhtunkhwa (KP) can conduct a thorough training needs assessment and analysis for developing targeted interventions to enhance classroom assessment practices among science teachers, ultimately leading to improved Students' Learning Outcomes (SLOs) in science education (Gouleta, 2015). The researchers intended to explore the training needs of science teachers in classroom assessment practices. The study would help improve the quality of classroom assessment, teaching-learning process or pedagogy at school and education system that in turn will contribute to achieve the sustainable development goal (SDG# 4) for quality education. Keeping in view the introduction, the problem of the study in specific terms was stated as analysis of the training needs for science teachers in classroom assessment practices at secondary level.

Objectives of the Study

- To analyse the science teachers and principals perception about the theoretical understanding and practical application competence for alternative and continuous formative classroom assessment practices of teachers in science subjects at secondary level
- To investigate the need for science teachers' training in assessment theory and practices at secondary level

LITERATURE REVIEW

Classroom assessment plays a crucial role as it provides valuable feedback to both teachers and students about the learning progress and attainment of educational objectives (Amua-Sekyi, 2016). It helps teachers to understand to design their instruction in order to meet individual learning needs. Through ongoing and continuous assessment, teachers can track students' progress over time (Ismail et al., 2022). It can foster a positive encouraging learning environment thus helping lifelong, self-regulated professional competence and growth (Khan & Sultana, 2022). Assessments are used to evaluate students' mastery of curricular objectives over time through benchmarks and standards related to students learning outcomes (Khan, 2010). It provides evidence whether instructional goals have been met in a lesson duration; and whether further instruction or remediation is needed (Ismail et al., 2022). Assessment data can inform decisions, such as grouping students for differentiated and individualized instruction (Khan, 2010) and selecting appropriate instructional content and materials as well as adapting teaching strategies to better meet the students' needs. Formative assessment practices also serve an accountability function to various stakeholders, parents, teachers, managers, administrators, and policymakers (Ghaicha, 2016).

In nut shell, classroom assessment is a fundamental component of the teaching-learning process, facilitating student' growth, guiding instructional practices, policies, curricular changes, teachers training and professional development. Improvement in assessment practices at schools, innovations in board examinations, and promoting continuous improvement in overall education system (Amua-Sekyi, 2016). Increasing teachers' assessment literacy skills as well as professional competence in their particular area, subject or discipline with the use of ICT integration in professional development and promoting life-long learning and creativity among the learners (Khan, 2013; Khan & Sultana, 2022). Assessing students at the secondary level in Pakistan holds significant importance due to several reasons including; secondary level as a critical transition phase to more specialized and advanced learning at higher education level

(Khan, 2010; Rind & Malik, 2019), it helps students identify their interests, aptitudes, and areas of specialization, guiding them in making informed decisions about their future academic and career paths, when assessment is tied to the national curriculum framework it ensures the quality of education (Yambi & Yambi, 2018).

Assessment at secondary level provides standards for accountability of the system (Summers, 2023) and data for monitoring students' progress as well as evaluating the effectiveness of educational policies, plans and programs that enables education authorities to track educational outcomes, identify disparities in learning achievement, and implement targeted interventions to address educational inequities (Summers, 2023) and it can provide targeted interventions and support to help students reach their full potentials. It enables teachers to improve their professional guidance and facilitations, and; it serves as a cornerstone of the education system, facilitating continuous improvement and accountability at both the individual and institutional levels (Sain, 2023).

METHODOLOGY

The overall design and nature of the study was descriptive and the quantitative, the data were collected through the use of survey type questionnaires. The collected data were analysed by using SPSS version 26. The accessible population of the study comprised of all the science teachers and principals of high/ higher secondary schools of two districts Swat and Malakand of Khyber Pakhtunkhwa (Pakistan). The sample of the study consisted of 71 science teachers and 38 principals of high/ higher secondary schools of two districts Swat and Malakand of Khyber Pakhtunkhwa (Pakistan) was chosen by simple random sampling procedure.

Data Analysis and Interpretation

The data analysis was presented in two sections A & B:

Science teachers' perception and satisfaction about the classroom assessment practices in science subjects at secondary level

Table 1

Descriptive statistics of Classroom Assessment Practices in views of science teachers (n=71)

No	Items	SDA	DA	UD	A	SA	M	SD
1	The students in our schools have been enabled and encouraged to assess their own work	12 (16.9)	43 (60.6)	02 (2.8)	09 (12.7)	05 (7.0)	2.32	1.12
2	The students in our schools have been enabled and encouraged to assess the work of the other students	12 (16.9)	43 (60.6)	02 (2.8)	09 (12.7)	05 (7.0)	2.32	1.12
3	The students are encouraged and guided to utilize textbook exercises for self-assessment/ peer assessment in our school at secondary level	12 (16.9)	41 (57.7)	04 (5.8)	11 (15.5)	03 (4.2)	2.32	1.07
4	The science teachers properly assess students learning and development through observation, checking, listening and watching interaction inside the classroom	14 (19.7)	37 (52.1)	04 (5.6)	10 (14.1)	06 (8.5)	2.45	1.21
5	The science teachers properly record the classroom assessment data in mind, notebook or in soft form	11 (15.5)	40 (56.3)	04 (5.6)	10 (14.1)	06 (8.5)	2.44	1.17
6	The science teachers are competent to give written and verbal corrective feedback for students' learning during assessment in classroom	11 (15.5)	23 (32.4)	02 (2.8)	29 (40.8)	06 (8.5)	2.94	1.31
7	The overall focus of classroom assessment in our school is conceptual understanding instead of memorization	15 (21.1)	36 (50.7)	04 (5.6)	10 (14.1)	06 (8.5)	2.38	1.21
8	The head of our school properly monitor and guide classroom assessment as a source of learning among students	14 (19.7)	33 (46.5)	08 (11.3)	10 (14.1)	06 (8.5)	2.45	1.21
9	The students in our class are free to ask question before, during and at the end of lessons	17 (23.9)	34 (47.9)	02 (2.8)	12 (16.9)	06 (8.5)	2.38	1.26
10	The non- participating students in classroom activities are identified and their problems are solved through counselling and remedial activities	13 (18.3)	38 (53.5)	03 (4.2)	10 (14.1)	07 (9.9)	2.44	1.23
Overall Mean and Standard Deviation of Questionnaire							2.45	1.2

Note: SDA = 1, DA = 2, UD = 3, A = 4, SA = 5, M = Mean Score & SD = Standard Deviation Score: First row shows the frequency while the second row in parenthesis shows the percentage.

Table 1 (item-1 to item-10) indicated that 77.5 %, of the respondents as science teachers with (M :2.32 & SD: 1.118), 77.5 % of the respondents with (M: 2.32 & SD: 1.118), 74.6 % of the respondents with (M: 2.32 & SD: 1.066), 71.8 % of the respondents with (M: 2.39 & SD: 1.201), 71.8 % of the respondents with (M: 2.44 & SD: 1.168), 50 % of the respondents with (M: 2.94 & SD: 1.308), 71.8 % of the respondents with (M: 2.38 & SD: 1.211), 76.2 % of the respondents with (M: 2.45 & SD: 1.205), 71.8 % of the respondents with (M: 2.38 & SD: 1.258), and 71.8 % of the respondents with (M: 2.44 & SD: 1.227) respectively disagreed with the items in the instrument. Table 1 also indicated that over all the respondents as science teachers with (M; 2.45 & SD: 1.284) disagreed that the teachers theoretically understand and practically apply the classroom assessment or formative assessment practices properly.

Principals Perception and satisfaction about the science teachers (ST) need of training in Classroom assessment (CRA) practices in the science subjects at secondary level

Table 2

Descriptive statistics of Classroom Assessment Practices in views of principals (n=38)

Statements	Responses	Frequency	Percent	Valid Percent	Cumulative Percent
1.ST received Training in CRA	Yes	6	15.4	15.8	15.8
	No	32	82.1	84.2	84.2
2.Principals imparted training in theory and practice of CRA to ST	Yes	15	38.5	39.5	39.5
	No	22	56.4	57.9	97.4
3. ST received trainings in SLO based assessment and exams.	Yes	16	41.0	42.1	42.1
	No	22	56.4	57.9	58.0
4.ST training needs in CRA theory and practices	Yes	16	41.0	42.1	42.1
	No	22	56.4	57.9	58.0
5.ST training needs in CRA, test construction, paper setting, marking and rubric designing	Yes	36	92.3	94.7	94.7
	No	2	5.1	5.3	5.3

The table 2 (statement 1), indicates that 84.2 % of the respondents replied that the science teachers received no training in classroom assessment. The table 2(statement 2) indicates that 57.9 % of the respondents as school Principals impart/ imparted no training in assessment theory and classroom assessment practices. The table 2(statement 3) indicates that 57.9 % of the respondents as Principals revealed that ST received no training in SLOs based assessment and examination system. The table 2(statement 4) indicates that 58 % of the respondents as principals opined that there was need of science teachers training in assessment theory and classroom assessment practices. The table 2(statement 5) indicates that 92 % of the respondents as principals agreed that there is need of science teachers training in test preparation, CRA, paper setting, marking and rubric designing for SLOs based examination at school and Board level.

RESULTS & FINDINGS

Over all perception and satisfaction of science teachers about the science teachers theoretical understanding and practical application of classroom assessment theory and practices were as 78 % of the respondents as science teachers disagreed that the students in our schools have been enabled and encouraged to assess their own work, self- assessment; to assess the work of the other students, Peer-assessment; the head of our school properly monitor and guide classroom assessment as a source of learning among students (Table 1: item 1, 2 & 8). 75 % of the respondents as science teachers disagreed that the students are encouraged and guided to utilize textbook exercises for self-assessment/ peer assessment in our school at secondary level (Table 1, item 3). 72.% of the respondents as science teachers respectively disagreed that: the science teachers can properly assess students learning and development through observation, checking, listening and watching interaction inside the classroom; the science teachers properly record the classroom assessment data in mind; notebook or in soft form, the overall focus of classroom assessment in our school is conceptual understanding instead of memorization; the students in our class are free to ask question before, during and at the end of lessons; the non- participating students in classroom activities are identified and their problems are solved through counselling and remedial activities (Table 1: item 4,5,7,9 &10).

51 % of the respondents as science teachers disagreed that the science teachers are competent to

give written and verbal corrective feedback for students' learning during assessment in classroom (Table 1, item 6). Over all perception and satisfaction of Principals toward Classroom Assessment Theory and Practices among science teachers at secondary level. 84 % of the respondents (as principals) reported that science teachers received no training in theory and practices of classroom assessment at secondary level (Table 2, item1). 58 % of the respondents (as principals) revealed that Principal imparted no training to science teachers in assessment theory, classroom assessment practices and SLOs based assessment and examination (Tables 2, items 2& 3). 57 % of the respondents (as principals) agreed that there was need of science teachers training in assessment theory and classroom assessment practices. (Table 2, item 4). 92 % of the respondents (as principals) agreed that there was need of science teachers training in test preparation, paper setting, marking and rubric designing (Table 2, item5).

Discussion

Significant number of the respondents as science teachers were reported that the students in our schools are neither provided with (Self-assessment practices) and (Peer-assessment practices) nor encouraged and guided to utilize textbook exercises for self-assessment/ peer-assessment in our school at secondary level (Continuous assessment practices). These assessment practices are used to make the student an independent and self- regulated learner (Wanner & Palmer, 2018). The science teachers revealed that they do not use alternative formative assessment techniques like observation, checking, listening and watching and interaction inside the classroom. The variety of assessment practices Amua-Sekyi (2016) playing an important role in introducing changes that will promote the cognitive processes and thinking skills desired in our schools and classrooms.

The science teachers do not properly record the classroom assessment data in mind, notebook or in soft form. The data recorded is then used for formative assessment (Dayal, 2021). The science teachers were not competent to give written and verbal corrective feedback for students' learning during assessment in classroom. The effectiveness of teachers' written and verbal corrective feedback has been discussed and supported (Patra, et al., 2022). They also disagreed that the overall focus of classroom assessment in our school is conceptual understanding instead of memorization. This point was discussed in (Ghaicha, 2016). The principals of our schools do not properly monitor and guide the classroom assessment as a source of learning among students. This point was emphasized in the article (Andrade & Brookhart, 2020). The students in our class are not free to ask question before, during and at the end of lessons as discussed in (Ozan & Kincal, 2018). The non- participating students in classroom activities are not identified and their problems are not solved through counselling and remedial activities as discussed in (Darling-Hammond et al., 2020). Overall, the respondents as science teachers disagreed that the teachers theoretically understand and practically apply the classroom assessment practices (Table 1) for formative and continuous assessment. This point is as discussed (Hussain, et al. 2019) for the teachers' classroom assessment practices, challenges and opportunities to classroom teachers in Pakistan.

Significant number of the respondents as Principals consistently disagreed that; 1) the STs received training in assessment as discussed (Khan, et al., 2022) for curriculum 2006 efficacy in English learning skills, 2) they impart training in assessment theory and classroom assessment practices as discussed. 3) STs received training in SLOs based assessment and examination as discussed (Mpolomoka, et al., 2023). Huge majority of the respondents as Principals consistently agreed that the science teachers need training in test preparation, CRA, paper setting, marking and rubric designing for SLOs based examination in school and Board levels.

CONCLUSIONS

The perception of science teachers was less positive toward their assessment literacy, classroom assessment and formative assessment practices in terms of use of students' self- assessment, peer assessment, data recording, feedback, diagnoses, alternative tools and continuous assessment. The perception of principals in huge majority was found in favour to arrange training for science teachers in assessment literacy, classroom assessment and formative assessment practices, SLO based assessment, test construction, paper setting and designing of scoring rubric.

Suggestion and Recommendations

- It is suggested to introduce a cascade model of professional development for science teachers

through Principals and Headmasters (schools' heads) in classroom teaching and assessment practices. So, it is recommended that the Provincial Department of Professional Development and Regional Development Centres under the Directorate of Curriculum and Teacher Education may arrange the trainings schedule and design or develop training manual and training materials for science teachers in classroom assessment during summer or winter vacations.

- It is suggested that the education policy and plans at secondary level have the provisions for and budget allocations to professionally develop the science teachers in classroom assessment and feedback mechanisms after every five years besides when needed for curricular and textbook changes; and innovation in pedagogy or assessment and examination systems. So, it is recommended the policy makers and educational planners that there be provisions for and allocation of budget for professional development and teachers training.
- It is suggested that the education department must made it compulsory that the last day of every month be spared for professional growth through online and blended modes using web-based cognitive apprenticeships and self as well as peer assessment methods. It is, therefore, recommended that one day of the month be utilized for continuous professional development in teaching, learning and assessment for development and updating of science teachers under the supervision of schools' heads and Board officials.
- The schools principals must have assigned duty as mentor and evaluator to evaluate the teachers and compile the report of this activity in the school diary for monitoring and accountability of the academic progress, teachers' performance and school annual academic efficiency report of all the activities in the professional and educational aspects.
- It is suggested that the research and evaluation wing or corps of the researchers in education be established to collect data from all the schools on monthly basis regarding the school professional development report and is compared with annual board examination results (SLOs based) for accountability and incentives as feedback for improvement of the teachers training and quality instruction at secondary schools not only in science but for all other subjects. Therefore, it is recommended that the research and evaluation wing or corps be established in the department and boards' level for evaluation and feedback of teachers' professional development and training needs assessment.

Further Research

- It is recommended that a thorough analysis of science teachers training need in classroom assessment be carried out by the department or all boards in the provinces and capital for designing science teachers' training framework in classroom assessment practices at secondary level in Pakistan.
- The suggestions and recommendations of the research study be discussed in seminars and conferences or symposia at the universities and education departments for teachers training programs development and innovation to achieve the sustainable development goal for quality education (SDG#4).

Competing Interests

The authors declared no competing interests.

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