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Practice and Challenges on the Formative Assessment System in Secondary Level Mathematics

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Abstract

Evaluation is more important at the school level in measuring learning achievement and making additional plans to raise the student's level. This study's main goals were to explore the condition of the use of formative assessment and challenges faced by the teacher while formative assessment in the mathematics classroom. This study used the interpretive research method under the qualitative research approach. The informants in this study were 4 teachers who taught at the secondary level. We applied in-depth interviews and recorded the same both in audio and video necessarily. The finding of this study shows that the large number of students in a class and the overwork load for a teacher were the main factors that influenced the internal evaluation system that has not been applied systematically. To ensure the effective use of formative assessment ought to motivate teachers, training schedules should be designed to the demands of teachers, and regular monitoring and supervision by the concerned bodies should be done regularly. The findings of this study would be useful for policymakers, curriculum designers, school management, and other stakeholders in designing policies and developing training packages for teachers.

***Keywords**: Internal evaluation, Formative assessment, Teacher training, Motivation, Supervision*

Introduction

Teaching-learning (T/L) activities and the evaluation system are interrelated to achieve the educational goals suggested by the curriculum. The T/L process is conducted to achieve pre-determined goals, and the evaluation process involves the measurement of the level of achievement. The evaluation system has greater significance at the school level in measuring learning achievement and further planning to improve the student's level (Gyawali, 2021).

Among the different evaluation processes, the formative evaluation and the summative evaluation are commonly used evaluation systems in education. The formative evaluation is more important than the summative evaluation because the formative evaluation is run together with the T/L process, and it helps a teacher to find the weaknesses of students and choose the appropriate strategies to minimize them.

According to Yambi and Yambi (2020), the formative assessment is intended to support the learning process by recognizing the learner's strengths and limitations; as a result, it provides feedback to enhance subsequent performance. Chigonga, (2020) claims that the key concepts that formative assessment facilitates for the success of instructional activities include interaction, cooperation, dialogue, and discourse. Interaction and discussion help the students learn mathematical concepts meaningfully. The project work and the collaborative work assist the learner in enjoying the mathematical concept by connecting the mathematical concept to a real-life situation. Formative evaluation is the process of evaluation carried out by teachers through observations, classwork, homework, project work, practical work, standardized tests, and other techniques developed by teachers.

The overemphasis on scores in examinations, especially in final examinations like BEE and SEE examinations, is the main problem in the Nepalese school education system. The periodic and standardized test was taken to measure the achievement of students. It does not allow the students to show their creativity, aptitude, and skills. This type of evaluation system forces the students into rote learning, and students always fear the examination, particularly in mathematics subject. It is almost impossible to memorize all the formulae and apply a suitable formula to find the answer to a mathematical problem. In this regard, Achary, (2019) said that the present practice of assessments at the school level fails to address the interest and needs of diverse backgrounds of the students. He suggested that project work, home assignments, group work, and continuous evaluation systems should integrate with the T/L process to measure the students' all-around capacity. When we include different activities together with regular classroom activities as evaluation, students enjoy mathematics, and the teacher can treat them according to their interests and needs. Bhattarai (2021) claims that students have to solve a mathematical problem on their own instead of depending on others by constructing the models that link mathematics to real, actual life as part of this process. The examination conducted at the end of the academic year or periodically at some interval of time is not able to measure all skills learned by the students which were expected to develop by the school level education. For this, we should integrate assessment as a learning and must focus on formative evaluation and include it in the final evaluation of the student's achievement.

The summative assessment is extremely important in the L/T process, not only for the students but also for the teachers. According to Johnson (2021), assessments serve the students by letting them know what errors they made and how they could correct those errors. It also helps students reinforce the content better if they don't remember it very well. This also helps the students motivate themselves and helps the teacher to plan their lesson effectively before

entering the classroom. So, assessment is considered a roadmap to reach the goal set at the beginning of the academic year or before starting the lesson.

Taking all of these into consideration, the National Curriculum Framework (NCF, 2019) has made the provision of internal and external evaluation systems in mathematics subjects too. For the internal assessment allocate 25% marks and internal assessment includes classroom participation, terminal examinations, and project work/practical work and presentation for the secondary level. However many teachers think of it as the legal provision of providing marks to the students to increase their grades in final examinations. This unacceptable interpretation of the term will imply the necessity of using various techniques to gauge the student's development. Some teachers consider it a time-consuming and tedious job since it does not help to obtain marks in the final examination. Naturally, some of the interesting questions in this context are; how does the secondary-level mathematics teacher perceive the internal evaluation system? How is internal assessment being practiced by secondary-level math teachers? What are the factors that influence the practice of internal assessment in mathematics classes? The considerable body of literature shows that formative assessment tools such as homework, class work, project work, and terminal tests help to enrich the mathematical concepts of the students. However, very few of them try to understand the teacher's perception, practice, and the problems behind it. Some researchers focus on finding the problems in the continuous assessment at primary and pre-primary levels but not at the secondary level. Additionally, it is a novel practice in the context of the study of mathematics because there was no internal assessment procedure implemented before the adoption of NFC, 2019. The researcher has thought that this issue is contemporary, burning, unexplored, and problematic. Thus, he has considered it as a research problem and is interested in research to explore the teacher's perception and practices in internal assessment systems in mathematics and identify factors that influence practicing internal assessment. The prime objectives of this study are: to find out the perception of secondary-level mathematics teachers on internal assessment, to examine how internal assessment is being practiced for mathematics at the secondary level, and to identify the factors that influence practicing internal assessment in mathematics teaching.

Literature Review and Research Gaps

In recent years, many countries have considered assessment to be an important aspect of education. Educational assessment means the process of documenting, usually in measurable terms, knowledge, skills, attitudes, and beliefs (Premila, 2022). According to Acharya (2019), "Mainly evaluation is categorized into diagnostic, formative and summative - means evaluation to learning, evaluation for learning and evaluation of learning respectively" (P.159). Internationally assessment is also considered the major tool to improve the achievement of students, particularly in mathematics. Summative assessments are used to evaluate student learning, skill acquisition, and academic achievement after a defined instructional period. According to Gyawali (2021), theoretically guided, textbook-based instruction and written examination-oriented evaluation result in students' low creativity, lack of critical thinking and collaboration, rote learning, dropouts, and challenges in learning achievement (p. 61). The

formative assessment is used to improve the student's achievement level and creates space to provide effective feedback to improve teachers' instructional strategies and students' learning performance/achievement (Dahal, 2019).

Wiggins noted that (as cited in Thompson et al. 2018) the word assessment derives from the Latin word as-side, meaning "to sit beside or with." This word suggests that assessment needs to be a process done with students, not simply for students. Thus, the objective of the assessment is not only decisions made based on the collected information but also to make a plan about the next steps in instruction that are likely to be better than previous ones.

Still, in many countries, including Nepal, examinations and evaluations are the indicators of the quality of education. They consider the grades obtained by the students in the final examination as the achievement of students. However, the countries whose Educational Development Index is high considered many evaluations that destroy student learning goals and encourage teachers to teach students to pass exams solely. The exam-oriented study underestimates the understanding and application part of education. According to Federick (2020), the students of Finland need to take a matriculation examination at the age of 18 only. This is also only for those students who want to enter colleges for higher education. Unlike other countries, Finland focuses on "Test less, Learn More." Every school and even the teacher in Finland can arrange their curriculum per the needs of the school and take their exams independently. The teachers in Finland give more intensive guidance that ensures no student is left behind in learning.

Sometimes, formative assessment creates an extra workload for the teachers, and it reduces the effectiveness of formative assessment. The number of students in the classroom, time available, knowledge, skills, and abilities are the main challenges to the effectiveness of the assessment. The class size, time availability, knowledge, skills, and abilities to implement are the main challenges to the effectiveness of the formative assessment. In this regard, Uiseb (2009) conducted a study to identify the problems experienced by teachers when conducting continuous assessments in the classrooms of Namibia. The purpose of this study is to know how teachers perceive, conceptualize, and understand continuous assessment. One hundred twenty teachers from ten primary schools in Windhoek Education Region participated in this study. A questionnaire was used as the main instrument to collect data. The finding of this study shows that the majority of the teachers have a positive attitude towards the continuous assessment system. They argue that continuous assessment is useful in assessing competencies, abilities, learning, and skills. The core challenges for the continuous assessment are overcrowded classrooms, lack of ongoing training, lack of clear guidelines, and complications of mark allocation, weighting, and calculation. Another serious issue raised by this research is the reliability and validity of the assessment.

Asale (2017) has researched to investigate mathematics teachers' perception of continuous assessment, how it is being practiced, and the main problems encountered during the implementation. This study deployed the mixed method to collect the data, and questionnaires,

interviews, and focus group discussions were the tools for data collection. Seventy mathematics teachers from government schools and ten mathematics teachers from private schools were included in the school, and 280 students were also involved in cross-checking the practices of continuous assessment in the classroom. The conclusion was drawn from analyzing both primary and secondary data generated from the respondents and documents, reports, and other shreds of evidence of schools and other institutions. The finding of this study shows that a considerable proportion of mathematics teachers have a clear concept of continuous assessment, but it has not been properly implemented in the classrooms. Large class sizes, lack of sufficient instructional materials, and lack of adequate training and incentives were some of the factors that hindered the proper implementation of continuous assessment.

Theoretical Framework

There are different theories used when learning mathematics; among them, constructivism is the utmost use of full theory. The constructivist believed that knowledge can never be passed from one to another (Vintere, 2018). The knowledge is constructed by learners interacting with the environment and experiencing themselves. Constructivism is a learning theory that emphasizes the active role of learners rather than passively receiving information. According to Brau (2022), there are three foundational psychologists of constructivism Jean Piaget, Lev Vygotsky, and John Dewey. Mathematics education is more influenced by Piaget, and Vygotsky, von Glasersfeld's ideas of constructivism. Piaget's ideas encouraged the development of knowledge. Piaget has identified four primary stages of development: sensorimotor, preoperational, concrete operational, and formal operational. Piaget theories focus on the human mind; they describe the structures of the mind and how a person assimilates information and adjusts.

The Russian psychologist Vygotsky has a significant role in the development of constructivism theory. The learning theory developed by Vygotsky is mostly used in mathematics classrooms. Vygotsky considers that social environment, culture, and people are the most important factors in the cognitive development of an individual (Vintere, 2018). Constructive processes are particularly robust in group conditions, and learning is based on the independent and critical learner. Mathematical knowledge is a conceptual structure in which each element is connected to another; it is not a collection of isolated facts. Constructivists think that mathematical knowledge can be constructed through the process of collaboration and interaction between students, in a group, rather than just the individual.

In the constructivist view, learning is a process of the construction of knowledge. It is not an active process just pours the matter into an empty vessel. The learners connect new ideas to existing ideas through scientific ways of thinking. The constructivism system sets the target of education for students to be able to think critically, solve problems individually and collectively, and be creative. Constructivist believes that assessment should be used as a tool to enhance student's learning and help the teacher to identify the current level of understanding of the students. In a constructivist classroom, different assessment tools like concept maps,

portfolios, rubrics, and assessment processes, i.e., self-assessment, peer assessment, and collaborative assessment, can be used.

The data for this study were collected from primary sources and an interview technique was used to collect data. The semi-structured interview was used to elicit in-depth data from the secondary-level mathematics teachers on their perception, practice, awareness, and skills in formative assessment in their class. After obtaining the informants' consent, the researcher first audio-recorded each interview. The data were also transcribed to begin the analysis process. The content analysis has been applied using the text's assigned codes. Lastly, the key themes were explained using the provided codes.

Result and Discussion

This part presents the results of the analyzed data obtained from the interviews given by the teachers.

Limited Use of Formative Assessment in the Classroom

Every teacher and educationist knows the importance of formative evaluation in the classroom but its use is limited in regular classroom teaching. Formative assessment can help teachers determine the strengths and weaknesses of their students. With that information, teachers can create a more rigorous learning environment that will help students to improve their mathematical achievement. There are different formative assessment methods, such as homework, classwork, project work, extracurricular activities, co-curricular activities, tests, quizzes, etc. The formative assessment is not implemented properly, especially in community schools. In this regard, one teacher expressed his experience as,

I sometimes give classwork home while teaching in the classroom and provide homework almost every day. I give the project work before the terminal and final examination except for the terminal and final examination conducted by the school. I rarely take the unit and monthly tests and never conduct mathematical quizzes/games.

This scenario shows the effectiveness of the homework and classwork in the mathematics classroom. From the above views of a teacher, it was claimed that formative assessment has been given less priority by the mathematics teacher. The result of this study is supported by the study of Acharya, (2019). He claims that formative assessment is not used to the fullest extent possible in classroom activities like group discussions, field visits, weekly tests, project work, homework, attendance, and remedial support.

Formative Evaluation is not Applied in a Systematic Way

The curriculum framework 2076 revised the curriculum stricture of school level In mathematics subject also makes the provision of internal and external evaluation system. There is a guideline for the division of marks in different titles and to make the internal evaluation system effective. However, it is not found that they follow the provision made by the curriculum and systematic record-keeping system. One of the mathematics teachers said that,

There is no provision for the record of the submission of homework, classwork, or project works by the students. We provide the same level of marks for all the students in the class. The parents want high scores in the examination of their children. So we add the internal marks to the marks obtained by the students in the final examination. It helps to increase the GPA of the students.

From the view of the teacher, it is not difficult to say that the provision of internal evaluation is widely misused. Indeed, this provision is launched to integrate the formative evaluation into the final evaluation. The same type of evaluation system can not evaluate the different abilities of students. So there are different methods of evaluation systems in the mathematics subject also. A teacher of institutional school about the internal evaluation system opines, "I don't know the marks of internal evaluation. It is provided by the school, I just check the answer sheet of the examination and provide marks."

The view of the teacher shows that the internal marks are not in the hands of the subject teacher, the students obtain the marks depending on the school management's will.

Issues with using formative assessment in the classroom

There are numerous reasons the formative assessment is not used in secondary-level mathematics classrooms. This study explores major issues here.

Lack of Motivation among Teachers

A motivated teacher is crucial in creating a successful learning environment in the classroom. They will look at teaching through different lenses, and, in doing so, motivate students to learn. If a teacher motivates the students innovative ways to do project work, group work, presentations, demonstrations, etc. the students start to do effectively. In this line, a teacher shares his view,

> First of all, a teacher should be self-motivated. He should have a desire to do some new thing, then he counsels his students on the importance of formative assessments such as homework, project work, and group work presentations. It helps to bring the positive vibrations into the students' minds.

This idea of the teacher shows that a teacher can change his classroom environment. He can produce positive vibrations in the students' minds that can play a vital role in the mathematical achievement of the students. Filgona, Sakiyo, Gwany, and Okoronka, (2020) highlight the importance of motivation in the learning process. They claim that students' motivation plays a critical role in academic achievement and later life. The only motivated teacher can motivate their students but this fact is often overlooked. About teacher motivation a teacher of a community school about the practice of assessment system expresses his experience as,

> Sir, there is no working environment in our school. Almost all teachers do not check the students' homework, and never give the project work. If any teacher starts to do some

creative work rest of the teachers demoralize him and he also stops to do and follows the other teachers. But I continue my work whatever the other says it is does not matter.

This is a good example to demonstrate how well the formative assessment is used in our schools. Without a self-motivated teacher, it is almost impossible to transfer the positive vibration to the students. Suarez-Mesa, and Gomez, 2024) advocate that teachers who possess intrinsic motivation have the potential to significantly enhance students' learning, autonomy, self-worth, and drive to achieve the best possible results in the classroom.

Excess Workload for the Teachers

Another serious reason behind the effective implementation of formative assessment was the overwork load and large class size for the secondary level mathematics teachers. The teachers of community schools have to take normally 5 periods daily and in the institutional teachers get 1 period daily. The leisure period is not grantee normally some teachers become absent and the other teachers have to go the class in their leisure periods. Another far-reaching cause is the large class size. In this regard, one of the teachers expressed his views,

> Sir, there are more than seventy students in a class, if I start to check the homework hardly see 20 to 25 students in a day, and takes more than 3 days to complete all the homework. I have no time to check to leisure period because I have to teach 5 periods daily and do not have sufficient time to check the homework for all the classes that I touched. I check randomly the homework of some students and just gave tick with the red pen.

From the view of this teacher, it is not difficult to conclude that excess load on the teachers is one of the most determining factors in implementing the internal evaluation system effectively in the schools. According to Asale (2017), there is a lack of adequate teaching resources, incentives for teachers, and huge class sizes that have prevented continuous assessment from being adequately applied in the classroom.

Lack of Training and Regular Supervision

A teacher training program is a program that equips teachers with techniques and modern pedagogy strategies that help them to better classroom management and teach their students effectively. Knowledge and skills once obtained do not help a teacher forever to do their work effectively. A teacher needs to update him for teaching in the classroom according to the change of time and as per the needs of the students. The curriculum is dynamic and ever-changing. When the curriculum changes means not only changes in the contents of teaching but also changes in the teaching strategies and methods of evaluations. The curriculum framework 2076 makes vast changes in the curriculum of secondary-level mathematics. It first time makes the provision of 25% internal evaluation and 75% external evaluation. The 25% internal evaluation is also considered as the formative evaluation because it is formative. It includes the terminal examinations, classroom competencies of the students, project work, and mathematical

activities. The teacher has felt much confusion while making the students' project work and mathematical activities. In this issue, a teacher expresses his view as,

> Sir, I give project work before the examination and most students write whatever they know and submitted. I am trying to do my best. The project concept is new to us, and we do not know how to do the project. If training is provided for us about the project, we can make our students do project work.

From the teacher's view, it is not difficult to conclude that lack of teacher training is one of the most hindering in fully implementing the formative assessment. The research carried out by Achara B. R. (2019) also identified the same problem. He claims that the present teacher training is not sufficient to provide knowledge to the teachers about the new assessment system thus teacher training should focus on particular areas as per the demand of teachers. The research conducted by (Baudi & Ebenuwa-Okoh, 2021) to identify the teacher's problems while conducting continuous assessment also shows to ensure the effectiveness of continuous assessment in the schools there must be seminars and conferences so that the teachers will receive adequate knowledge to conduct it. Training is essential to provide the necessary professional and technical knowledge to in-service and new teachers entering the teaching profession. It helps the teacher to update their knowledge, provides essential skills about the newly launched system, and provides professional knowledge to the recently entered teaching profession.

Further, the lack of regular monitoring and supervision is a reason for not implementing the formative assessment in the classroom. To ensure institutional development, organizational compliance, and the improvement of teaching and learning methods in the field of education, effective supervision and monitoring are essential tools. While monitoring involves administrative oversight in compliance with laws, regulations, and policies, supervision entails giving teachers the technical support they need to improve students' learning outcomes through professional development. In this regard, one teacher shares his view;

To use the formative evaluation effectively the school management has to regularly supervise and monitor. The school management has to interact and discuss with the teachers the problems they face while using formative assessment in the classroom and facilitate them if necessary. The group work and project work must integrate with regular classroom teaching, not just the final examination.

This statement confirms that regular monitoring and supervision ensure the effective use of formative evaluation in the classroom. Not all teachers have a sense of responsibility and enthusiasm towards work. In this situation, regular monitoring and inspection force them to fulfill their responsibilities.

Conclusion

This research aimed to explore the perception and practice of internal evaluation in the secondary-level mathematics classroom. Through the interviews with the teachers who taught at the secondary level, an attempt was made to find out the reasons for not using formative assessment effectively and the solutions. It was shown that most of the teachers were not attentive in using other formative assessment tools, such as games, math quizzes, field trips, extracurricular activities, and so on. The teachers were using usual methods like homework, classwork, unit tests, weekly tests, and monthly tests for formative student evaluation. It was not found that the teachers keep records of the class work, homework, unit, monthly and quarterly exams, and project work done by the students and provide internal evaluation marks based on that. The internal evaluation system has not been implemented systematically due to more class load among the teachers, a large number of students in the class, and a lack of awareness among the teachers about the changed evaluation system. For that, it seems that teachers should be motivated towards new work and arrange training schedules according to their needs. To make sure that the students receive the marks from the internal evaluation by completing the curriculum-recommended tasks it appears that the concerned agencies should conduct routine monitoring and inspections.

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