

Research on Multicultural Issues in Science Classroom

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Abstract

This article is about classroom practices from multicultural point of view especially in the case of science classroom at primary level. The main purpose of this article is to assess reality of science classroom in comparison to ideal culturally responsive science classroom. Gram Sewa Higher Secondary School is the study location. Indicators of ideal science classroom were prepared and practices in science classroom were observed on the basis of these indicators to draw the real situation.

The real situation of science classroom indicated that the physical environment of classroom (seating chart and classroom decoration) and psychological environment of classroom (language of instruction, teachers' understanding, planning, teaching methods, learning aids, motivation, assignment system, assessment system and extracurricular activities) were based on melting pot approach. Most of the teachers' teaching practices were found neither culturally relevant nor culturally responsive. The performance of marginalized group students was lower than others. There is a need of reformation to address classroom diversity and make it culturally responsive.

Key words

Marginalized, Mainstreaming, Inclusion, Culturally relevant, Culturally responsive

The Context

Nepal is topographically, culturally, linguistically, and ethnically very diverse despite its relatively small geographical size. After the restoration of democracy every sector including education is demanding for the inclusion of lingual, ethnic, religious groups in all steps of governing the state.

Enrolment of girls, Dalit, Janjati (Indigenous People) and different types of disabled students is very poor in school level. Of the total enrolment at the school level, girls' enrolment constitutes almost 50.1%, i.e., 50.5% at primary level. In comparison to their share in the total population at around 12%, the share of Dalit enrolment is 21.5% at primary level and in comparison to their share in the total population at around 40%, the share of Janajati enrolment is 38.2% at primary level. Furthermore, out of the total students at primary level, 1.2% students are with different kinds of disabilities (DOE, 2010). In order to improve the situation of this enrolment, education should address its diversity.

To sum up, while clarifying the above discussion, firstly though Nepal is a multicultural, multilingual and multiethnic country, education has not given equal opportunity for the celebration of this diversity. Secondly, disadvantaged groups as Dalit, women and ethnic

group's participation in education is very poor. Therefore, education system of Nepal has great responsibility to address these different forms of diversity through education. Multicultural education has now emerged as an umbrella concept to address diversity in the education world.

Nepal's Efforts towards Multicultural Education

In the context of Nepal, the term multicultural education is not a completely practiced subject. But a number of policies encouraging participation of girls, disabled children and children from other marginalized groups are closely related to the concept of multicultural education. The efforts made after Rana period in the field of multicultural education are discussed in this section.

The National Education Planning Commission (NNEPC) was formed in (1956). This Commission tried to highlight the life of rural Nepal through the pictures of multiethnic, multicultural and multilingual situation. It was in favour of multicultural education but emphasized one language policy as the medium of instruction. Overly, the NNEPC report did not address the needs of the indigenous and ethnic minority class children or marginal class students.

The All Round National Education Committee (ARNEC) was formed in 1960. The Committee suggested implementing free and compulsory primary education which is a positive aspect for development of multicultural education in the country but it did not suggest any change in the language policy. Moreover, teacher training and curriculum development programmes did not include mother tongue in education. In this sense the report ignored the inclusion of marginalized cultures in education.

National Education System Plan (NESP) was introduced from 1971 to 1975. Emphasis was placed on teacher training programmes, production and development of school textbooks and teacher's guides in Nepal. But policies related to multicultural education and language remained the same as those introduced in NNEPC and ARNEC. Therefore, this plan also failed to flourish multicultural education.

The government formed the National Education Commission (NEC) in 1990. The constitution of the kingdom of Nepal (1990) regarded the local languages as 'language of nation' and Nepali language as 'national language' and constitutionally, it stopped all types of discriminations related to the gender, caste, religion, sex, culture etc. NEC was constituted after the promulgation of constitution. Hence provision of localized curriculum opened ways for multicultural education in symbolic form.

After NEC, the National Language Policy Recommendation Commission 1993 had categorically recommended the necessity of mother tongue and bilingual education for non-Nepali speaking children. The Commission had suggested measures to design curriculum, prepare textbooks and introduce mother tongue as the medium of instruction in monolingual communities and in transitional primary education and literacy programmes.

High Level National Education Commission (HLNEC) was formed in 1998. This commission emphasized the conservation of language, religion and culture of different people and women's education.

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The new primary school curriculum of 2003 (2060 BS) has given continuity to the provision made in 1992 (2049 BS) curriculum by providing 20% weightage for the study of local contents in social studies, creative and expressive arts, and physical education. It has also made provision for an additional subject for local need based study that may include mother tongue or local subject so that students can select the subject and content according to their interests.

The National Curriculum Framework (NCF) was prepared in 2005. It emphasized on inclusive curriculum for all students irrespective of gender, ethnicity, cultures, religion, castes, ethnicity, abilities and disabilities, socio-economic conditions and geographical conditions. Similarly, key guiding principles of national curriculum, as mentioned in NCF are: curriculum will address diverse curricular concerns through integration; follow child-centered developmental approach; recognize mother tongue in teaching and learning; be inclusive; provide opportunity for local need-based learning, recognize Sanskrit education as the foundation for Eastern knowledge and philosophy; provide opportunity for ICT education; follow collaborative approach; and recognize alternative learning to be related to multicultural education and teaching in multicultural classroom directly or indirectly.

Interim Constitution (2007) article 35 (10) states that the State shall pursue a policy, which will help to promote the interest of the marginalized communities and the peasants and laborers living below poverty line, including economically and socially backward indigenous tribes, Madhesi and Dalits by making reservation for a certain period of time with regard to education, health, housing, food sovereignty and employment. Similarly, it further mentions in article 35 (14) that the State shall pursue a policy of making special provision based on positive discrimination to the minorities, landless, squatters, bonded laborers, disabled, backward communities and sections, and the victims of conflict, including women, Dalits, indigenous tribes, Madhesi and Muslims (MOLJ, 2007).

More recently, realizing the importance of the mother tongue, the 'Education for All National Plan of Action Nepal (2001-2015)' has added one more goal to the six major goals set by Dakar Forum. The goal is to ensure the rights of indigenous people and linguistic minorities to quality basic and primary education through their mother tongue (EFA/NPA, 2002).

Similarly, piloting phase of multilingual programmes is launched in seven schools of six districts: Kanchanpur, Rasuwa, Sunsari, Jhapa, Dhankuta and Palpa. Eight different mother tongues have been selected for multilingual programme. Moreover, multilingual education section is operating under Department of Education for the development of multilingual education (DEO, 2009).

School Sector Reform Plan (SSRP) was prepared in (2007) and it is being implemented now. It has considered cultural diversity as one of the national treasures. Similarly it mentions that Nepal is one of the most diverse countries on earth and thus has a responsibility to conserve its rich cultural heritage. It further realizes that minority groups, ethnic communities and disadvantaged groups (such as women, Dalits and ethnic minorities) have low levels of participation in education. Finally it accepts the increase in the participation of such groups is a key challenge for the government. In the history of Nepal's education, SSRP is the most multicultural education friendly document.

In this context, NCED under Ministry of education has developed audio, visual, audio visual and text materials for students to give education through distance mode. These all programmes are being fruitful for science teachers and students.

From the above discussion, it is obvious that constitutional provision, recommendations of education commissions and other study reports have accepted the multilingual, multicultural and multiethnic situation of the country. Furthermore, these documents have also ensured to stop all types of discriminations related to caste, gender, culture etc. But these efforts could not address the applied aspect of multicultural education in the real field i.e. classroom. So, in this article I have chosen to research on how multicultural education is being practised in primary level classrooms and what are the gaps between the theory of multicultural education and classroom practices. As such, the major objective of this article is to assess classroom practices from multicultural point of view.

Methodology

Study Location: This research was carried out in Gram Sewa Higher Secondary school of Kathmandu district which is located in the rural area. This school was my working place as a secondary level science teacher which helped me for an in-depth study of the situation. While analysing the cast composition of students, students belonging to ten castes were studying in grade one, nine in grade three, four and five and eight in grade two. Thus primary level had ethnic, lingual, and culturally diverse students in each class. This diversity appealed me to select this school for my study purpose.

Sample: Teachers, some guardians and students of primary level were considered as research participants of this research.

Tools: Indicators of classroom practices from multicultural perspective were developed (Table 1) on the basis of the review of different national and international practices on multicultural education. Furthermore, interview guideline, questionnaire and class observation guideline were developed based on those indicators.

Table 1 Indicators of culturally responsive Science Classroom

Classroom practices	Indicators
Seating chart	<ul style="list-style-type: none"> • All seats need to be arranged in such a way that each student can clearly see the teacher and the teacher can take a moment in each student and sufficient space for group work. • Movable bench to conduct group activities in the classroom • Mixed seating or rotation system of seating arrangement • Equal opportunity to each student during seating arrangement • Enough space for multi methods teaching

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Classroom decoration	<ul style="list-style-type: none"> • Pasting different posters representing various castes, pictures that motivate the students towards study, different sayings of heroic people and various materials prepared by the students inside the classroom.
Language of instruction	<ul style="list-style-type: none"> • Multilingual teaching
Teacher	<ul style="list-style-type: none"> • Culturally responsive to conduct teaching learning activities in culturally diverse or multicultural classroom. • Socio cultural consciousness (examines the socio cultural identity and inequality) • An affirming attitude towards students from culturally diverse backgrounds (respects cultural differences) • Commitment and skills to act as agent of change (develops skills for collaboration) • Constructivist view of learning • Culturally responsive teaching and learning strategies (supports constructivist view of knowledge which promotes critical thinking, problem solving ,collaboration and recognition of multiple perspective) • Learning about students (students' past history, home culture, etc)
Planning	<ul style="list-style-type: none"> • Prepared on the basis of the study on students' cultural background or culturally responsive lesson plan
Teaching method	<ul style="list-style-type: none"> • Application of variety of teaching methods or multimethod teaching • Kinetic and tactile involvement for marginalized students • Cooperative methods for marginalized • Lecture for mainstreaming • Cultural balance as gender ,caste, language, religion etc
Learning aids	<ul style="list-style-type: none"> • Culture specific materials which can help them to liberate from oppression. • Generally, computer, posters ,historical and contemporary contributions of minority students, references to people from different ethnic and cultural groups, examples of minority persons or groups, devices relevant to student experiences, role models, biographical readings about minorities ,cultural experiences of the child and family and culture friendly learning materials
Motivation	<ul style="list-style-type: none"> • Use of culturally responsive teaching method, language of instruction, learning aids, feedback, assignment and assessment system, extra curricular activities
Assignment system	<ul style="list-style-type: none"> • Individual and group assignments that promote cultural aspect

Assessment system	<ul style="list-style-type: none"> • Sensitive towards multilingual students • Interest of multicultural students • Assessment of learning and assessment for learning.
Extra curricular activities	<ul style="list-style-type: none"> • Equality of opportunity to all group of students
Performance	<ul style="list-style-type: none"> • Almost equal performance of the students from different culture. • No vast gap between marginalized and mainstreaming group students

Source: Study of literature on multicultural education

Discussion on Reality of Heterogeneous Classroom Management for equity

Situation of study area: The data and information showed that the percentage of primary level students from marginalized groups was higher than of mainstreaming group in the study school. Similarly, the number of girls was slightly more in comparison with boys which states that girl's enrolment rate of study school was slightly different than the national level data on girl's enrolment rate in primary schools.

There were students speaking at least five to nine different mother tongue as Tamang, Nepali, Newari, Gurung, Limbu, Rai, Sherpa, Maithali, etc in each primary grades of the school. There might be two reasons for the increment of marginalized group students in the government school. One reason may be that the guardians belonging to mainstreaming group send their children to private schools due to their better economic status and their feeling that those private schools give quality education. Parents of marginalized group students send their children to public schools. Another reason may be that, government has provision of various kinds of scholarship schemes for Dalit, Janiati and girls. In my understanding the economic reason plays a vital role for the increment in the enrolment of marginalized students in public schools.

Physical management of the classroom

As I observed the physical environment of the classrooms (classroom decoration and seating chart) from multicultural perspective, the classrooms were not culturally responsive.

Seating chart: I found unmanaged seating arrangement in the classroom. The taller students were found seating on the front lines blocking the back benchers. Also, talented and active students were always sitting in the front of the classroom. Weak students were always at the back. For the solution of this problem, a teacher can do a number of things like rotation system and by placing taller students at the back rows and smaller at the front row. Teachers had not thought about such types of seat arrangements. There were sufficient number of benches but they were not well managed. There was not enough space for teachers to move inside the classroom to supervise the activities of the students and to conduct group work in the classroom. Similarly, there were not any materials to conduct experimental activities of science in the science classroom.

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Classroom decoration: The walls inside the classroom were not well decorated but all classrooms in general and multicultural classroom in particular needs decoration of classroom from multicultural perspective. The classroom of my study school had neither the literature nor posters or pictures of different cultures decorated on the walls to give equal identity to all cultures.

Psychological Management of the classroom

Language of instruction: In terms of language, there was linguistic diversity in all classrooms but the teaching was mostly monolingual in all of the classes. This situation deprives the multi lingual students to gain education in their mother tongue. Even though people are not restricted to language for communication, language is of overarching importance because it is the fundamental medium through which ethnicity is transmitted and cultural identity is formed (Banks, 2006). Students and guardians had more interest in English as a language of instruction. But teachers were teaching all subjects except Nepali in English by translating into Nepali. This type of instructional pattern hinders the learning of students. The craze of students and parents towards English can be linked with the assimilationist's ideology given by Banks which states that teachers, parents and students inclined to worldwide language.

Teaching learning activities: Analysis of teachers' understanding of multicultural classroom shows that all the teachers know the lingual, religious, gender, caste and ethnic diversity of the classroom but their practices are not addressing the needs and interests of the diverse groups.

According to pluralist ideology, marginalized group students need skilled teachers of the same race and ethnicity for role models, to learn more effectively, and to develop more positive self concepts and identities (Banks, 2006). But most of the teachers are from mainstreaming group. Similarly, to be effective multicultural teacher, he/ she should have positive attitude towards different racial, ethnic, cultural and social class groups (ibid) but when I consulted with teachers in my informal talks, most of the teachers have low expectations from marginalized group in the classroom. Teachers were blaming that the low performance of their school was due to the presence of marginalized class students

In multicultural classroom, teachers should act as cultural mediator as well as change agent (Banks, 2006). But in my study school teachers were not seen to be cultural mediator and they were acting as an obstacle of the change because they were giving continuity to the traditional teaching styles and settings. Moreover, the teacher should be more informed about the history and culture of groups other than his or her own (Bass, 1999). But teachers of the school were found having less knowledge about the different cultures and they had less interest to learn the cultures and history of different groups as well.

When I asked the students from different castes and religions about their main festivals, they claimed Dashain, Tihar and Teej but not their own as the festivals belonging to mainstreaming groups was focused more. This situation can be linked with the theory of assimilation which holds that when marginalized cultural groups come into contact with mainstreaming cultural groups over time, lifestyle of the marginalized groups are replaced by those of mainstreaming groups (Sleeter and Grant,2003). The values and languages of the marginalized groups were not practised in school. This can be proved from the fact that marginalized group students

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said about the festivals of the mainstreaming class such as Dashain and some Newari festivals but they could not say about their own festivals such as Losar. Similarly, some of them could not speak their own mother tongue but they could speak Nepali fluently. So we can say that minority group's cultures are replaced by the culture of mainstreaming classes. Even teachers of different cultures emphasized on the importance of festivals of mainstreaming group like Dashain, Tihar etc. but they ignored other festivals of marginalized group.

Multicultural ideology emphasizes that the teacher in the multicultural classes should have multiple ideas / techniques to address the diverse cultural knowledge as well as the cognitive methods suitable for different ethnic students (Kendall, 1983). Similarly, each student has a unique learning style. Teachers should not only build on these learning styles when teaching but help students discover their own particular styles (Sleeter and Grat, 2003:175). So they can learn more effectively and efficiently. From the observation of twenty five classes of primary level, it was found that all the teachers were using teacher centred traditional lecture method or sometimes discussion methods creating pin drop silence. Hence student centred multi-idea methods of teaching were not used because teachers did not have sufficient knowledge about such methods.

Furthermore, the theory of cross culture states that cross cultural literature discussion helps the students feel pride in them and in their culture when they see their background valued in classroom reading and studying activities ([http; www.conductivedconsulting.com/freearicles/multicultural.html](http://www.conductivedconsulting.com/freearicles/multicultural.html)). But teachers of the researched school had no knowledge about the culture of Sherpa, Limbu, and Tamang although they have some knowledge about Newari culture. They had never made a programme for discussing about the culture of different groups. This situation indicates that cross cultural literature discussions are not held in the 25 classrooms observed in the school. Furthermore, teacher training programmes of Nepal have also ignored such multicultural classroom management skills.

Teacher must be culturally responsive in the multicultural classroom. Culturally responsive teachers take students seriously in planning lessons, projects, classroom rules and consequences (NCCREST, N.D) Though the teachers had got the ideas of good planning, they did not bring it into practice. There was not any plan except class routine provided by the school which means that they do not carry out their responsibility in well managed way. In this situation how will they deal with multicultural aspects?

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It is important to provide various activities through which students can gain knowledge or skills, as well as demonstrate competence. For example teacher should consider the methods in which course content is to be presented (e.g., lecture, large group discussion, small group activity, reading assignment, simulation, performance activity etc.). If students with different multicultural background are in the classroom, there is a need to use different teaching methods and focus on collaborative learning. But the teachers followed only teacher centred method i.e. chalk and talk method though they said that they had knowledge of various teaching techniques.

Culturally responsive pedagogy can fulfill the needs of multicultural classroom. Multicultural classroom needs culturally mediated and student centred instruction and role of teacher as a facilitator (NCCREST, N.D). But in the observed classrooms teachers were acting as the depositor of knowledge as banking concept of education given by Frere (1973).

Teachers could make groups and give group task in collaboration basically focusing on marginalized students. In this situation students can learn more effectively.

Different teaching aids are required to make classroom teaching effective. Culture specific materials could be used as teaching aids according to the pluralist ideology (Banks, 2006). Different books from different religions, biography of different cultural heroes, magazines, atlas, and locally available teaching materials can be used in multicultural classrooms. But almost all the teachers were using chalk and talk method without the use of any learning aids. The reason given by the teachers for not using the learning aids was the poor economic condition of the school. They said that the school was unable to provide instructional materials. However, teachers were found unaware to use locally available materials.

Motivation of both teachers and students towards learning plays vital role for better achievement. So as to motivate the students in learning the teachers should be familiar with and curious about the aim and objectives of the class teaching (Ericson, 1978). But during my observation of twenty five classes, I found that teachers were teaching only from the textbooks without considering the objectives of the curriculum. Similarly, students can be motivated through appropriate feedback. Informative feedback should be provided to the students (NCCREST, N.D) during checking assignments, class works and distributing students' progress report for betterment of their performance. Similarly, from the theories of multicultural education students in multicultural classroom can be motivated through culturally relevant teaching materials; student centred teaching methods, group assignment, and formative evaluation. But in classroom practices such types of teaching materials were not used by the teachers.

Teachers were found giving individual class works and assignments in all observed classes. They were not found giving group work in classroom activities. In this respect synergetic learning style of marginalized group students was discouraged and the cognitive learning style of the mainstreaming group students had been fostered because of lack of knowledge of the school teachers. I found that Individual assignments were provided to the students rather than group assignments.

In the context of assessment system government has lunched continuous assessment system in school level to address the needs of all students but it was not well functioning in the school. Assessment of learning was more practised than assessment for learning. Teachers were found maintaining autocratic discipline while teaching. Teachers were found giving fewer opportunities of asking questions to the students.

Teachers should not show any symbol of discrimination in the classroom during his/ her teaching. During classroom observation, I found most of the teachers were asking questions equally to both boys and girls. Such activities can be regarded as positive practice from the multicultural point of view. But I found the teachers asking more questions to the talented students than to the weaker students which hinders the learning process for weak students. Similarly, while giving examples, teachers emphasized more on male than female heroes and heroes of mainstreaming groups than those from the marginalized groups. This may be due to the knowledge, background or content of curricular materials such as textbooks, teacher's guides etc.

Teachers pay attention to assessment of learning not to assessment for learning. Teacher should be sensitive to those students whose first language is not the medium of instruction and exams should recognize the student's diverse backgrounds and special interests (Bass, 1999). But teachers were not sensitive towards the diverse background of the students. The same assessment criteria were used in language tests for students of different mother tongues.

Extracurricular activities : Multicultural education is grounded in the ideas of social justice and education equity (Pinar, Reynolds, Slattery, Taubman, 1996). So, school/teachers have to give equal opportunity to all the students in extracurricular activities like cultural dance, singing, drama, field visit, debate, volleyball, foot ball, long jump, high jump, etc. But school was found conducting such programmes rarely. School conducts some of the programmes in the starting phase of the session but does not continue during the session. Furthermore, the extracurricular activities could not fulfill the needs of all students. For instance, girls were not included in the athletic programmes of the school but school was encouraging such types of games as extracurricular activities. Hence, the situation of motivation in the school was not culturally responsive

My reflection : In my observed school, average performance of all students was less than fifty percent in each grade. It might be due to two reasons. First reason may be classroom practices not being culturally responsive and relevant. Second reason could be that if we consider all the students from economic perspective most of the students belong to financially poor class. So far as the case of result was concerned mostly mainstreaming group students were seen in better position. But in a few classes, even the marginalized students secure first, second and third position. The poor performance of students can be linked with the Bourdieu's cultural reproduction and social reproduction theory, Jensen's intelligence theory, Coleman's theory of familial effect which states that the performance of middle class students was better than lower class students or economically poor students (Mathema and Bista, 2006). From my reflection this poor result seen in the school was due to majority of poor class students and lack of culturally responsive teachers and pedagogy.

Concluding Remarks

Going back to the theoretical frame of my article, I came to the knowledge that physical environment of the science classroom is not culturally decorated and seating chart is not also culturally relevant as told by Banks. In language of instruction assimilation is happened as Banks, and there are not skilled teachers of the same race as said by pluralist ideology. Furthermore, teachers are not positive towards diversity and they are unable to be cultural mediator. Hence, they are not fit with the theory of Banks. Teachers are not informed about the history and the culture of different groups; there are not collaborative activities in the classroom and assessment system is also different from the theory of Bass. Similarly, as the theory of Sleeter and Grant, life styles of marginalized groups are replaced by mainstreaming class and unique learning styles of each student is not addressed. But teaching learning activities are being conducted as the banking concept of Freire. Multi techniques are not used as said by Kandall, teaching materials are not culture specific as said by pluralist ideology and there are not sufficient extracurricular activities according to theory of equality and justice. Furthermore, students are not motivated through objective of the lesson as said by Ericson but I found lower class students as Jensen's theory of intelligence, Bourdieu's theory of cultural reproduction and

social reproduction and Coleman's theory of familial effect in my researched school and their performance is poor as said by that theorist.

Implications for Practice

We can draw the following implications for practice from this article:

1. There is a need of training programmes for the teachers to make them able to manage the classroom, decorate it well, and apply different teaching methods and techniques to address the students having different economic status, language, caste, culture and gender. Moreover, the training programmes delivered from government should focus to uplift the status of the marginal group students.
2. During teacher's selection procedure, the administration should prefer multilingual teacher who is more conscious about the student's culture and economical background.
3. Curriculum, text book, and teacher's guide should be culturally responsive and relevant
4. Assessment system needs to be improved.

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