Science Education in Tribhuvan University: Present Status and Challenges

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Abstract

Nepal has the history of more than eight decades of science teaching/learning at the higher-level education. It started in 1934 in Tri-chandra College at proficiency level. This paper tries to analyze the present status and challenges of science education in Tribhuvam University. It is found that science education has only 3.60 % share of total students' enrollment in constitute campuses of TU. It is also found that there is an association between enrollment of male and female students in constituent/affiliated science campuses.

Key words: Enrollment policy, Regional distribution, Students' enrollment.

Introduction

Science is a process as well as knowledge. People learn science by being involved not only with its content, but also with its methodology. The effective science facility accommodates both; its study requires a variety of unique instructional materials in addition to those materials that are common to all education. Science facility must have space to accommodate this variety in combination with hands on instructional strategies. Its instructional areas have spatial and material needs that are different from those considered in designing a general use classroom. Science education is the field interested in sharing knowledge and process with individuals not traditionally considered part of the science community. The target individuals may be college students, or general public adults. The field of science education contains some science content, some sociology, and some teaching pedagogy.

The education of science in Nepal started from Trichandra College, with the introduction of Intermediate of Science (I. Sc.) program, which upgraded to Bachelor of Science (B. Sc) level in 1950. In the beginning, there was no any university in Nepal. So, Tri-chandra College was affiliated to Patna University. Tribhuvan University (TU) established by promulgating the Tribhuvan University Act in July14, 1959 with objective of spreading higher education in the country and produce educated man-power to fulfill the need of our country. Initially, Master's Degree in science was started only from November 28, 1965 in Trichandra College with the introduction of a program in Chemistry and Physics. This historical step also pioneered the introduction of research initiatives especially Ph D in 1970s onward in Nepal. Initially the invited guest professor from India, UK, and U S started science education at Tribhuvan University**.** After the inception of MSC program, Nepalese science scholar who did B. Sc and M.Sc. Were sent to India, Bangladesh, U.K. and USA for Ph D studies through Colombo plan. Educated and trained Nepalese teachers have been involved on teaching and research at science department of Tribhuvan University (Gimire & Bhatta, 2013).

Institute of Science and Technology (IOST) is one of the largest technical institutes in Tribhuvan University with 13 central departments and 23 constituent campuses and 45 affiliated campuses. Several schemes, plans, policies and implementation strategies have been experimented in science education. It has come to the present form after facing many challenges to prepar scientifically oriented technical man-power of different levels to meet the requirements of the nation. It hasbeen capable to be compared with

universities at regional and global levels in term of curriculum and pedagogic standards.

Objective of the Study

The primary objective of the study is to analyze the present status and challenges of science education in Tribhuvam University on the basis of regional distribution of science campuses, present scenario of students' enrollment and enrollment policy of central department of sciences.

Methodology

The present study is analytical as well as descriptive in nature, which is based on the secondary data like TU Today 2013-14, TU Planning Division 2013 and other related published and unpublished materials. Some descriptive statistics such as percentage, simple bar diagram and multiple bar diagram are used to analyze the present status of science teaching in Tribhuvan University. Inferential statistics such as chi-square test for independent of attributes is used to test whether there is an association between enrollment of male and female students in constituent/affiliated science campuses of Tribhuvan University.

The Chi –square test is given by

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where O=Observed frequency

E= Expected frequency

Establishment of Different Science Subjects in Nepal

In Tribhuvan University, there are 13 main departments of sciences. The following table shows the name of subjects of science and their establishment of years.

Table1: Establishment of Different Science Subjects in Nepal

Subject	Establishment
Chemistry	1965
Physics	1965
Microbiology	1990
Biotechnology	2008
Environmental science	2001
Botany	1965
Zoology	1966
Geology	1967
Hydrology Metrology	NA
Mathematics	1959
Statistics	1972
Computer Science and IT	2001
Food Technology	1973

Source: www.edctu.edu.np

Table 1 shows that teaching of Mathematics started in 2059, Chemistry, Physics and Botany started in 1965. Similarly, Zoology started in 1966, Geology started in 1967,Statistics in 1972, Food Technology in 1973, Microbiology in 1990, Biotechnology in 2008. Therefore, the histry of science teaching is not so long, it crossed only 50 years.

Science Teaching in Constituent Campuses of Tribhuvan University

The following table shows the number of different constituent campuses of Tribhuvan University in Nepal based on development zone like eastern, central (outside Kathmandu Valley and Inside Kathmandu Valley), western, mid western, and far western where any one of science subjects has been started.

Table 2: Science Teaching in Constituent Campuses of Tribhuvan University

Development Region	Name of Campuses	Level
Eastern	Mechi Campus, Japaa	Bachelor
	Mahendra M.M. Campus , Biratnagar	Bachelor, Master
	P.G. Campus, Biratnagar	Master
	Dhankuta Camus, Dhankuta	Bachelor
	Mahendra B.M. Campus, Rajbiraj	Bachelor
	Central Campus of Technology, Dharan	Bachelor, Master

Central(Out of Kathnandu Valley)	RR Campus, Janakpur	Bachelor, Master
	Thakur Ram M. Campus, Birgunj	Bachelor
	Birendra M. Campus , Bharatpur	Bachelor, Master
Central(Inside Kathmandu Valley)	Bhaktapur M. Campus, Bhaktapur	Bachelor
	Patan Samyukta Campus, Patan	Bachelor, Master
	University Campus, Kirtipur	Master
	Trichandra Campus, Ghantaghar	Bachelor, Master
	Amrit Campus ,Lainchaur	Bachelor, Master
	Padma Kanya M.Campus, Bagbazar	Bachelor
Western	Gorkha Campus, Gorkha	Bachelor
	P.N. Campus, Pokhara	Bachelor, Master
	Tribhuvan M. Campus, Palpa	Bachelor
	Butwal M. Campus, Butwal	Bachelor
	Dhaulagiri Campus, Baglung	Bachelor
Mid western	Mahendra M. Campus , Dang	Bachelor
	Mahendra M. Campus, Nepalgunj	Bachelor
Far western	Siddhnath Campus, Mahendra Nagar	Bachelor

Source: TU Today, 2013-201

Table 2 shows that there are 6 science campuses in eastern development region, 3 science campuses in central development region (out of Kathmandu Valley), 6 campuses in central development region (inside Kathmandu Valley), 5 campuses in western development region, 2 campuses in mid western development region and only one in far western region. There are only 10 campuses that have run the master degree program, where as 3 in eastern development region, 2 in out of Kathmandu valley central development region, 4 in inside Kathmandu Valley central development region, only one in western development region, and none in mid western development region. Among 13 subjects of central department of sciences, 12 of them are located in University Campus, Kirtipur.

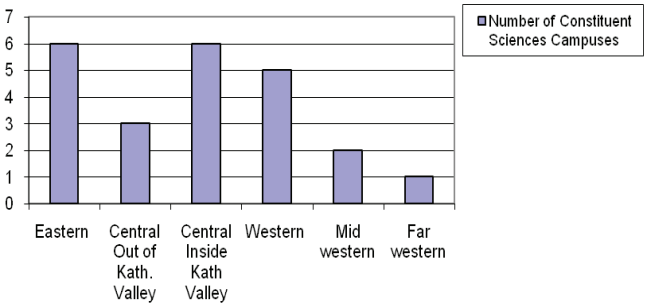

Figure 1: Science Teaching Constituent Campuses of TU in development region

Figure1 indicate that there are unequal distributions of constituent Science campuses among the development regions. It is ironical point that there is no any master degree science program in constituent campus of Tribhuvan University in mid western and far western development region.

Present Scenario of Students' Enrollment in Science Subjects

The following table shows that the current scenario of students' enrollment in science subjects in the constituent and affiliated campuses of Tribhuvan University based on gender.

Table3: Students' Enrollment in Science Subjects

Gender	Constituent Campus		Affiliated Campus	
	Number	Percent	Number	Percent
Male	14803	78.86	1930	64.20
Female	3968	21.14	1076	35.80
Total	18771	100	3006	100

Source: TU Today, 2013-201.

Table 3 shows that there are in total 21777 enrollment of science students, 86.20 % (18771) enrolled in constituent campuses, remaining 13.80 % (3006) enrolled in affiliated campuses of Tribhuvan University. Among the 18771 enrollment of science students in constituent campuses, 78.86 % are male and 21.14 are female. Similarly, among the 3006 enrollment of science students in affiliated campuses, 64.20 % are male and 35.80 % are female. There is an association between enrollment of male and female students in constituent/affiliated science campuses of Tribhuvan University ($\chi^2 = 312.725 > \chi^2_{(0.05, 1)} = 3.841$, reject Ho).

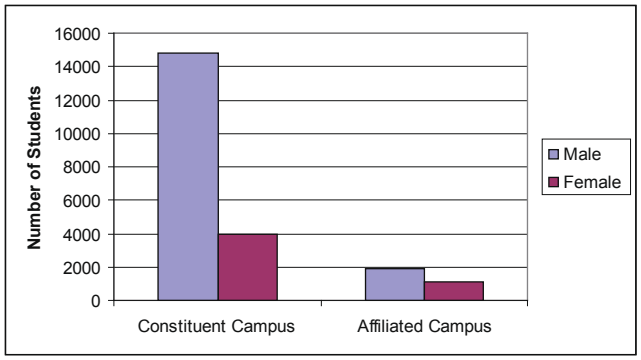

Figure 2: Students' Enrollment in Science Subjects

Figure2 indicates that there is huge gap between the male and female enrollment in constituent campuses in Tribhuvan University but that scenario does not seem in affiliated campuses**.**

Enrollment Policy in Central Department of Sciences of TU in Master Level

There are limited numbers of students' enrollment for each central department of sciences. The following table shows the enrollment policy of student in central department of sciences of Tribhuvan University in master degree program.

Table4: Enrollment policy in Central Department of Sciences of TU in Master Level

Subjects	Number of Students	Percent
Physics	120	16.64
Chemistry	90	12.48
Zoology	60	8.32
Botany	35	4.85
Microbiology	40	5.55
Geology	50	6.93
Environmental Science	48	6.65
Mathematics	150	20.80
Statistics	30	4.16
Metrology and Hydrology	40	5.55
Computer & IT	24	3.33
Biotechnology	24	3.33
Food Technology	10	1.39
Total	721	100

Source: Gimire & Bhatta, 2013.

Table4 shows that only 721 students can enroll the central departments of sciences of Tribhuvan University in the master degree program. Among them, 16.64 % are in Physics, 12.48 % in chemistry, 8.32 % in Zoology, 4.85 % in Botany, 5.55 % in Microbiology, 6.93 in Environment science, 20.80 % in Mathematics, 4.16 % in Statistics, 5.55 % in Metrology and Hydrology, 3.33 % in Computer and IT, 3.33 % in Biotechnology and 1.39 % in food Technology.

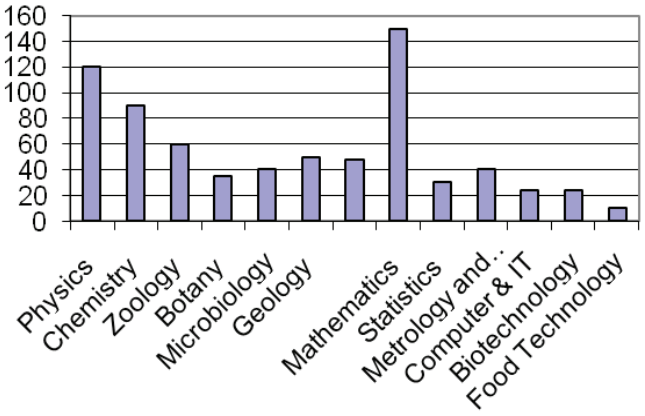

Figure 3: Enrollment Policy in Central Department of Sciences of TU in Master Level

Figure3 shows that Central Department of Mathematics has the maximum capacity to enroll the students and Central Department of Food and Technology has the minimum capacity to enroll the students in the master degree program under Tribhuvan University.

Challenges

Despite of imparting higher education in sciences, TU faces many challenges in governance and resource management for providing basic infrastructure and education facilities required for quality education environment. In spite of limited infrastructures and educational facilities, it has been producing efficient and competent graduates. The graduates of sciences are comparatively more reputed in terms of quality at international level. Likewise the importance of science and technology has never been in priority order as compared to other technical institutes like engineering, medicine, forestry, agriculture in which intake of science students are required, quality of teaching science must be emphasized for better quality of teaching in any other institutes as well. Similarly, laboratory development and required academic activities for science has been ignored completely in multiple campuses. Quite often, budget of science is being used in other administrative and financial matters. Two years to three years (one major subject), four years (two major subjects) system has introduced with proper assessment. Therefore, it needs to improve the status of laboratories and qualified human resources, efficient administrative and financial management. In the master level, there is no long-term vision for the future of science teaching and research at the policy.

It is necessary to take initiative for academic and administrative reforms in higher education. These reforms are aimed at promotion of quality and excellence in teaching and research. To initiate such reforms, it has given importance to – a. Introduction of semester system b. choice based credit system c. revision of curriculum, and d. examination reforms. The academic and administrative reforms is an ongoing process or exercise. Therefore, it is utmost necessary that in the competitive world innovations in academic and administrative areas are very essential.

Adequate resources have always been a challenge before higher education of science. In most of the colleges, vacant positions of the teachers are not yet filled up. Buildings and infrastructure are poorly maintained and the maintenance grants have stagnated for a number of years. So various steps by the government are essential to be taken to facilitate financial assistance to the institutes of higher education in science.

Primary education is the foundation stone of any education system and secondary education is the back- bone. All are well known about the miserable condition of Nepalese primary and secondary education. Till today both levels of education are unable to serve their purpose. Most of the children of primary and secondary school complete their schooling without undergoing adequate training, especially in science education. So, when they go for higher education they face a lot of difficulties. If these stages of education are up to the mark in their performance then the poor performance of higher education is obvious.

Teaching and research are interrelated and are integral parts of higher education in science. The qualities of teaching and research are the back-bone of development of any nation. More research is one of the prominent indicators of quality of higher education. So imputes to research is essential in higher education (Bajaj, 2006).

Politicization of Higher Education has become the main obstacle in the quality of higher education. Now a days, it has become a trend in the Nepalese higher education. Most of the political parties are influencing the higher educational institutions. It seems to be one of the major challenges in front of Nepalese higher education. Students Union and other student organization are always putting pressure at time of students' enrollment. There is vested interest of different political group. It has made the university as a platform to run their political activities instead of academic center. Although the charm of core university science courses are still on the rise as compared to the other disciplines offered by the Tribhuvan University.

Conclusion

Science education has to give emphasis to research and innovation to direct the nation's development and administrative visions and policies and to fulfill the market demands in terms of new research and innovation. Likewise, the university has to provide an access to learning to the poor students including those from the remote areas of Nepal. There is an urgent need to manage required physical infrastructure and refresher course at TU constituent and affiliated campuses to run the 4 years B.Sc. courses perfectly. Teachers who are involved in research and innovation and students who do strong inclinations towards learning can help the university materialize this vision. It is a time to redirect TU for making its academic programs locally and globally respectable and saleable. Therefore, creating an environment for the teachers to fully engage themselves in the academic activities of the university can only ascertain the quality of education and save the image of TU as the centre of the higher education.

About the author

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