

Challenges of Open and Distance Learning in Departing Education for Learners of Science Group: A Study on Bangladesh Open University

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Abstract

This study's goal was to pinpoint the difficulties that SSC and HSC science education at Bangladesh Open University (BOU) faces. Therefore, 12 Regional Centers (RCs) of this university were used to conduct this study. For the purpose of conducting this study, 240 respondents who had been purposefully chosen were questioned using a semi-structured questionnaire. The respondents were learners in the science group of the SSC and HSC programs. Additionally, a checklist was used to conduct 12 Focus Group Discussions (FGDs) and 12 Key Informant Interviews (KII). The study discovered that there were numerous difficulties in the science education of the SSC and HSC programs through ODL at BOU, including learners' lack of interest and seriousness in science education, forced admission, difficult science group and subject matter, tutors' inefficiency, difficult and sparse tutorial sessions, a lack of activities that focused on practical application, a lack of proper guidance in study centers, a lack of logistical support for lab facilities, and the absence of both learners and tutors in tutorial sessions. In order to remove the obstacles of science through ODL in Bangladesh, this study would be helpful to policy makers, educators, and academicians.

Keywords

Challenges, ODL, Science Education, Bangladesh

1. Introduction

1.1. Background of the Study

Due to various socio-economic perspectives a portion of population in Bangla-

des remain unskilled, illiterate in the long term. But the lower level of education enrolment in the country has been increased significantly over the last decade. Therefore, the overwhelming 96 percent of the labor force has less than secondary education (World Bank, 2013). The education of Bangladesh is very larger which has over 30 million students (World Bank, 2013) and the system carried out by different stakeholders. Although Sarker et al. (2019) identified poor physical condition, biased social practice, lack of quality education, economic hardship, geographic isolation, parental education and family factor, uncontrolled population growth an unequal access to education, early marriage and pregnancy of school going girl, migration and effects of relationship and insecurity pushed the enrolled students to dropout here in Bangladesh. Further these dropped out students sometimes started their study again with Bangladesh Open University as this institution provides enormous opportunities for those dropped out students to help them mainstream their education. As a result, they enrolled in Secondary School Certificate (SSC) and Higher Secondary Certificate (HSC) program of Bangladesh Open University. In SSC and HSC program, there are three groups namely Humanities, Science and Business Studies learners are engaged in education through ODL in Bangladesh Open University. Every year a handsome number of learners are enrolled in science group. But to continue their study the ODL learners have to face various challenges. The learners who are enrolled in science group obviously have to take extra pressure than the learners of humanities and business studies group. They have to study on lab based physics, chemistry, biology etc. on which one third of full marks. In ODL system the learners are engaged with their tutors in study centers. But the tutorial classes are not mandatory for the learners as the system is flexible. The tutorial and the lab based practical works are essential for the learners of science group. Besides, the conventional tutoring in ODL, Bangladesh Open University introduces some technology based tools for delivering education to the students. It has developed its internet based educational resources which may be helpful for the students of science group of SSC and HSC Program.

1.2. Rationale of the Study

The modern era is totally based on science and technology. No sustainable development is possible without science education. Bangladesh Open University can be part of development of our nation by generating ICT mentors through science education. But the science education comparatively is harder than other education and expensive also. Every year a huge number of learners are enrolled in SSC and HSC Program of Bangladesh Open University. These learners have to study many harder subjects in their study time. Lab based practical session is must for the learners of science group. Without lab based practical session the science education will not be completed. As the education system is being depend on study center based tutoring, the lab work is totally depends on the capacity of the particular study center. If the study has not any well lab then they

cannot provide proper lab based practical work. That is challenges how ODL can provide lab works for learners. This study is needed to identify the challenges and to the know prospect of science education through ODL in Bangladesh.

1.3. Objectives of the Study

The objective of this study was to identify the challenges of science education of SSC and HSC Program through ODL in Bangladesh Open University.

2. Review of Literature

Umeasiegbu & Esomonu (2012) revealed the problems of science and physical education through e-learning. Whereas, Chimpololo (2010) said that some issues such as, hunger for education, conducive political environment, booming ICT technologies, rural electrification, improved road infrastructure and peace and stability is challenges to science education. Mpofu et al. (2012) provided insight into challenges faced by students and lecturers on inception of the program. Dodo et al. (2013) stated that the students facing various challenges in virtual and open learning system, such as, financial challenge, personal commitment, time and stereotypes, social and over all work pressure. Ezeudu et al. (2013) found the cultural heritage of Igbo nation which are scientific and their problems that hinder their integration into the basic needs of modern society. Kaptan & Timurlenk (2012) found the problem of the lack of quality science teachers; inadequate compensation for the science teachers, lack of training program; lack of environment for computerized subjects; demographic changes; large number of students in one classroom; lack infrastructural facilities, laboratory crisis etc. They also explained some way to overcome these problems. Kara et al. (2019) identified internal, external and program related challenge that faced by the distance learner. The authors added that the internal challenges comprised by management challenge, learning challenge and program-related challenge where external challenge covered by job related challenge and domestic challenge and finally the program related challenge consisted of tutor related challenge and institutional challenge. Besides, the ODL learners face the challenge of cost of the program, lack of equipment and infrastructural facility and lack technical advancement (Zirnkle, 2001); lack of knowledge to operate ICT system (Mossberger et al., 2003); lack of timely feedback to learners' performance and lack of access to library (Kamau, 2007); nature of study materials, lack of contact with teacher and lack of interaction among the learners (Attri, 2012), lack of proper infrastructure and huge curriculum area (Kundu, 2014); lack of support from the employer and lack of proper study materials (Musingafi et al., 2015); internet connection saturation and lack of repository (Palvia et al., 2018) cited in Ray et al (2021). On the other hand, the challenges of science education comprised the examination pattern, syllabus and textbooks, science teacher education program (pre-service and in-service training), availability of resources and schooling pro-

cedure (Jessani, 2015). Moreover, the tutors/teachers faced challenges while they teach the learners outside of their subject specialization (Childs & McNicholl, 2007) and that reason the tutorial session remain more tutors/teacher dominated and learners have to wait for tutor's/teacher's explanation (Sanders et al., 1993).

3. Methodology of the Study

This study has been conducted in Dhaka, Mymensingh, Chittagong, Rajshahi, Khulna, Barisal, Jessore, Comilla, Bogra, Rangpur, Faridpur and Sylhet regions on the learners of SSC and HSC program of science group of Bangladesh Open University. Through a semi-structured survey interview questionnaire, 240 purposively chosen SSC and HSC learners were interviewed. The responses were received through 5 point Likert Scale where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree. Additionally, a checklist was used to conduct 12 Focus Group Discussions (FGDs) and 12 Key Informant Interviews (KIIs). Reviewing relevant books, journals, articles, research reports, evaluation reports, seminar reports, conference proceedings, magazines, related news on daily newspapers, unpublished reports, theses, and monographs, among other sources have been used to gather secondary data. Online and internet sources have been studied regularly. Statistical Package for Social Sciences (SPSS) and Microsoft Excel were used to organize, analyze, and present the collected data in accordance with the study's objective.

4. Findings

4.1. Lack of Seriousness among the Learners to Science Education

Statement-4.1# "I am not serious to science education" (Strongly agreed 21.7%, agreed 20.8%, neutral 20%, disagreed 15% and strongly disagreed 22.5%). The majority of the learners of science group enrolled in the program purely to pursue their hobbies. As a result, they did not take seriously their education through open and distance learning (Mean = 2.9583; Standard Deviation = 1.46019).

4.2. Lack of Interest among the Learners in Science Education

Statement-4.2# "I have no interest in science education" (Strongly agreed 17.9%, agreed 16.3%, neutral 25.8%, disagreed 23.3% and strongly disagreed 16.7%). Despite enrolling in the program, the majority of the learners did not express their interest in science education (Mean = 3.0458; Standard Deviation = 1.33585).

4.3. Forceful Admission into Science Group

Statement-4.3# "I have admitted into this program for pressure of someone" (Strongly agreed 25%, agreed 20%, neutral 26.3%, disagreed 13.8% and strongly disagreed 15%). However, the mean value of 2.7375 and the standard deviation value of 1.36982 shows that forcing admission was a problem for science education delivered through ODL. Qualitative results show that learners who joined

the science group experienced pressure from their parents, siblings, and other family members. The coordinator of the study center put some pressure on them occasionally.

4.4. Far Distance of Study Center

Statement-4.4# “Study center is very far away” (Strongly agreed 18.3%, agreed 13.3%, neutral 36.3%, disagreed 18.3% and strongly disagreed 13.3%). Therefore, the mean value of 2.9542 and standard deviation value of 1.26176 shows that many learners found it difficult to learn science using ODL due to the distance to the study center. The qualitative data reveal that the majority of the learners who perceived distance from their study location as a difficulty were in relatively distant regions of the country with poor connectivity infrastructure. They were mostly female and unable to routinely attend tutorial sessions because they lived in a very remote place.

4.5. Gaining Certificate

Statement-4.5# “I have admitted into this program only for certificate” (Strongly agreed 3.3%, agreed 12.9%, neutral 7.1%, disagreed 35.4% and strongly disagreed 41.3%). Some learners mentioned that they have admitted into science group only for gaining certificate (Mean = 3.9833; Standard Deviation = 1.14244). The qualitative data show that the learners who admitted into science group just for gaining certificate were service holder. They wanted certificate for their promotion or upgradation in their service.

4.6. Harder Science Subjects

Statement-4.6# “The subjects of science group are harder” (Strongly agreed 49.6%, agreed 17.5%, neutral 15.4%, disagreed 12.5% and strongly disagreed 5%). The fact that the mean score of 2.0583 and the standard value of 1.26621 indicates that science topics were more difficult than other disciplines. The qualitative data reveal that several science topics, including physics, chemistry, mathematics, biology, and higher mathematics, were quite challenging. In contrast, geography, home economics, and agricultural studies were simple to understand.

4.7. Harder Subject Matter

Statement-4.7# “I could not understand the subject matter” (Strongly agreed 50%, agreed 21.3%, neutral 13.8%, disagreed 11.7% and strongly disagreed 3.3%). Most of the learners were not capable to understand the subject matter (Mean = 1.9708; Standard Deviation = 1.18709). The qualitative data support the claim that learners could not comprehend the science sciences’ subject matter as a result of its difficulty. Despite their best efforts, they were unable to understand. As a result, they either needed assistance from a house tutor, family members, or friends, or they were unable to comprehend the material.

4.8. Inefficiency of Tutors

Statement-4.8# “The tutors are not efficient to teach us” (Strongly agreed 26.7%, agreed 16.3%, neutral 27.1%, disagreed 18.3% and strongly disagreed 11.7%). Many learners complained that the study center’s tutors were ineffective at teaching science (Mean = 2. 7208; Standard Deviation = 1.34490). The qualitative section of this study finds that tutors of physics, chemistry, mathematics, and higher mathematics were significantly less effective at teaching those subjects than were tutors of biology, geography, and agricultural studies.

4.9. Harder Tutorial Session

Statement-4.9# “I could not understand the class lecture so, I do not attend class” (Strongly agreed 49.6%, agreed 17.5%, neutral 15.4%, disagreed 12.5% and strongly disagreed 5%). The learners did not attend tutorial sessions because of the harsher tutorial sessions, as indicated by the mean value of 2.0583 and standard deviation value of 1.26621. The qualitative data demonstrate that the tutors failed to make the lesson enjoyable, clear, and productive. Although some tutors made the class interesting and pleasant, the majority of tutors fell short.

4.10. Insufficient Tutorial Classes

Statement-4.10# “Tutorial classes are insufficient” (Strongly agreed 12.5%, agreed 8.3%, neutral 14.6%, disagreed 24.6% and strongly disagreed 40%). Few learners said that the conducted tutorial class for each course was not sufficient (Mean = 3.7125; Standard Deviation = 1.38908). The qualitative data demonstrate that the tutorial course fell short in the areas of physics, chemistry, mathematics, biology, and higher mathematics.

4.11. Large Volume of Study Materials

Statement-4.11# “The volume of study materials is large” (Strongly agreed 65%, agreed 12.9%, neutral 12.1%, disagreed 6.7% and strongly disagreed 3.3%). The volume of study materials was large (Mean = 2.7042; Standard Deviation = 1.12036). The qualitative data show that the volume of physics, chemistry, biology, mathematics was so large.

4.12. Harder Language in the Study Materials

Statement-4.12# “The language of the study materials is not easy” (Strongly agreed 30.4%, agreed 23.8%, neutral 19.2%, disagreed 13.8% and strongly disagreed 12.9%). The language of the study materials of science subject was hard (Mean = 2. 5500; Standard Deviation = 1.38340). The data from the qualitative component, where the learners said that the language of the physics, chemistry, biology, and geography subjects was difficult.

4.13. Insufficient Practical Classes

Statement-4.13# “Practical classes are insufficient” (Strongly agreed 44.6%, agreed

18.8%, neutral 15%, disagreed 11.7% and strongly disagreed 10%). The majority of learners who participated in tutorial sessions through ODL claimed that there weren't enough practical classes (Mean: 2.5500; Standard Deviation: 1.38340). The qualitative data demonstrate that most study centers lacked the ideal tools for practical classes, and as a result, practical sessions were not held. On the other hand, even if some study centers had the essential tools, the tutors lacked the motivation to hold enough practical classes.

4.14. Absence of Practical Class Guide

Statement-4.14# "There have lack of practical class guide" (Strongly agreed 40.4%, agreed 13.8%, neutral 20%, disagreed 15.8% and strongly disagreed 10%). The majority of learners said that there was no instructor for practical classes in their study center (Mean = 2.5500; Standard Deviation = 1.38340). According to the qualitative data, certain study centers offered useful class materials for biology, geography, and agricultural sciences. However, there was typically no physics or chemistry instructor for the practical classes at the study center.

4.15. Insufficient Lab Facility in the Study Center

Statement-4.15# "There have lack of lab facility in the study center" (Strongly agreed 30%, agreed 25%, neutral 24.6%, disagreed 11.7% and strongly disagreed 8.8%). There was lack of sufficient lab facility in the study center (Mean = 2.4417; Standard Deviation = 1.26951). Additionally, the qualitative data support the fact that the majority of study centers lacked adequate lab facilities. The learners, however, did not participate in lab work. Numerous study centers only possessed biology-specific equipment.

4.16. Tutors' Disinterest in Practical Classes

Statement-4.16# "The tutors are not much interested in practical class" (Strongly agreed 25%, agreed 15%, neutral 32.1%, disagreed 16.7% and strongly disagreed 11.13%). Many learners reported that many tutors were uninterested in teaching practical skills and preferred to just conduct theoretical sessions (Mean = 2.7417; Standard Deviation = 1.30654). The qualitative data show that compared to the tutors at the study centers in urban areas, the tutors in semi-urban and rural areas were substantially less interested in practical sessions.

4.17. Lack of Video on Practical Work

Statement-4.17# "There have lack of video on practical work" (Strongly agreed 41.7%, agreed 18.3%, neutral 21.7%, disagreed 13.8% and strongly disagreed 4.6%). The lack of videos on practical work was cited by many learners (Mean = 2.2125; Standard Deviation = 1.24786). The qualitative data reveal that the majority of the video for agricultural studies on practical work. Videos on practical work in biology, chemistry, and physics were lacking.

4.18. Lack of Practical Handbook

Statement-4.18# “There have lack of practical handbook” (Strongly agreed 24.6%, agreed 15%, neutral 28.7%, disagreed 16.3% and strongly disagreed 15.4%). The mean value of 2.8292 & Standard deviation value of 1.37521 proves that there had lack of practical handbook. The lack of a practical guidebook was a problem for the majority of learners, according to the qualitative data.

4.19. Insufficient Practical Exercise

Statement-4.19# “There have not sufficient practical exercise in the study materials” (Strongly agreed 14.2%, agreed 8.3%, neutral 15.4%, disagreed 24.2% and strongly disagreed 37.9%). The mean value of 3.6333 & Standard deviation value of 1.41973 proves that there had lack of sufficient practical exercise in the study materials (See **Table 1** below).

Table 1. Percentage, mean and std. deviation value of the responses.

SL#	Statement	Response (%)					Mean	Standard Deviation
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree		
4.1.	I am not serious to science education	21.7	20.8	20.0	15.0	22.5	2.9583	1.46019
4.2.	I have no interest in science education	17.9	16.3	25.8	23.3	16.7	3.0458	1.33585
4.3.	I have admitted into this program for pressure of someone	25.0	20.0	26.3	13.8	15.0	2.7375	1.36982
4.4.	Study center is very far away	18.3	13.3	36.3	18.8	13.3	2.9542	1.26176
4.5.	I have admitted into this program only for certificate	3.3	12.9	7.1	35.4	41.3	3.9833	1.14244
4.6.	The subjects of science group are harder	49.6	17.5	15.4	12.5	5.0	2.0583	1.26621
4.7.	I could not understand the subject matter	50.0	21.3	13.8	11.7	3.3	1.9708	1.18709
4.8.	The tutors are not efficient to teach us	26.7	16.3	27.1	18.3	11.7	2.7208	1.34490
4.9.	I could not understand the class lecture so, I do not attend class	49.6	17.5	15.4	12.5	5.0	2.0583	1.26621
4.10	Tutorial classes are insufficient	12.5	8.3	14.6	24.6	40.0	3.7125	1.38908
4.11.	The volume of study materials is large	65.0	12.9	12.1	6.7	3.3	1.7042	1.12036
4.12.	The language of the study materials is not easy	30.4	23.8	19.2	13.8	12.9	2.5500	1.38340
4.13.	Practical classes are insufficient	44.6	18.8	15.0	11.7	10.0	2.2375	1.38350
4.14.	There have lack of practical class guide	40.4	13.8	20.0	15.8	10.0	2.4125	1.40555
4.15.	There have lack of lab facility in the study center	30.0	25.0	24.6	11.7	8.8	2.4417	1.26951
4.16.	The tutors are not much interested in practical class	25.0	15.0	32.1	16.7	11.3	2.7417	1.30654
4.17.	There have lack of video on practical work	41.7	18.3	21.7	13.8	4.6	2.2125	1.24786
4.18.	There have lack of practical handbook	24.6	15.0	28.7	16.3	15.4	2.8292	1.37521
4.19.	There have not sufficient practical exercise in the study materials	14.2	8.3	15.4	24.2	37.9	3.6333	1.41973

5. Discussions

The study shows that there had lack of seriousness among learners to science education. Many factors work to reduce seriousness of the learners in science education. For instance, Acharya (2017) identified that affecting difficulties in mathematics learning such as, mathematics anxiety, learners' previous knowledge, less labor of learner, supports from parents, lack of teachers' motivation. Besides, teaching learning environment, household environment, financial status of the family and parents' educational status also affects to the seriousness of learners to science education. Although mathematics is more complex subject to understand than other subject but the learner are not serious to do hard labor regarding to understand-Acharya added. As a result, lack of sufficient mathematics skill of learners cuts their capability in physics (Erinosh, 2013). Moreover, researchers (Ornek et al., 2008; Funda et al., 2008; Oon & Subramaniam, 2011) emphasized the skill for mathematics for physics. So, this study says once someone have lack of seriousness to any subject pushes lack of seriousness for other science subjects (42%). Lack of seriousness among the learners pushes disinterest or lack of interest in science subjects (34%). The issue of disinterest or lack of interest to science subjects depends on the advice from parent, peer and older peer and teacher, enjoyment, logistics, ability, subject characteristics, teaching quality and usefulness of subject (Palmer et al., 2017). Most of the learners in the distance education system in Bangladesh previously dropped out from their study due to many circumstances related science curriculum.

This study highlights that the parents of these learners (45%) forcefully admitted them into academic program. This forceful admission makes disinterest or push triviality to the learners. Besides, far distance of study center makes problems for the learners and pushed challenges for science education. Due to the far distance the learners did not attend tutorial classes and because of their less attending in tutorial classes makes lack of socialization among them (32%). As a result, distance learners feel lonely (Bušelić, 2012) and their socialization cycle subdued (Tayebnik & Puteh, 2011) and in long it makes challenge for science education. Harder subject in science group (67%) and harder subject matter (>70%) of those subject and insufficient tutorial class (>20%) pushed challenge for science education through ODL as significant difficulties in science work need classroom communication, particularly talk support the learner to understand scientific content (Ogborn et al., 1996; Mortimer & Scott, 2003; Erduran et al., 2004) and make interaction between teacher and students (Kaptan & Timerlenk, 2012). Sometimes this interaction is absent in open and distance learning system. For example, one way delivery from tutor does not work for majority of learners (Kaptan & Timerlenk, 2012) that often found in ODL system.

The tutor in open and distance learning is merely different from face-to-face teacher. However, the ODL tutors had to have many functions and skills in delivering education to the learners. For example, tutors roles vastly in ODL is cog-

nitive, affective, systemic (Tait, 2004) where Goodyear et al. (2001) mentioned the role of tutors as content facilitator, manager/administrator, process facilitator, technologist, designer, process facilitator, advisor/counsellor, assessor, and researcher (Cited in de Metz & Bezuidenhout, 2018). This study shows that many learners (>40%) reported that the tutors were not much efficient to teach as ODL tutors because there have lack of such type of roles among the tutors mentioned by Tait & Goodyear. This study also says that as the tutors could not play the roles so they did not make the tutorial session understandable and enjoyable to learners (67%) and due to this reason the learners did not attend tutorial sessions.

Large volume of study materials created challenge for the learners of science group (>77%). As the volume of study materials was large so the tutorials session was large as well. Due to large tutorial session the learners did not keep patient and sometimes they felt bore. Finn et al. (2003) said that class size greatly affects the learners' social, academic and personality issues whereas Miller-Whitehead (2003), on the other hand, small class size assists to raise teachers' spirit and manage class by decreasing discipline issues. Moreover, Bahanshal (2013) for example, mentioned that teaching large classes is a huge burden and the learners feel exhausted.

The language of the study materials for science subjects such as, physics, chemistry, biology and mathematics was hard and due to the harder language of the study materials was too tough to understand the subject matter. In case tutors were not teach through local dialect or language which made problem for the learners of ODL. However, learning in appropriate language conveying the competence of reading and writing (De Wet, 2007) and it has number of advantages (Mogashoa, 2014).

Although practical work develops communication skill of students to solve problem (Woolnough, 1994), helps to differentiate observation and presentation (Lawson, 1995) and plays significant function in science education (Hofstein & Lunetta, 1982; Hofstein & Mamlok-Naaman, 2007 cited in Shana & Abulibdeh 2020), but this study reveals insufficient practical work (63%), absence of practical class guide (64%), insufficient laboratory facility (55%) in the study center, tutors' disinterest in practical classes (40%), lack of video on practical work (70%), lack of practical handbook (40%) and insufficient practical exercise in the study materials (22.50%) pushed challenge for the ODL learners.

6. Conclusion and Recommendations

Bangladesh is a developing country. Sustainable development of a country depends on science and also depends on what extend a country based on science and technology. To reach the achievement goal of sustainable development, it is important to spread the science and technology based learning as well as science education in the each and every layer of the society. The learners of Bangladesh Open University are the important part of our society. If the learners are science oriented, the society will get skilled manpower. Because knowledge gained from

science make the learners more confident and more skilled. From the above discussion, it is observed that most of the learners of BOU are disinterested in science education. Also they have faced some problem with science curriculum. The study materials of science group both Secondary School Certificate (SSC) and Higher Secondary Certificate (HSC) program are difficult for the learners through ODL. The subject matter of the book like physics, chemistry, mathematics, biology is too hard and the syllabuses are vast for the learners. The learners are engaged with the different types of work or job in different areas. Even most of them cannot attend in the tutorial class. As a result they cannot understand the subject matter of these difficult and complex subjects by themselves. Also they cannot get any extra tutorial class for their better understanding.

The study recommended that:

- 1) To aware the people about science education through ODL;
- 2) To make easier of the harder subject;
- 3) To monitor practical classes;
- 4) To increase subject based practical classes; and
- 5) To make more video lecture on practical classes.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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