

Exploring the Barriers of Science Education Courses of Bachelor of Education Program at Bangladesh Open University

Sufia Begum¹ & Amirul Islam²

Abstract

Quality study materials are the key for Open and Distance Learning (ODL) educational activities that would help learners to achieve their learning outcomes. The present study is intended to identify limitations as well as innovative and good practices in particular areas such as study materials, curriculum, etc. of ODL module for the B.Ed. Program under BOU. The study was conducted through a survey among the tutors and students of science courses to collect data from primary source. Study result shows that there has been a gap between learners' learning outcome and study materials provided, the later appeared as 'not enough'. However, majority of the tutors and students think that there is enough scope for improvement of learning materials both in terms of quality and quantity. Enhanced use of digital contents as study materials can improve the quality of the module, and may contribute in using the acquired knowledge in practical and professional life. Findings of the study would surely enrich the quality of the program that ultimately helpful to attain Quality Education in Sustainable Development Goals (SDG).

Keywords: Science education, ODL, Quality (study) materials, Digital contents.

Background of the study

BOU is the only public university in Bangladesh that offers academic programs through open and distance learning (ODL) system. It is running under the auspices of 6 six academic schools, 53 formal and 19 non formal programs with a country-wide network through its 12 Regional Centers, 80 sub-regional centers and 1506 study centers (BOU Diary, 2019). The prime objective of this university is to transform the country's vast human resources into an educated and trained work-force by extending a wide range of academic programs through the distance learning (DL) mode. BOU's programs are aimed at everyone, particularly working people and woman and those socially disadvantaged groups who cannot enroll in traditional universities (Parvin, I. 2011).

The School of Education (SoE) of BOU offers the Bachelor of Education (B.Ed.) Program which is the oldest program of BOU designed for the would-be secondary teachers or untrained serving teachers. Teachers' Training Colleges (TTCs) serve as the tutorial centers for the B.Ed. Program, and the teachers of those colleges serve as the tutors. Trainees have to attend the tutorial classes once a week in the weekend. Students are studying professional and educational courses, and some school teaching subjects. 'Science Education' course is one of the school teaching subjects which is optional. Only science teachers are taking this subject or course. Most of students (i.e., science teachers) prefer BOU for their B.Ed. course, since they can easily do their study in a distance mode to achieve the degree without 'study leave' from their current job.

¹ Professor (Zoology), School of Education, Bangladesh Open University

² Associate Professor (Mathematics), School of Education, Bangladesh Open University

Significance of the Study

Quality learning materials could enhance learners' knowledge and help them to use their knowledge at the level of education or lifelong. Learners' enrollment at B.Ed. Program was started at the beginning of the University. The result of the present study would help BOU professionals and the students to understand strengths and weaknesses of science course to make the latter more effective contributing towards continued implementation of the Program. It is also hoped that insights gained through the present study might stimulate further studies in this regard.

Objectives of the Study

Study materials are the key concern of educational activities of a learner. Standard and quality study materials would help learners to achieve learning outcomes. This study was to identify information on innovative and good practices in ODL in BOU, in particular areas such as study materials and curriculum development. The specific objectives of the study were:

- To know the demographic status of the respondents;
- To explore science education course design and program development;
- To identify the quality of study materials for science education provided by BOU; and,
- To make recommendations for the improvement of course contents and science education program as a whole to the policy makers of BOU.

Literature Review

A number of studies and frameworks focus on an analysis strategy where the learning material or course is evaluated *as a text*, i.e., the object of study is the explicit and implicit descriptions of student behaviour and expected learning outcome. Baker (2003) has developed a framework for design and evaluation of Internet-based distance learning courses on the basis of Ralph Tyler's (1949) theory of curriculum development, Bloom's (1956) learning taxonomy and Blanchard and Johnson's (1984) SMART framework. Leacock and Nesbit (2007) have developed a very popular and well-described framework called *Learning Object Review Instrument* (LORI). By using LORI, evaluators can create reviews consisting of ratings and comments on nine dimensions: content quality, learning goal alignment, feedback and adaptation, motivation, presentation design, interaction usability, accessibility, reusability, and standards compliance. A primary goal of LORI is to balance assessment validity with efficiency of the evaluation process (Leacock & Nesbit 2007), and thus evaluation is not based on close reading or detailed analysis, but on the evaluator's overall impression of the learning object's dimensions of quality.

Another congenial framework is *Læremiddeltjek* (English: *learning material check out*), a systematic tool for assessing learning material through evaluation within six parameters: accessibility, progression, differentiation, facilitation, coherence and legitimacy. The framework is intended to be used by researcher as well as teachers to give a swift evaluation of learning material, qualified by a theory-based model which offers a functionalistic approach to learning materials as tools helping the user with solving specific problems related to learning and teaching (Hansen & Skovmand, 2011).

A third group of studies focus on evaluating learning material in concrete situations through ethnographic research, and, in some cases, such studies include test-based evaluation of the participants' learning outcome. Harley, Seals and Rosson (1998) studied a learning tool to support object-oriented design of computer programs through a problem-based approach. They used video to capture the students' collaboration and screen-capture to record the interactions with the computer. The analysis focused on the quality of the learning material through analysis of students' interaction with the system and the resulting success in problem solving. Further, the research group centered around Neil Mercer and Rupert Wegerif have developed a number of innovative computer programs based on the hypothesis that students improve their thinking skills by developing a few ground rules of dialog. The group has done a number of evaluation studies to support their hypothesis including discourse analysis of transcripts based on video recordings of students' collaboration, pre- and post-intervention reasoning tests etc. (Wegerif 2004; Wegerif & Mercer 2000). In Krauss and Ally (2005), the outcome of integrating the evaluation of learning objects in the design process is studied through a variety of methods from student and faculty ratings and survey questionnaires to think-aloud sessions. Nadelson, L.S. et al. (2018) constructed the dynamic model of conceptual change to provide science educators and researchers a holistic framework for exploring and accommodating changes in science instruction and learning. However, changes in technology and their multi-dimensional use in this regard have contributed much in improving science teaching-learning processes. Linn M.C. et al. (2016) emphasized technology as an important driver of science education. For science education, technologies helped evolve views of learning, instruction, teaching and assessment. Authors also give importance to establish design guidelines for curriculum materials that prepare students understanding science. Akhter, S. (2004) stated that a systematic evaluation of the course materials of any program is imperative to detect their deficiencies as well as explore the areas of improvement, while conducting a study on the course materials for M.Ed. Program of BOU. The author described 'print materials' as the primary mode of delivery of instruction in this program and stressed on the necessity to modify course materials with the changing demand which is particularly important for distance education. Maintaining quality of instructional materials is an essential matter for maintaining quality of any educational program. A number of underlying factors for the quality of self-instructional materials were described in reference to Mishra, Ahmed and Rai (2001), notable among which are: appropriate contents and its presentation to the learners which should be interesting; and the subject matter should be logically and gradually developed in simple language to motivate the students to complete their studies. The available literature including those reviewed here focus on many aspects of teaching-learning process and instructional materials in general, such as the overall framework, its intentions, use, and the learning outcome, etc. However, there are few available which exclusively provide a holistic view on evaluating learning materials from the viewpoint of teachers and learners. Indeed, present study intends to evaluate learning materials of the B.Ed. Program of BOU with such a holistic approach.

Research Design and Methodology

A review of available relevant study materials including books and journals as well as reports/publications was carried out for the purpose of this study. All data were collected from primary source through sampling with 2-sets of structured questionnaires for two B. Ed. program related groups:

- i) the Tutors, with a sampling size of 7; and,
 - ii) the students, with a sampling size of 103.
- Data collection: from 7 Study Centers (at the TTCs), namely- Chattogram, Sylhet, Rangpur, Rajshahi, Khulna, Barisal, Cumilla.
 - Data processing: IBM SPSS V.20 and MS Excel 2016 were used to process and analyze the data.

Limitations of the Study

The primary data source is one of the major limitations of the study. As there are few subject specific or science course teachers available in the Study Centers and not many science students (because of optional subject) were available for conducting survey to carry out the present study, the sample size remained low. However, it appeared to have a genuine source for primary data and information which served as the basis for this study. In addition, it is worthwhile to mention that the selection of Study Centers were also made on the importance and different geographical locations (7 centers in 7 Divisions) covering the whole country.

Findings and Analysis

1.1 Demographic Profile of the Respondents

The Tutors: Among the tutors (7 in number) the minimum age was 35 and maximum 60 years. On an average the age of the tutors was about 49 years. Out of them 57% were male and 43% were female. It was found that about 86% of the tutors have Master's degree and the rest 14% have got Bachelor (in Pass course) degree.

The Students: A total of 103 students were interviewed for the purpose of this study; out of them 61% were male and 39% were female. The qualification of maximum student's was Master's degree, while the age ranges from 27 to 49 years.

1.2 Views of the Tutors

Table 1.2.1: The following table shows responses of the tutors in relation to two questions, first- whether the content of science education is helpful to increase the knowledge of students; the answer was about 86% of the tutors found the content of science as 'Average Helpful' to increase knowledge of the learners; the rest 14.3% responded as 'Helpful', but there was no respondent who found the content of science as 'Not Helpful' (please see Table 1.2.1).

Table 1.2.1: Showing tutors' views on the content of science learning.

How much helpful the content of science to increase knowledge of learner?			Is the content of science learning updated?		
Response	Frequency (F)	Percent (%)	Response	F	%
Average Helpful	6	85.7	Backdated	1	14.3
Helpful	1	14.3	Average	3	42.9
Not Helpful	0	0	Updated	3	42.9
Total	7	100.0	Total	7	100.0

The second question was whether the content of science is updated or not; about 43% respondents opined that the content is 'updated', while another 43% have seen the content as an 'average'. However, 14% of the respondents thought the content of the science learning is 'backdated' (Table 1.2.1).

Table 1.2.2: The question relates to this table was whether the present learning-teaching strategy and the learning materials are 'enough' or not. It is evident from Table 1.2.2 that about 43% of the tutors think the present learning teaching strategy is 'not enough' and yet another 43% think it as 'average'; while only 14% of the respondents think the present learning teaching strategy is 'enough'.

Table 1.2.2: Tutors' views on learning materials and teaching strategy.

Do you think the present learning teaching strategy is enough?			Are the learning materials enough?		
Response	F	%	Response	F	%
Not enough	3	42.9	Not enough	4	57.1
Average	3	42.9	Average	2	28.6
Enough	1	14.3	Enough	1	14.3
Total	7	100.0	Total	7	100.0

The same table (Table 1.2.2) also shows us about the opinion of the respondents on learning materials. In case of learning materials, 57% of tutor respondents think those are 'not enough', and 29% think as 'average'; rest 14% only think learning materials as 'enough'.

Table 1.2.3: Responses for 3-questions were compiled in this table about the practical work, content of the course book and the facility to exercise in science learning.

Table 1.2.3: Tutors' views on practical work, content and exercise facility.

Is the practical work used satisfactorily in science learning?			Is it easy to understand the content of the course book to learners?			Is there enough facility to exercise in science learning?		
Response	F	%	Response	F	%	Response	F	%
Not Satisfactory	3	42.9	Hard to understand	1	14.3	Average	5	71.4
Average	4	57.1	Average easy to understand	2	28.6	Enough	2	28.6
Satisfactory	0	0	Very easy to understand	4	57.1	Not Enough	0	0
Total	7	100.0	Total	7	100.0	Total	7	100.0

As shown in the Table 1.2.3, no respondents were fully satisfied on practical work for the purpose of science learning. However, 57% of the respondents expressed their 'average' satisfaction, while 43% were 'not satisfied' about the practical work for science learning.

Most of the tutors (about 57%) opined that the content of the course book is 'very easy to understand by the learners. Whereas, around 29% of the respondents think it 'average easy to understand' and only few (about 14%) think that 'hard to understand' (Table 1.2.3).

Table 3.2.3 also shows us the views of respondent on the facilities to exercise in science learning. Only 29% respondents think that this is 'enough' while the rest (71%) considered the facilities as 'average'; no one responded as 'not enough'.

Table 1.2.4: Shows the findings from 3-questions which relate to the use of digital content in learning practices, rate of attendance in tutorial class and the use of earned knowledge in their practical life by the learners.

Table 1.2.4: Tutors' views on the use of digital content, attendance in tutorial class and the use of earned knowledge in practical life by the learners.

Do the learners use digital content in learning?			Is the rate of attendance in tutorial class in satisfactory?			Do the learners use the earned knowledge in their practical life?		
Response	F	%	Response	F	%	Response	F	%
No	4	57.1	Not Satisfactory	2	28.6	Can be used partly	7	100.0
Average	2	28.6	Average	4	57.1			
Yes	1	14.3	Satisfactory	1	14.3			
Total	7	100.0	Total	7	100.0			

Table 1.2.4 also shows the rate of attendance by the learners in tutorial classes, where only 14% tutors expressed their satisfaction. While 57% of the respondents think that the attendance is on an 'average' and rest 29% were totally dissatisfied regarding the attendance. Nevertheless, all the tutors (100%) think that the earned knowledge can partly be used by the learners in their practical life (Table 1.2.4).

Table 1.2.5: Responses from the tutors on the number of and timely attendance in tutorial classes by the learners, as well as providing advice, information and practical work to the students by the tutors were compiled in Table 1.2.5.

It reveals that around 43% of the tutors think the tutorial classes are not enough to complete the science course. On the other hand, rest 57% of the respondents equally (50-50) shared their views on the tutorial classes as 'average' and 'enough' to complete the science course.

Table 1.2.5: Tutors' views on number of and timely attendance in tutorial class, and providing advice, information and practical work in the class.

Are tutorial classes enough to complete science course?			Are the learners attend timely in tutorial class?			Do you provide advice, information and practical work in class?		
Response	F	%	Response	F	%	Response	F	%
Not enough	3	42.9	Average	6	85.7	Help some of the matter	2	28.6
Average	2	28.6	Yes	1	14.3	Help all matters	5	71.4
Enough	2	28.6	Total	7	100.0	Total	7	100.0
Total	7	100.0						

Timely presence in tutorial classes by the learners is essential in science learning; whereas Table 1.2.5 shows only 14% of the tutors think that students do so. Most of the respondents (about 86%) expressed an 'average' opinion on the issue of timely presence of the learners in their tutorial classes. It is also found that most of the tutors (around 71%) 'help in all matters' to the learners in providing advice, information and practical work in the class; while rest 29% tutors used to 'help in some of the matter'.

Table 1.2.6: Presents the views of tutors on the use of 'easy finding learning tools' and 'online' or Smartphone technologies for teaching, as well as on their thoughts whether the science teaching course is enough to make skilled teachers in science.

The findings show that 'easy finding learning tools' are generally used in the classroom to teach and most of the tutors (about 71%) 'sometimes' use them. While rest 29% of the tutors always use this tool for their teaching purpose (Table 1.2.6).

Table 1.2.6: Tutors' views on 'easy finding learning tools and Smartphones for teaching purpose, and whether science course is enough to make skilled teachers

Do you use easy finding learning tools to teach?			Do you think the science teaching course in enough to make skilled teacher in science?			Do you use online or Smartphone to increase learner's knowledge?		
Response	F	%	Response	F	%	Response	F	%
Sometimes	5	71.4	Not enough	1	14.3	Never	1	14.3
Always	2	28.6	Average	5	71.4	Sometimes	4	57.1
Total	7	100.0	Enough	1	14.3	Used	2	28.6
			Total	7	100.0	Total	7	100.0

The study was interested to know whether 'science teaching course' is enough to produce skilled teachers in science. Table 1.2.6 shows that only 14% of the respondent think it as 'enough' and another 14% as 'not enough'; while 72% tutors' opinion was on 'average'. Responses regarding the question on using 'online' or Smartphone for teaching purpose reveal that around 29% of the tutors use them to increase learners' knowledge; while 57% use 'sometimes' and 14% never use these technologies for their teaching purposes (Table 1.2.6).

Table 1.2.7: Questions regarding satisfaction over the existing process to evaluate science teaching and the language quality in science learning books were answered by the tutors, which are presented in the following table.

Table 1.2.7: Tutors' views on existing process to evaluate science teaching and language quality of science learning book.

Are you satisfied with the existing process to evaluate science teaching?			How is the language quality used in science learning book?		
Response	F	%	Response	F	%
Average	4	57.1	Easy to understand	4	57.1
Satisfactory	3	42.9	Very easy to understand	3	42.9
Total	7	100.0	Total	7	100.0

About 43% of the respondents expressed their satisfaction over the existing process to evaluate science teaching, while the rest 43% think the process as an 'average' (Table 1.2.7).

Language quality is very important for any book. Among the tutors, 57% of the respondents think that the language quality used in science learning book is 'easy to understand'; yet the other 43% think the language 'very easy to understand'. It does mean that no one among the tutors found the language quality 'hard to understand' in the science learning book.

1.3 Views of the Students

The report comprised of the responses from Students to various questions on science education course of B.Ed. Program relating to design, contents and study materials as it was for the Tutors during the present study. The findings were analyzed and compiled with following 9 tables (**Table 1.3.1 to Table 1.3.9**)

Table 1.3.1: Provides responses from the Students on 3-questions: i) whether the content of science learning is updated or not; ii) about presented information, and iii) the method and process of science teaching-learning.

Table 1.3.1: Students' view on the content, presented information and the method and process of science teaching and learning.

What do you think about the content of science learning: is it updated or not?			Is it possible to acquire the goals and objectives of science learning by presented information?			How much does the method and process contribute effectively to teach and learn science?		
Response	F	%	Response	F	%	Response	F	%
Backdated	5	4.9	Impossible	7	6.8	Ineffective	5	4.9
Average	39	37.9	Average	66	64.1	Average	57	55.3
Updated	59	57.3	Possible	30	29.1	Effective	41	39.8
Total	103	100.0	Total	103	100.0	Total	103	100.0

As seen in Table 1.3.1, about 57% of the students think that the content of science learning is 'updated'. While around 38% think it as 'average' and only 5% as 'backdated'. Responses on the 2nd question show only 29% of the students think that it is possible to acquire the goals and objectives of science learning by the presented

information, whereas majority (64%) expressed their views on ‘average’ and 7% respondents think that as ‘impossible’.

Table 1.3.2: The student asked about whether the facility to use learning materials and the opportunity to do participatory work are enough or not, as well as how much this course is helpful to acquire science knowledge. The answers are given in the following table.

Table 1.3.2: Students’ view on facility, participatory work and utility of the course to acquire science knowledge.

Do you think the facility to use learning materials is enough in science teaching?			How much is the opportunity to do participatory work in science learning?			How much helpful this course to acquire science knowledge?		
Response	F	%	Response	F	%	Response	F	%
Not enough	40	38.8	Not enough	19	18.4	Not helpful enough	9	8.7
Average	50	48.5	Average	53	51.5	Average helpful	52	50.5
Enough	13	12.6	Enough	31	30.1	Helpful Enough	42	40.8
Total	103	100.0	Total	103	100.0	Total	103	100.0

The above table shows that only 13% students considered the facility to use learning materials is enough in science teaching; in contrast 39% of them considered the facility as ‘not enough’. However, most of the respondents (48%) think that the facility is ‘average’. On the other hand, 30% students think that there is ‘enough’ opportunity to do participatory work in science learning, whereas 18% gave the opposite opinion; but most of the respondents (52%) think the opportunity as an ‘average’.

Table 1.3.3: Responses of the students on understanding the content of science textbook, and whether they used digital content in tutorial class as well as created any digital content in class teaching were compiled in this table.

Table 1.3.3: Students’ views on understanding science textbook and the use and creation of digital contents.

Do you understand the content by reading the science textbook?			Is digital content used in tutorial class to teach?			Do you create any digital content in class teaching?		
Response	F	%	Response	F	%	Response	F	%
Incomprehensible	17	16.5	Never	27	26.2	Never	19	18.4
Easy to understand	72	69.9	Sometimes	56	54.4	Sometimes	69	67.0
Very easy to understand	14	13.6	Yes	20	19.4	Always Prepared	15	14.6
Total	103	100.0	Total	103	100.0	Total	103	100.0

Most of the respondents (about 70%) considered the content ‘easy to understand’ by reading science textbook, while some (about 14%) thought that even ‘very easy’. Only around 16% respondents think the content as ‘incomprehensible’.

Out of 103 respondents, only 19% (i.e. 20 students) told that digital content is being used in tutorial classes for teaching, whereas 26% (i.e. 27 students) had said ‘never’. However, most of them (about 55%, i.e. 56 students) expressed the view that digital content has been used ‘sometimes’ in tutorial classes. It also appears from Table 3.3.3 that most of the students (67%) ‘sometimes’ create digital content; while 18% ‘never create’ and only 15% of them ‘always create’ digital contents in class teaching.

Table 1.3.4: Shows the students’ views on enough practical work in science teaching, enough exercise activity in every semester, and teaching by lesson plan in the classroom.

Only 26% respondents think that there is ‘enough’ practical work in science teaching, whereas 21% think that as ‘not enough. Most respondents (53%) considered the practical work in science teaching as an ‘average’. On the other hand, 46% of respondents think that there is enough exercise activity in every semester, in contrast to the answer of about 14% who considered that as ‘not enough’. The rest 40% of the students termed the exercise activity in each semester as an ‘average’ in their opinion (Table3.3.4).

Table 1.3.4: Students’ views on practical work, exercise activity and lesson plan.

Is it enough practical work in science teaching?			Is it enough exercise activity in every semester?			Do you teach by lesson plan in classroom?		
Response	F	%	Response	F	%	Response	F	%
Not enough	22	21.4	Not enough	14	13.6	Never	3	2.9
Average	54	52.4	Average	42	40.8	Sometimes	56	54.4
Enough	27	26.2	Enough	47	45.6	Always	44	42.7
Total	103	100.0	Total	103	100.0	Total	103	100.0

Table 1.3.4 also shows that about 43% of the respondents have ‘always’ taught by lesson plan in their classroom, when only 3% ‘never’ did that. But most of the respondents (54%) ‘sometimes’ teach by lesson plan in the classroom.

Table 1.3.5: This table compiles answers from the students to 3-questions, relating: i) use of the easy finding learning tools; ii) whether existing exercise facilities are enough to make skilled teacher, and iii) how much effective is the evaluation process in science teaching.

Table 1.3.5: Students' views on the use of 'easy finding learning tools', existing exercise facility and evaluation process of science teaching.

Do you use easy finding learning tools in classroom?			Do you think existing exercise facilities for teaching are enough to make skilled teacher?			How much effective is the evaluation process in science teaching?		
Response	F	%	Response	F	%	Response	F	%
Never	1	1.0	Not enough	11	10.7	Not enough	4	3.9
Sometimes	53	51.5	Average	55	53.4	Average	68	66.0
Always	49	47.6	Enough	37	35.9	Enough	31	30.1
Total	103	100.0	Total	103	100.0	Total	103	100.0

Answers for Q-i) show that about 48% respondents 'always' use easy finding learning tools in the classroom and about 51% use that 'sometimes'; while very few respondents (only 1%) 'never' used easy finding learning tools.

For Q-ii), 36% considered the existing exercise facilities for teaching are 'enough' to make skilled teachers, whereas most of the respondents (about 53%) think the facilities as 'average'. Only 11% respondents think that the existing exercise facilities are 'not enough' to produce skilled teacher. While answering the Q-iii), two-third (66%) of the respondents had 'average' opinion about the effectiveness of evaluation process in science teaching; whereas 30% think that as effective 'enough' and only 4% considered the process as 'not enough' (Table 1.3.5).

Table 1.3.6: This table shows compilation of responses from the students on 3-questions, viz.i) whether self-learning method and the reflecting process contribute effectively; ii) whether facility for co-curriculum activities is enough for science teaching, and iii) how is the language quality used in science learning book.

Table 1.3.6: Students' views on 'self-learning method', co-curriculum activities and language quality used in science learning book.

How much self-learning method and the reflecting process contribute effectively?			Is the facility for co-curriculum activities is enough for science teaching?			How is the language quality used in science learning book?		
Response	F	%	Response	F	%	Response	F	%
Ineffective	5	4.9	Not enough	22	21.4	Hard to understand	9	8.7
Average	52	50.5	Average	70	68.0	Easy to understand	55	53.4
Effective	46	44.7	Enough	11	10.7	Very easy to understand	39	37.9
Total	103	100.0	Total	103	100.0	Total	103	100.0

It is evident from the Table 3.3.6 that about 45% respondents considered self-learning method and the reflecting process as 'very effective'. On the other hand, only 5% respondents think it as 'ineffective', but the rest half (50%) of the respondents termed it as 'average'.

According to only 11% respondents, existing facilities for co-curriculum activities are ‘enough’ for science teaching; but most of the respondents (68%) think that as ‘average’, while 21% considered as ‘not enough’.

It is evident from the students’ views that only 9% of them found the language quality used in science learning book as ‘hard to understand’, but the rest 91% considered that as ‘easy’ (53%) or ‘very easy’ (38%) to understand (Table 3.3.6).

Table 1.3.7: Questions relating to Table 1.3.7 were, whether the i) textbook is enough to continue teaching activities; ii) the content is written for self-study; and, iii) the acquired knowledge can be usable in practical life or workplace. The responses are as follows:

Table 1.3.7: Students’ views on whether the textbook is enough and contents written for self-study, and acquired knowledge is usable in practical life or workplace.

Is the textbook enough to continue your teaching activities?			Is the content written for self-study?			Is acquired knowledge usable in practical life or workplace?		
Response	F	%	Response	F	%	Response	F	%
Not enough	15	14.6	Never	18	17.5	Unusable	5	4.9
Average	53	51.5	Sometimes	39	37.9	Average	30	29.1
Enough	35	34.0	Yes	46	44.7	Usable	68	66.0
Total	103	100.0	Total	103	100.0	Total	103	100.0

About one-third (34%) of the respondents got the opinion that textbook is ‘enough’ to continue for teaching activities, in contrast about 15% didn’t think so (i.e. ‘not enough’); while majority (51%) considered the textbook as on ‘average’ scale for this purpose.

While most of the students (about 45%) think the content is written for self-study, 17% of them did not agree to this opinion and 38% think that the content written is ‘sometimes’ useful for self-study. Two-third (66%) of the students thinks that the acquired knowledge is ‘usable’ in practical life or workplace, while only 5% says it ‘unusable’. The rest 29% of the respondents considered the use of acquired knowledge as ‘average’.

Table 1.3.8: Students were asked 3-questions, whether: i) they attend practical class regularly; ii) tutorial classes are enough to complete science course; and, iii) they get advice, information and practical work from their tutors. The answers were compiled in following table:

Table 1.3.8: Students' views on attendance in practical class and whether tutorial classes are enough and they get advice, information and practical work from tutors.

Do you attend practical class regularly?			Are tutorial classes enough to complete science course?			Do you get advice, information and practical work from your tutor?		
Response	F	%	Response	F	%	Response	F	%
Never attend	1	1.0	Not Enough	47	45.6	Never	2	1.9
Sometimes	36	35.0	Enough	49	47.6	Sometimes	28	27.2
Always attend	66	64.1	Excess	7	6.8	Yes	73	70.9
Total	103	100.0	Total	103	100.0	Total	103	100.0

It was found that majority of the students (64%) 'always attend' practical class regularly; only 1% of them found 'never attend' and 35% 'sometimes' attend practical class. Table-3.3.8 provides an interesting finding that almost similar percentages of respondents think tutorial classes as 'enough' (48%) and 'not enough' (46%); while a few (around 7%) even think the tutorial classes as 'excess' in their opinion.

More than two-third (about 71%) of the students got advice, information and practical work from their tutors. However, 27% think they got 'sometimes' and 2% students 'never' got those support from their tutors (Table 1.3.8).

Table 1.3.9: The last table of this Section presents responses of the students on two different questions: i) whether enough lessons from science are presented in BOU's TV programs, and ii) whether students use 'online' or Smartphones to learn more about science.

Table 1.3.9: Students' views on BOU's TV program and the use of 'online' or Smartphone in science learning.

In BOU's TV Programs, do enough lessons presented from science?			Do you use online or Smartphone to learn more about science?		
Response	F	%	Response	F	%
Never	12	11.7	Never	7	6.8
Something	52	50.5	Sometimes	45	43.7
Yes	39	37.9	Used	51	49.5
Total	103	100.0	Total	103	100.0

The result shows about 38% respondents opined that enough lessons are presented from science in the BOU's TV programs, while 12% did not agree on this opinion; but the rest 50% of the respondents have got the impression that 'something' has been presented from science. Regarding the use of online and Smartphone to learn more about science, almost half of the students answered 'yes', whereas 7% 'never' used; and about 44% students 'sometimes' use these technologies for learning more about science.

1.4 Comparison of Responses: Tutor vs Student

The Research report presents a comparison between the responses of Tutors and Students for 3 different questions regarding, i) Easy finding learning tools in the classroom; ii) Language quality used in science learning book; and, iii) Use of 'online' or Smartphone to learn more about science. The findings are presented in following three Figures:

Figure 1.4.1: Shows a comparison between Q14 for the Tutors and Q13 for the Students on the ‘use of easy finding learning tools’ in the classroom. Most of the tutors and students responded that either ‘sometimes’ or ‘always’ they use these tools; there is no significant difference seen among their responses.

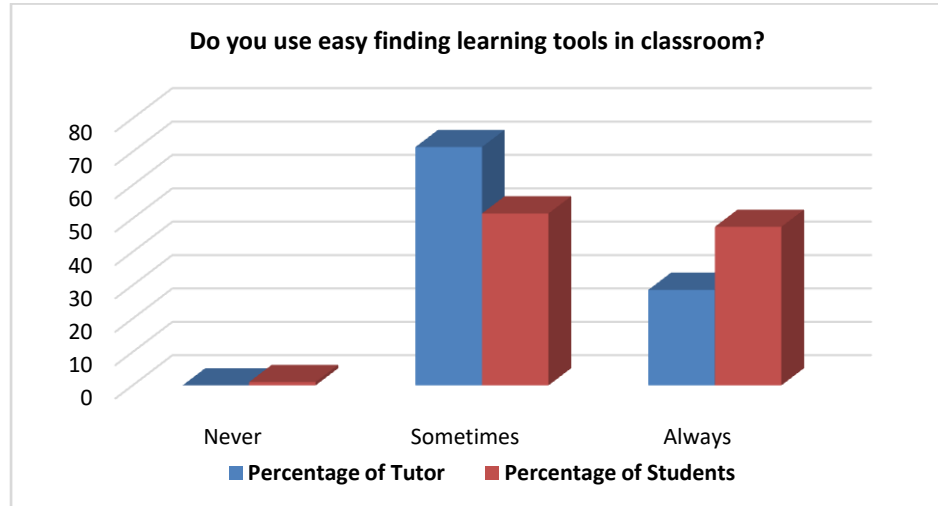


Figure-1.4.1: Showing difference of opinion between Tutors (for Q14) and Students (for Q13)

Figure 1.4.2: A comparison of responses for the same question (Q18- involving language quality) for both Tutors and the Students has shown in the following figure (Figure 1.4.2). It appears that responses were very close from both the groups to the question ‘how is the language quality used in science learning book’. They replied either ‘very easy’ or ‘easy’ to understand the language quality used in science learning book, almost with no significant difference in their opinion.

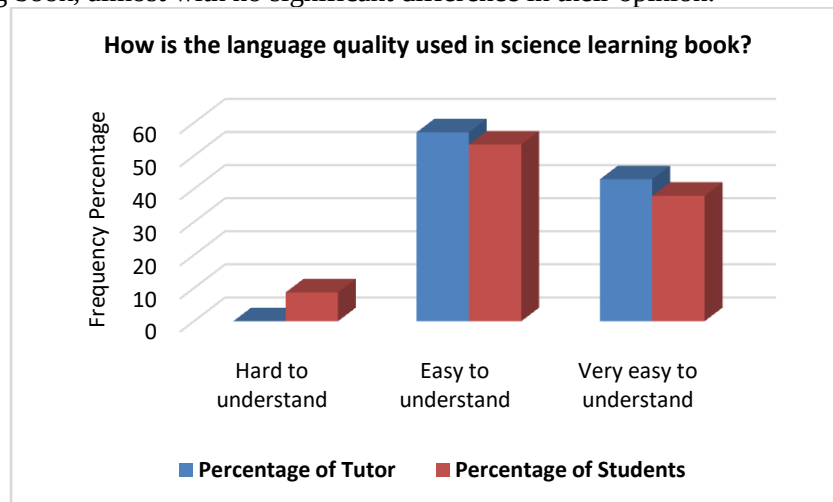


Figure 1.4.2: Showing difference of opinion between Tutors and Students for Q18.

Conclusion and Recommendations

Conclusion

Any distance learning program needs careful planning and implementation supported by quality study materials and associated learning facilities. The present study provided some insights to explore the constraint and elucidation of science education of BOU's B.Ed. Program. It has become evident that the study materials and facilities being provided for the science education are not enough to achieve learning objectives. Even in many cases tutors and students are not using the available learning tools properly for their learning purposes. Scope for improving course contents and enhancing the use of digital content has appeared one of the most prospective ways to make B.Ed. Program more effective and successful. It is essential, however, to put due importance on these issues by the policy makers of BOU, unless otherwise the science education would not achieve its desired goal.

Recommendations

On the basis of findings and discussion, present study concludes with the following recommendations:

- It appears that there has been enough scope for further improvement of course contents, specially through updating on a regular manner to accommodate contemporary changes. Therefore, more thrust should be given on improving and updating course contents rather than to concern about language issue, since people are found more or less comfortable with the later.
- The use of digital technology has become a reality of life now-a-days. Although it was found that a good number of tutors and students are using digital contents and Smartphones, yet enhanced use of quality digital contents and available technologies, specially creating digital contents by the students is highly recommended as a demand of time into the teaching-learning processes of ODL.
- The existing process and methods need to be reformed with new ideas and thoughts to improve the teaching-learning status. This should include sufficient advice, information and practical works for the learners, change of existing process to evaluate science teaching and effective contribution of self-learning method and the reflecting process, etc. from both sides (tutor and student) of the process.
- There is an obvious need for increasing the existing facility to use learning materials as well as increasing exercise activities in each semester for the on-going science course. This includes increased supply of learning materials for increased number of practical works and tutorials as well as more opportunity to do participatory work with increased facilities for co-curriculum activities.
- Regular and timely attendance in the tutorials is considered as one of the keys to make success in science learning. However, it was not found at a satisfactory level during the present study, particularly from the tutors' point of view. Therefore, it is recommended that more attention is needed to be given in this area of regular and timely attendance of the students in practical and tutorial classes for science learning.

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