

AN ANALYTICAL STUDY OF DIFFICULTIES IN TEACHING SCIENCE AT THE HIGH SCHOOL LEVEL

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Abstract

The main purpose of the study is to investigate the analytical study of the difficulties in teaching science at the high school level. By using simple random sampling method, (160) among (248) science teachers in (43) Basic Education High Schools and (11) Basic Education High Schools (Branch) in the Mandalay region were selected as the sample. To be obtained the difficulties in teaching science at the high school level, a questionnaire consists of (56) items and is rated on five-point Likert scale with seven dimensions. The data obtained were analyzed by using descriptive statistics and inferential statistics such as the independent samples *t*-test and one-way ANOVA. Findings showed that 71% of participants had difficulties in teaching science at the high school level because they may have less experience and expertise in science teaching and their schools have not enough school facilities and teaching aids. According to the research findings, science teachers in high schools (branch) faced in the difficulties with science teaching methods and science assessment more than those in high schools in types of school. Moreover, science teachers in (0-5 years) faced in difficulties of science teachers and difficulties with science textbooks more than those in (6-10 years) and (11 years and above) in terms of teaching science experience. Therefore, in order to teach physics with great joy and success, the physics teacher should establish and maintain a respectful, supportive and safe teaching environment that is emotionally and physically conducive to teaching. Thus, it was clearly seen that this research would be a valuable work that produces a remarkable improvement in teaching science at the high school level in Myanmar.

Keywords: Science, Difficulty in Teaching, Teaching Difficulty in Science

Introduction

Science is all around ones. It is everywhere in their daily lives – all day, every day. From an early age, people interact with their environment, asking questions and seeking answers. This question and answer process lies in the heart of knowing and doing science. Furthermore, science teachers can provide the basic concepts needed to enhance the development of human society in the country. That is why training programs are designed to improve the efficiency of teaching. Also, teachers must keep abreast of modern development in teaching techniques (Singh, 1990).

Background of the Study

Background theories in science are taken both as proof and as disproof that theory choice is underdetermined by data. The proof is often thought to threaten the possibility of responsible scientific theory choice. Properly understood, it shows that scientific inference is fallible and contextual. This is compatible with the disproof, which shows that no theory choice can be timeless or no contextually underdetermined. Philosophers had often replied to the disproof by focusing their attention on total sciences rather than theories. If empirically equivalent total sciences were at stake, then there would be no background against which they could be differentiated. Science is characterized by the systematic gathering of information through various forms of direct and indirect experimentation (Herr, 2018).

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Purposes of the Study

The main purpose of the study is to investigate the analytical study of difficulties in teaching science at the high school level. The objectives of the study are as follows:

- To investigate the difficulties faced by the teachers towards teaching science at the high school level.
- To explore the difficulties in teaching science at the high school level in types of school and in terms of teaching science experience.
- To give suggestions and recommendations to improve teaching science based on this study.

Research Questions

In accordance with the purposes of the study, the research questions are described as below.

1. What difficulties do teachers encounter in teaching science at the high school level?
2. Is there any difference in the difficulties of teachers in teaching science at the high school level types of school?
3. Is there any difference in the difficulties of teachers in teaching science at the high school level in terms of teaching science experience?

Definition of Key Terms

According to the title of an analytical study of difficulties in teaching science at the high school level, the definition of key terms describes as follows:

Science

Science is a methodical approach to studying the natural world (Niyungeko, 2020).

Difficulty in Teaching

Difficulty in Teaching is a situation where a teacher does not succeed and satisfy in teaching performance.

Teaching Difficulty in Science

Teaching Difficulty in Science is a situation where a teacher fails to grasp a concept or idea and to perform a teaching task in science.

Significance of the Study

Science focuses on the significance of chemistry to society by discussing a chemical product that has altered agriculture, food, health, medicine, transportation, electronics, technology, the household, environment, etc. And then, science focuses on the significance of physics to other fields of study by giving specific examples of how physics principles provide a richer understanding of music, computers, business, art, history, technology, sports, engineering, manufacturing, communications, economic, etc. Moreover, science focuses on the significance of biology to other fields of study by giving specific examples of botany, health, geology, biology, astronomy, literature, sports, etc. Science is very important in society. So, this is a heavy load on the science teachers to be difficult in their teaching (Herr, 2008). Of course, an emphasis of the study on investigating difficulties in teaching science would be useful for the teachers, students, curriculum developers, and educational researchers.

Review of Related Literature

Science is important subject and understanding of basic science concepts increases the content knowledge of the teachers and students. But for some teacher is facing difficulties to understand some science concepts. These concepts which are difficult to understand for the teachers show as follows:

Difficulties in Teaching Science

Teaching science in modern society shows a lack of efficiency, as well as the discrepancy between goals and the quantum and quality of students' knowledge. Teaching science in high schools in Myanmar is also inefficient. Then teaching is not oriented to content, whose adoption allows the student to cope in the same or similar situations, but the method of their application in an unfamiliar situation allows the student to solve the problem (Pedretti, 2005). These difficulties situations with teaching science at the high school level are as follows:

Difficulties of Science Teachers

Science teachers face various difficulties, which will surely affect their performance in their teachings. Teaching difficulties facing high school science teachers are the most problematic issues: science is a discipline that requires learners to employ a variety of methods of understanding and to translate from one to the other words, tables of numbers, graphs, equations, diagrams and maps (Abrar, 2017).

Difficulties with Science Students

The different ability levels of the students, levels of their understandings and teachers' workload, the want of modern teaching aids are the main difficulties for assessing the students. Therefore it is very difficult for teachers to give close observation to each and every student. It is difficult to involve students in group work as their ability varies and sometimes they are not interested to participate in the classroom.

Davis (2016) outlined that the ten of the most common classroom problems with the students when teaching science as production or investigation. They are as follows:

1. Students become overly dependent on the teacher.
2. Persistent use of thinking and problem solving.
3. Student is defiant, rowdy, or distracting of others.
4. Students "hijack lesson" _ the lesson does not go where you want it to.
5. Personalities clash.
6. Students are unclear what to do, or do the wrong thing.
7. Students are bored, inattentive, or unmotivated.
8. Strong student dominance.
9. Students are unprepared.
10. Tardiness.

Difficulties with Science Textbooks

Sometimes, the use of science textbooks in teaching at the high school level is to be difficult for students because of many contents, insufficient time by using effective methods and insufficient science teaching aids and the large size of the class. So, science textbooks will be difficult in teaching to science students as follows:

1. The content may not be at the right level.
2. The sequence of units is not appropriate in accordance with real work-related needs.
3. The activities, readings, visuals, etc., may be boring.
4. The timetable for completing the textbook or parts of it may be unrealistic.
5. The textbook does not take the students' background knowledge into account (Graves, 2000).

Difficulties with Teaching Aids

The role of pictures, models, pictorial magazines, projectors, tape-recorder, radio, film strips, computers and television cannot be minimized. Science teachers use a variety of teaching aids to make classroom activities interesting and interactive. A science teacher needs to be expert some equipment such as optimal teaching aids, or the audio-visuals that might increase the possibility of students to comprehend whatever that might be involved with to learn. Besides the textbook and associated workbooks, there are a wide variety of teaching aids available to the science teacher. One of the most commonly used teaching aids is the blackboard or whiteboard. Besides this, visual aids such as flashcards, postcards, and magazine photos are very useful (Kitao & Kitao, 1997).

Insufficient time of using resources and aids is one of the major problems in teaching and learning science. Without any sufficient aids, the students might feel difficulty in comprehending the given lesson. Teaching aids are needed a crucial component of working conditions. It is true that through classroom work, teachers tend to be satisfied to some extent. Some individuals, however, contend that such satisfaction appears to lack a background (Kitao & Kitao, 1997).

Difficulties with Science Teaching Methods

Teachers at high schools often face many difficulties in solving quantitative science tasks. The teachers face difficulties with teaching methods as follows:

1. in explaining the basic equations to be used in solving science problems,
2. in making summary notes on key topics and how to solve the science problems,
3. in performing laboratory-based problem solving with special reference to science,
4. in providing ample time and opportunity to solve the science problems during the process of teaching,
5. in giving enough homework and assignments from each topic,
6. in revising the key and fundamental topics in science skills, and
7. in providing organized tutorial on how to solve problems with easy way when a problem is to be solved (Mary, 2013).

Difficulties with Classroom Environment

Many high schools in Myanmar have no enough classrooms and teachers. The difficulties of large classes compounded by the shortage of teachers put a strain on the teachers' ability to provide quality science work to the learners because the teacher-learner ratio is not proportional.

Teachers face workload in the classroom. This has led to the difficulties of overcrowded classes and poor teaching performance since the teacher is overworked and provides students few question for easy marking. Both teachers and students identified large classes as a major difficulty to practice and assessment in science. Besides, the large number of students in the class and furniture setting also act as difficulties for assessing the students. Overcrowded classrooms prevent the teacher to deliver, to monitor teaching, mark and provide corrections at the right time. The class size accelerates to poor delivery of teachers, and failure of majority of students. The teacher becomes unable to assist each student when teaching in the classroom (Davis, 2016).

Difficulties with Science Assessment

Assessment is a term that refers to a thorough but constant appraisal, judgment and analysis of students' performance through meticulous collection of information. Evaluation is described as an overall but regular judgment and analysis of teaching, learning, as well as curriculum through systematic collection of data. In assessment, the focus is on specific point of language; but in evaluation, the emphasis is placed on overall aspects of science. Assessment looks at the individual science learners, but evaluation checks the whole science learning program. Assessment aims to inform the program evaluators of the results while evaluation seeks to report to the superior authorities. In assessment, success means how well students progressed and failure implies how poorly the teacher performed while success in evaluation indicates how effectively the program has been managed, failure is implicitly ascribed to the ineffectiveness of instruction (Hamidi, 2010).

Research Method

This study is an analytical study of the difficulties in teaching science at the high school level. It includes the population and sample size, research design, instrument and procedure.

Population and Sample Size

This study was conducted in Mandalay region. There are (43) Basic Education High Schools and (11) Basic Education Branch High Schools in Mandalay. All schools were taken to carry out this study. The sample was distributed to every Basic Education High School and every Basic Education High School (Branch). By using simple random sampling method, (160) science teachers among (248) science teachers who are teaching science (chemistry, physics and biology) were selected as the sample. Then the total numbers of the sample was (160) science teachers in Mandalay.

Research Design

This study was conducted by using survey method which is one of the descriptive research designs. Descriptive research involves collecting data in order to test the questions concerning the current status of the subject of the study (Gay, 1987).

Instrument

In this study, the major instrument used for data collection was a questionnaire. The survey questionnaire was used to investigate the difficulties in teaching science at the high school level.

This questionnaire was based on the questionnaire of Al- Qadomi (1996, cited in Razmjoo, & Mavaddat, 2016) and literatures of Mary (2013), Khatir (2015), Ertnosho (2013, cited in Zamani, & Ahangari, 2016). In the questionnaire, there are seven dimensions. Each dimension consists of eight items.

There are (56) items rated on five- point Likert- scale in the instrument. The questionnaires were delivered to five science teachers at each high school and three science teachers at each branch high school. The questionnaire was used five-point Likert- scale. The items were rated on five alternative options (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree and 5. Strongly Agree) for each item. But Strongly Disagree and Disagree responses were assigned as a Disagree group. Undecided responses were assigned as an Undecided group. And Agree and Strongly Agree responses were assigned as an Agree group. And then there were three groups (Disagree, Undecided, Agree). To obtain the qualitative data from the responses of the participants about the difficulties in teaching science (Chemistry, Physics, Biology) at the high school level, four open-ended questions was used.

Instrument Validity

After preparing the questionnaire, the copies of the questionnaire were distributed to the five experienced teachers in the field of education in Sagaing University of Education. And then, the experienced teachers were requested to advise the questionnaire. Their opinions regarding the suitability of each item for exploring the difficulties in teaching science (Chemistry, Physics and Biology) at the high school level was accepted. Finally, the items were modified according to the experienced teachers' suggestions.

Pilot Testing

After validating the questionnaire, a pilot survey was conducted with (22) high school science (Chemistry, Physics and Biology) teachers at No (27), (29), (32) and (39) Basic Education High Schools and No. (20), (24) (25) and (29) Basic Education Branch High Schools in Pyigyitagon Township in Mandalay. According to the findings of the pilot test, internal consistency reliability of the questionnaire was determined by Cronbach's alpha. The value of Cronbach's alpha was (0.952).

Procedure

Firstly, the related literature was collected from several books, dissertations, journals and internet (various websites). Secondly, in order to get the required data, the instrument was constructed concerning with the difficulties in teaching science of high school science teachers. Then, the validity was determined by five experienced teachers in the field of Education. After getting validation, a pilot test was taken with twenty- two high school science teachers from four Basic Education High Schools and four Basic Education Branch High Schools in Pyigyitagon Township. For the internal consistency reliability, Cronbach's alpha coefficient was used. After the pilot study, the major survey was conducted. Finally, the obtained data was collected, analyzed and presented. After collecting the required data, data analysis was carried out. The data was analyzed by using descriptive statistics and inferential statistics such as independent samples *t*- test and one-way ANOVA.

Findings

This section is concerned with the findings and interpretations based on the data taken from the study. Data acquired from the present study were analyzed by computing mean, standard deviation, the percentages of science teachers’ responses, the independent samples *t*-test and one-way ANOVA. Findings and results were investigated in the following section.

(1) Findings of the Teachers’ Responses towards Difficulties in Teaching Science at the High School Level

These all dimensions deal with the responses of science teachers towards difficulties in teaching science at the high school level. It consists of 56 items. The responses of teachers towards all dimensions were analyzed by descriptive statistics. The responses of teachers for all items in the study are presented in the following table (see Table 1).

Table 1 Responses of Teachers towards Difficulties in Teaching Science at the High School Level

No.	Dimension	N	No. of Frequency in all Dimensions		
			Disagree	Undecided	Agree
1	Difficulties of Science Teachers	160	69	7	84
2	Difficulties with Science Students	160	36	11	113
3	Difficulties with Science Textbooks	160	45	10	105
4	Difficulties with Teaching Aids	160	26	8	126
5	Difficulties with Teaching Methods	160	28	8	124
6	Difficulties with Classroom Environment	160	26	7	127
7	Difficulties with Science Assessment	160	31	10	119
Total/Average		160	37	9	114

Likert-scales in all items were assigned as three groups. The strongly disagree and disagree responses were assigned as a group of disagree, undecided responses were assigned as a group of undecided and strongly agree and agree responses were also assigned as a group of agree. And then, these three groups were shown by percentages.

The percentages of high school science teachers’ responses towards difficulties in teaching science were analyzed in Table 2.

Table 2 Percentages of Teachers’ Responses towards Difficulties in Teaching Science at the High School Level

Teachers’ responses	Frequency	Percentage (%)
Disagree	37	23
Undecided	9	6
Agree	114	71
Total	160	100

According to the findings, the responses of science teachers for (56) items on all dimensions are presented by pie chart (see Figure 1).

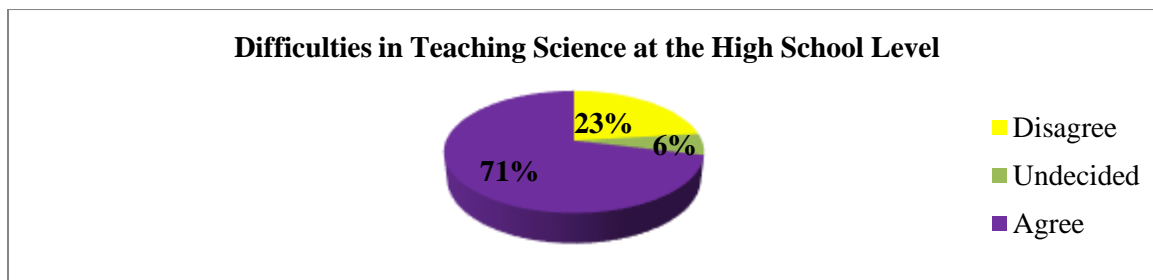


Figure 1. Percentages of teachers’ responses towards difficulties in teaching science at the high school level

Table 2 and Figure 1 showed the percentages of teachers’ responses towards difficulties in teaching science at the high school level. It means that (23 %) of science teachers marked on disagreed. So, (23%) of science teachers are not difficult in teaching science at the high school level. But (71%) of science teachers marked on agreed in teaching science at the high school level because they may have less experience and expertise in science and their schools have no enough school facilities and teaching aids. (6%) of science teachers are neither difficult nor easy because they marked on undecided.

(2) Findings for Descriptive Statistics of the Responses of Science Teachers towards Difficulties in Teaching Science at the High School Level

According to descriptive statistics of the responses, the results are as follows:

Table 3 Descriptive Statistics for the Responses of Science Teachers towards Difficulties in Teaching Science at the High School Level

Difficulties in Teaching Science	N	Minimum	Maximum	M	SD
Difficulties of Science Teachers	160	8	24	16.77	5.99
Difficulties with Science Students	160	8	24	19.89	4.46
Difficulties with Science Textbooks	160	8	24	19.01	4.94
Difficulties with Teaching Aids	160	8	24	21.00	4.52
Difficulties with Science Teaching Methods	160	8	24	20.81	3.99
Difficulties with Classroom Environment	160	8	24	21.03	3.99
Difficulties with Science Assessment	160	8	24	20.45	4.98
Total/Average	160	8	24	19.85	4.70

According to Table 3, “Mean ± 1 SD” was used to describe as high, moderate and low levels. In the Table (3), the average mean is (19.85) and average standard deviation is (4.70). If average mean is added to one standard deviation, the result is (24.55). If one standard deviation is subtracted from average mean, the result is (15.15). If the mean score is larger than (24.55), it is assigned as high difficulty. If the mean score is less than (15.15), it is assigned as low difficulty. But if it is between (24.55) and (15.15), it is assigned as moderate difficulty. According to Table 3, it means that science teachers face moderate difficulties concerning with difficulties of science teachers, difficulties with science students, difficulties with science textbooks, difficulties with teaching aids, difficulties with teaching methods, difficulties with classroom environment and difficulties with science assessment. The results can be clearly seen in the Figure 2.

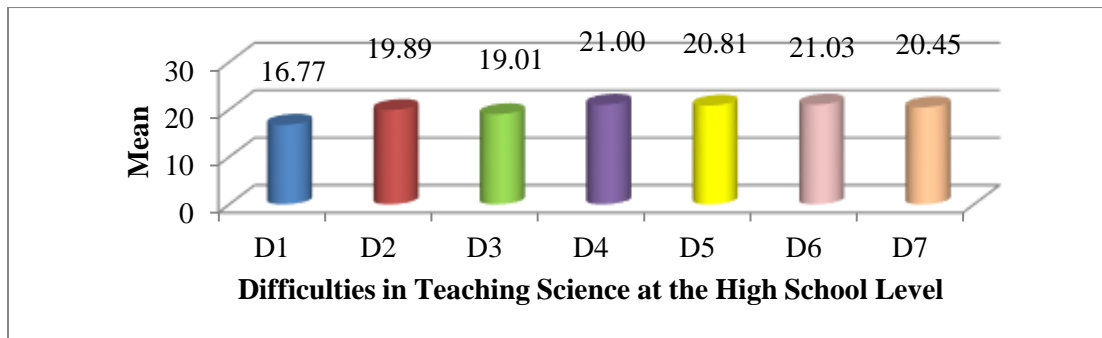


Figure 2. Difficulties in teaching science at the high school level

- Note.** D1 = Difficulties of Science Teachers
 D2 = Difficulties with Science Students
 D3 = Difficulties with Science Textbooks
 D4 = Difficulties with Teaching Aids
 D5 = Difficulties with Science Teaching Methods
 D6 = Difficulties with Classroom Environment
 D7 = Difficulties with Science Assessment

(3) Findings for Difficulties in Teaching Science at the High School Level in terms of types of School

According to the independent samples *t*- test, the results are as follows:

Table 4 The Results of t- test for Difficulties in Teaching Science at the High School Level in terms of types of School

Dimension	School	N	M	SD	t	df	Sig.
Difficulties of Science Teachers	BEHS	137	17.06	5.90	1.464	158	.145
	BEHS(B)	23	15.09	6.41			(ns)
Difficulties with Science Students	BEHS	137	19.76	4.63	-.888	158	.376
	BEHS(B)	23	20.65	3.30			(ns)
Difficulties with Science Textbooks	BEHS	137	18.85	4.93	-.952	158	.343
	BEHS(B)	23	19.91	4.98			(ns)
Difficulties with Teaching Aids	BEHS	137	20.90	4.59	-.696	158	.487
	BEHS(B)	23	21.61	4.12			(ns)
Difficulties with Science Teaching Methods	BEHS	137	20.59	4.12	-1.670	158	.040*
	BEHS(B)	23	22.09	2.92			
Difficulties with Classroom Environment	BEHS	137	20.85	4.13	-1.376	158	.083
	BEHS(B)	23	22.09	2.86			(ns)
Difficulties with Science Assessment	BEHS	137	20.17	5.07	-1.759	158	.049*
	BEHS(B)	23	22.13	4.12			

Note. **p*< .05 ns = not significant

According to Table 4, there were significant differences in the difficulties with teaching methods and science assessment in terms of types of school. The significant difference in the difficulties with teaching methods was at the (*p* = .040) level. And then, the significant difference in the difficulties with science assessment was at the (*p* = .049) level. So, science teachers in high schools (branch) faced difficulties with teaching methods and science assessment more than those

in high schools. But, high schools (branch) find a little difference concerning science teachers, science students, science textbooks, teaching aids and classroom environment than those of high schools. Therefore, there were no significant differences in the difficulties of science teachers, with science students, science textbooks, teaching aids and classroom environment. It can be interpreted that high schools (branch) were more difficult than those of high schools because basic education high schools (branch) may have insufficient.

(4) Findings for Difficulties in Teaching Science at the High School Level in terms of Teaching Science Experience

According to one-way ANOVA, the results are as follows:

Table 5 ANOVA Results of Difficulties in Teaching Science at the High School Level in terms of Teaching Science Experience

Dimension		SS	df	MS	F	Sig.
Difficulties of Science Teachers	Between Groups	221.654	2	110.827	3.165	.045*
	Within Groups	5498.246	157	35.021		
	Total	5719.9	159			
Difficulties with Science Students	Between Groups	41.117	2	20.559	1.034	.358 (ns)
	Within Groups	3122.858	157	19.891		
	Total	3163.975	159			
Difficulties with Science Textbooks	Between Groups	175.495	2	87.747	3.724	.026*
	Within Groups	3699.499	157	23.564		
	Total	3874.994	159			
Difficulties with Teaching Aids	Between Groups	2.829	2	1.414	0.068	.934 (ns)
	Within Groups	3249.171	157	20.695		
	Total	3252	159			
Difficulties with Science Teaching Methods	Between Groups	60.138	2	30.069	1.903	.153 (ns)
	Within Groups	2480.856	157	15.802		
	Total	2540.994	159			
Difficulties with Classroom Environment	Between Groups	34.358	2	17.179	1.082	.341 (ns)
	Within Groups	2492.486	157	15.876		
	Total	2526.844	159			
Difficulties with Science Assessment	Between Groups	63.803	2	31.901	1.290	.278 (ns)
	Within Groups	3883.797	157	24.738		
	Total	3947.6	159			
Overall	Between Groups	1557.067	2	778.533	1.270	.284 (ns)
	Within Groups	96213.63	157	612.826		
	Total	97770.69	159			

Note. * $p < .05$ ns = not significant

The results of Table 5 indicated that there were significant differences in the difficulties of science teachers and difficulties with science textbooks at the high school level in terms of teaching science experience. The significant difference in the difficulties of science teachers was

at the ($p = .045$) level. The significant difference in the difficulties with science textbooks was at the ($p = .026$) level. There were no significant differences in difficulties with science students, difficulties with teaching aids, difficulties with teaching methods, difficulties with the classroom environment and difficulties with science assessment. According to multiple comparisons of ANOVA, the results are presented in Table 6.

Table 6 Multiple Comparisons of ANOVA Results for Difficulties in Teaching Science at the High School Level in terms of Teaching Science Experience

Dimension	Experience		MD	Sig.
Difficulties of Science Teachers	0-5 years	6-10years	-2.038	.274 (ns)
		11 years and Above	-3.064*	.034*
	6-10years	0-5 years	2.038	.274 (ns)
		11 years and Above	-1.026	.610 (ns)
	11 years and Above	0-5 years	3.064*	.034*
		6-10years	1.026	.610 (ns)
Difficulties with Science Textbooks	0-5 years	6-10years	-2.694*	.037*
		11 years and Above	-2.455*	.040*
	6-10years	0-5 years	2.694*	.037*
		11 years and Above	.239	.961 (ns)
	11 years and Above	0-5 years	2.455*	.040*
		6-10years	-.239	.961 (ns)

Note. * $p < .05$ ns = not significant

According to Table 6, difficulties of science teachers and difficulties with science textbooks were significant differences in terms of teaching science experience. For teaching science experience if there was compared with (0-5 years) and (11 years and above), the significant difference was at the ($p = .034$) level in difficulties of science teachers. So, science teachers in (0-5 years) are more difficult than science teachers in (11 years and above). And then, if there was compared with (0-5 years) and (6-10 years), the significant difference was at the ($p = .037$) level in difficulties with science textbooks in terms of teaching science experience. Therefore, it was clearly seen that science teachers in teaching science experience (0-5 years) were more difficult than science teachers in (6-10 years). Moreover, if there was compared with (0-5 years) and (11 years and above), the significant difference was at the ($p = .04$) level in difficulties with science textbooks in terms of teaching science experience. It can be interpreted that science teachers in (0-5 years) were more difficult than science teachers in (6-10 years and 11 years and above) in terms of teaching science experience.

Findings on Open-ended Questions

To obtain relevant qualitative data for this study, open-ended questions were asked to high school teachers. According to four open-ended questions in the questionnaire,

- Science teachers are not sufficient in every high school and branch high school.
- Lab assistant teachers are not in every school.
- If specialized subjects are not appropriate, science teachers will be difficult in science teaching.
- To develop thinking and problem-solving skills, it is necessary to provide laboratory aids, video click, TV, computer and Over-head Projector
- Some teaching aids cannot get easier and some are expensive.
- Classrooms are overcrowded.

Summary of Findings

The results of research findings from (54) high schools were as follows:

- According to percentages, (23%) of science teachers are not difficult in teaching science at the high school level. But (71%) of science teachers in teaching science are difficult. Moreover, (6%) of science teachers are neither difficult nor easy.
- According to mean scores, science teachers face moderate difficulties concerning all dimensions in teaching science at the high school level.
- The results of *t*-test that there were significant differences in the difficulties with science methods and science assessment at the high school level in terms of types of school. It means that science teachers in high schools (branch) faced in difficulties with science methods and science assessment more than those in high schools in terms of types of school.
- There were significant differences in difficulties of science teachers and difficulties with science textbooks in terms of teaching science experience. It means that science teachers in (0-5 years) faced in the difficulties of science teachers and difficulties with science textbooks more than those in (6-10 years) and (11 years and above) in terms of teaching science experience.

Conclusion

This section is presented in three parts. The discussion of the research is presented in the first part. And the second part is suggestions and recommendations. Finally, the third part is the conclusion of the research.

Discussion

Nowadays, science has developed in globalization and scientific knowledge has increasingly become a universal demand. Besides, it is one of the compulsory subjects at the schools. Some teachers (little experience), the goals and method of teaching science and lack of students' interests and capabilities in science affect to be difficult in teaching science. Therefore, this study was conducted to investigate difficulties in teaching science at the high school level. The total number of (160) at (43) high schools and (11) branch high schools science teachers from six townships in Mandalay were conducted.

At first, according to the results of descriptive statistics, it was found that the highest percentage in the overall dimension was (71%) at an agree group, the second was (23%) at a

disagree group and the last was (6%) at an undecided group. It means that high school science teachers face difficulties in teaching science at the high school level. The finding of this study was consistent with the results of Razmjoo and Mavaddat (2016) which indicated that most secondary science teachers are not up-to-date, competent and experienced. The constraint of time to teach the lessons and lack of teaching materials make difficult for teachers to apply teaching methods in the class.

Moreover, the skills of students in English are very weak. So, science subjects written by English were coming to be afraid to students. Khatir (2015) said that most students in the class today are less interest in science learning, less their science background knowledge and they learn science for passing their exams rather than the pleasure of thinking and problem solving. Moreover, the skills of students in thinking and problem solving are very weak.

Continuously, according to the results of *t*-test, there were significant differences in the difficulties with teaching methods and difficulties with science assessment. Science teachers in branch high schools faced difficulties in teaching science more than those in high schools because most branch high schools are not sufficient such as aids, classrooms, teachers, etc. And insufficient facilities in the classroom and overcrowded classrooms are difficult for effective teaching. Mary (2013) stated that the essential school facilities such as instructional materials are in short supply. Therefore, these problems affect the effectiveness and efficiency of teachers' teaching performance in schools.

However, it may be more difficult in branch high school science teachers than the high school science teachers because they are novices and thus they have no experience with high school science textbooks and teaching methods. Amin and Rahimi (2018) in their study stated that novice science teachers experienced job-related challenges such as workplace stress, workload, time management, content, curriculum, textbook knowledge, teaching subject matter, students and instructional strategies.

Finally, according to one-way ANOVA, it was found that there were statistically significant differences in the difficulties of science teachers and difficulties with science textbooks. Kamau (2013) said that a less experienced teacher encounters a wide range of problems ranging from classroom management to knowing learners' need and identifying instructional strategies. Besides, they are less effective than those who were more experienced.

Suggestions and Recommendations

According to the results of the present study, most of science teachers face difficulties in teaching science at the high school. These difficulties make poor teaching performance for teachers. If the difficulties of high school science teachers can reduce, their performance will be good. Based on the results of the study, the following suggestions and recommendations were made:

- It needs to promote the students' interests and thinking skills.
- The classrooms should not be overcrowded and adequate teaching aids should be supplied for the schools.
- High school science teachers should be provided in-service training courses and teaching development programs in order to keep in touch with new teaching methods and strategies.
- High school science teachers should have an adequate working environment and condition, including the high technology, resources and facilities essential for effective teaching, in addition to real protection in terms of occupational health and safety.

- Moreover, Practical and experimental works and field study should be included in the assessment system if students want to improve thinking and problem solving skills. And students will be the most interesting on science.
- Further studies are needed to determine whether there is a similarity or a difference between chemistry, physics and biology teachers or textbooks.

This study consisted of only seven dimensions in difficulties of teaching science at the high school level. Further studies should be conducted with many other dimensions such as difficulties in professional development, difficulties with school administrators, difficulties with the curriculum, difficulties in the nature of work, etc. regarding difficulties in teaching science at the high school level.

Conclusion

Science is central in developing countries. An adequate understanding of the nature of science and scientific inquiry is the main instructional purpose of science education. Additionally, with a solid foundation in science, the students are able to appreciate the intrinsic beauty and quantitative nature of scientific phenomena and to develop an understanding of the practical applications of science to a wide variety of fields such as engineering, medicine, economics, production and other scientific and technological fields. This study will be an important source of information for science teachers. That is, it will provide valuable information for science teachers about how they can effectively teach science, how they deal with the students of the different abilities and how they facilitate the teaching difficulties of the science teachers. In the same way, through this study, science teachers can grasp at the teaching difficulties to generate the new brilliant generations and scientists. If science teachers face the difficulties in their teaching, it will make poor teaching performance and ineffective teaching process. Ignoring teachers' difficulties may have negative consequences. According to the findings, it can be concluded that science teachers in high schools (branch) are facing more difficulty in teaching than those in high schools. This study showed a way to recognize the difficulties of high school science teachers. It may also be helpful in solving the difficulties and problems that high school science teachers faced. Also, the results of the study may be a highlight for policymakers, administrators and teacher educators to reduce the obstacles of the high school science teachers' difficulties. Moreover, it is hoped that this study may provide a basis for further studies.

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