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Message from the editor-in-chief

Malaysian Online Journal of Educational Sciences (MOJES) strives to provide a national and international academic forum to meet the professional interests of individuals in various educational disciplines. It is a professional refereed journal in the interdisciplinary fields sponsored by the Faculty of Education, University of Malaya. This journal serves as a platform for presenting and discussing a wide range of topics in Educational Sciences. It is committed to providing access to quality researches ranging from original research, theoretical articles and concept papers in educational sciences.

In order to produce a high quality journal, extensive effort has been put into selecting valuable researches that contributed to the journal. I would like to take this opportunity to express my appreciation to the editorial board, reviewers and researchers for their valuable contributions to make this journal a reality.

Professor Datuk Dr. Sufean Hussin, University of Malaya, Malaysia

July 2017

Editor in chief

Message from the editor

Malaysian Online Journal of Educational Sciences (MOJES) seeks to serve as an academic platform to researchers from the vast domains of Educational Sciences. The journal is published electronically four times a year.

MOJES welcomes original and qualified researches on all aspects of Educational Sciences. Topics may include, but not limited to: pedagogy and educational sciences, adult education, education and curriculum, educational psychology, special education, sociology of education, Social Science Education, Art Education, Language Education, educational management, teacher education, distance education, interdisciplinary approaches, and scientific events.

Being the editor of this journal, it is a great pleasure to see the success of the journal. On behalf of the editorial team of the Malaysian Online Journal of Educational Science (MOJES), we would like to thank to all the authors and editors for their contribution to the development of this journal.

Assoc. Prof. Datin Dr. Sharifah Norul Akmar Syed Zamri & Assist. Prof. Dr. Onur İşbulan

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Table of Contents

CONCEPTIONS OF T HE NATURE OF BIOLOGY HELD BY SENIOR SECONDARY SCHOOL BIOLOGY TEACHERS IN ILORIN, KWARA STATE, NIGERIA	
Adegboye Motunrayo Catherine, Ganiyu Bello, Isaac O. Abimbola	
EXAMINING THE RELATIONSHIPS BETWEEN THE LEVEL OF SCHOOLS FOR BEING PROFESSIONAL LEARNING COMMUNITIES AND TEACHER PROFESSIONALISM	13
Ramazan Cansoy, Hanifi Parlar	
LEARNER DIVERSITY IN INCLUSIVE CLASSROOMS: THE INTERPLAY OF LANGUAGE OF INSTRUCTION, GENDER AND DISABILITY	28
Mwajabu K. Possi, Joseph Reginard Milinga	
PERCEPTIONS OF GENERATION Y UNDERGRADUATE STUDENTS ON CAREER CHOICES AND EMPLOYMENT LEADERSHIP: A STUDY ON PRIVATE HIGHER EDUCATION INSTITUTIONS IN SELANGOR	45
Clarence Anthony Puspanathan, Charles Ramendran SPR, Pragash Muthurajan, Ninderpal Singh Balwant Singh	
THE EXAMINATION OF THE ATTITUDES OF SECONDARY SCHOOL STUDENTS TOWARDS PHYSICAL EDUCATION COURSE	59
Özkan Keskin, Gülten Hergüner, Ahmet Dönmez, Milaim Berisha, Erkan Üçan	
TURKISH SCIENCE TEACHERS' ATTITUDES TOWARDS THE CONSTRUCTIVIST APPROACH	68
Ayşem Seda Önen, Canan Altundağ, F. Merve Mustafaoğlu	
UNDERSTANDING OF MACROSCOPIC, MICROSCOPIC AND SYMBOLIC REPRESENTATIONS AMONG FORM FOUR STUDENTS IN SOLVING STOICHIOMETRIC PROBLEMS	82
Kamariah Binti Sujak, Esther Gnanamalar Sarojini Daniel	

Conceptions of the Nature of Biology Held by Senior Secondary School Biology Teachers in Ilorin, Kwara State, Nigeria

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ABSTRACT

There is a sustained public outcry against the persistent abysmal performance of students in biology and other science subjects at the Senior School Certificate Examinations conducted by the West African Examinations Council (WAEC) and the National Examinations Council (NECO). Biology is a unique science discipline with peculiar philosophical principles and methodology that are not applicable to other science disciplines. Understanding the unique structure of knowledge, principles and methodology for providing explanations in biology is sine qua-non for effective and efficiency teaching of biology by teachers, and meaningful learning by the students. This study, therefore, investigated the conceptions of the nature of biology held by biology teachers in Ilorin, Nigeria. The study adopted the descriptive research design of the survey type. A questionnaire entitled "Biology Teachers' Conceptions of the Nature of Biology Questionnaire"(BTCNBQ) was designed by the researchers and used as the instrument for data collection. The population for the study comprised all the biology teachers in Ilorin, Nigeria. Simple random sampling technique was used to select two hundred and sixty (260) biology teachers from Ilorin, Nigeria. Results of the study revealed that each biology teacher held admixture of informed conceptions and misconceptions about the nature of biology. The results of the study also revealed that biology teachers' gender, qualifications and experience did not have a significant influence on the number of misconceptions and informed conceptions of the nature of biology they held. The findings imply that biology teachers often misrepresent biology concepts, principles, and theories in their explanations during class lessons, consequently, impeding meaningful learning by the students. Based on the findings, it was recommended that Biology educators and curriculum experts should introduce courses on the unique nature and philosophy of biology into teacher education programmes, to enhance teachers' pedagogical content knowledge (PCK).

Keywords: *Nature of Biology, Biology teachers, Science education, Misconceptions, Alternative conceptions, informed conceptions*

INTRODUCTION

The role of science education in the socio-economic development of any nation hardly needs any arguments. Bello and Abimbola (2015) rightly noted that 'the socio-economic development of a country cannot rise above its level of scientific and technological development; it is obvious that science education is a potent tool for the security of the country' (p.146). It is because of this realization that science

education has come to stay in school curricula in almost every country around the world. Science curricula in various countries of the world do not solely focus on developing the understanding of science concepts among students, but also on the understanding of the basic nature of science (American Association for the Advancement of Science (AAAS), 1990; National Research Council (NRC), 1996). Abd-EL-Khalick, Bell, and Lederman (1998) opined that the nature of science has to do with the theory of scientific knowledge. Lederman (2007) pointed out that the main attributes of the nature of science includes: scientific knowledge is empirically based, scientific knowledge is reliable and tentative, scientific knowledge is liable to change over time as new discoveries are made, scientific knowledge is a product of creative thinking; scientific knowledge is subjective and affected by the cultural milieu.

Biology is a unique branch of natural sciences, however, like other natural sciences; it is concerned with the search for in-depth understanding of natural phenomena and events. It is composed of two major fields, functional biology and historical biology, which is also, known as evolutionary biology. (Frilov, 1984; Mayr, 2004). The functional processes of biology deal with physiological processes in living things and it can be explained with the natural laws of physical sciences, especially at the cellular-molecular level. The most frequent question asked in functional biology field is how? In the field of historical biology, a sound knowledge of history is needed for the explanation of all aspects of the living world that have to do with the dimension of historical time. Experiments are sometimes inappropriate to provide answers to the why and how questions that are frequently and occasionally asked respectively in this field of biology. The historical narrative is the methodology used in this field of biology to provide explanations. The forgoing led to the rejection of cosmic teleology and vitalism as conceptual frameworks for explanations in biology. Indeed, there are certain principles of the physical sciences that are not applicable to biology. Such principles include Essentialism / Typology, Determinism, Reductionism, and many physical sciences laws. The aforementioned principles are now replaced with principles that are unique to living things only, which are not applicable to non-living things. For instance, the holistic thinking principles are the appropriate framework adopted in biology instead of reductionism, while Population thinking is the new framework that replaced typology principle. The Nigerian Secondary School Biology Curriculum partially reflected these features of the discipline. The forgoing discussions highlight the uniqueness of biology as a branch of natural science as explained by Mayr (2004).

Evidence abound in the literature that students and teachers held misconceptions and alternative conceptions on a wide range of biology concepts, and the nature of science (Bello, Bello, and Abimbola 2016; Modell, Michael, & Wenderoth, 2005; Palmquist & Finley, 2007). It is, therefore, logical to assume that teachers too hold a range of misconceptions as noted by Kikas (2004). Indeed, studies have shown that many teachers, including experienced biology teachers, teach while holding misconceptions about various biological concepts. In fact, research studies indicated that biology teachers hold many of the same misconceptions of biological concepts as their students (Chinsamy & Plagány, 2007; Nehm & Schonfeld, 2007). Researchers such as; Galvin, Mooney, Simmie and O'Grady, (2015); Yate and Marek (2013); Oyeyemi (2004); Boo (2005); have extensively conducted research works into teachers' misconceptions and alternative conceptions of the biology concepts, in particular. Yate and Marek (2013) studied the prevalence of biological evolution-related misconceptions held by introductory biology teachers, seventy six (76) biology teachers served as the sample for the study, the result of the study revealed that biological evolution related misconceptions were prevalent among biology teachers. Kurt, Ekici, Aksu, and Aktas (2013) investigated pre-service biology teachers' cognitive structures related to reproduction through the free word-association test and the drawing-writing technique. The findings of the study showed that pre-service biology teachers held misconceptions and alternative conceptions related to the concept of reproduction. A study conducted by Oyeyemi (2004) was carried out on the misconceptions and alternative conceptions of biology concepts held by biology teachers in Kwara State, the study showed that secondary school Biology teachers also held misconceptions and alternative conceptions on basic biology concepts. As Nehm and Schonfeld (2007) concluded, "one cannot automatically assume that biology teachers with extensive backgrounds in biology have an accurate working knowledge of the nature of biology" (p.52).

There are indications in biology education literature that learning biology by Nigerian secondary school biology students seems to be a struggle as reflected in their persistent abysmal performances at the Senior School Certificate Examinations conducted by WAEC and NECO. (Abimbola,

2013; Auwalu, Mohd, and Muhammad,2014; Sakiyo, and Badau, 2015; WAEC Chief Examiner report, 2013). It has also, been well documented in biology education literature that misconceptions and alternative conceptions are major barriers to learning of biology concepts by the students (Abimbola, 2015; Boo,2006; Olorundare,2014). Biology teachers' mastery of the unique nature of biology is essential in providing explanations of biology concepts and theories to students; eliminate students' misconceptions and alternative conceptions, and enhance meaningful learning by the students. It is thus, imperative to find out if biology teachers hold appropriate conceptions of the unique nature of biology in their cognitive structures as part of efforts to determine and improve their pedagogical content knowledge (PCK). In view of the foregoing, this study was aimed at investigating the misconceptions and informed conceptions of the nature of biology held by biology teachers in Ilorin, Nigeria. Misconception refers to an idea that is in conflict with biologic knowledge. While, informed conception refers to an idea which is in congruent with the accepted biologic knowledge.

Research Objectives

This study sought to examine the conceptions of the unique nature of biology held by biology teachers in Ilorin, Kwara State, Nigeria. It specifically sought to identify misconceptions and informed conceptions of the unique nature of biology held by the teachers. It also, sought to determine the influence of teachers' gender, years of teaching experience, and qualifications on their conceptions of the unique nature of biology.

Research Questions

The study was guided by the following research questions;

1. What are the conceptions of the nature of biology held by biology teachers?
2. Is there a gender difference in the number of informed conceptions and misconceptions of the nature of biology held by biology teachers?
3. Is there any difference in the number of informed conceptions and misconceptions of the nature of biology held by qualified and unqualified biology teachers?
4. Do the number of informed conceptions and misconceptions of the nature of biology held by experienced and less experienced biology teachers differ significantly?

Research Hypotheses

Based on the preceding research questions, it was hypothesized that;

1. HO_1: There is no significant difference in the number of informed conceptions and misconceptions of the nature of biology held by male and female biology teachers.
2. HO_2: Significant difference does not exist in the number of informed conceptions and misconceptions of the nature of biology held by qualified and unqualified biology teachers.
3. HO_3: There is no significant difference in the number of informed conceptions and misconceptions of the nature of biology held by experienced and less experienced biology teachers.

METHODOLOGY

The study was a descriptive research of the survey type. The population for this study was all biology teachers in senior secondary schools in Ilorin metropolis, Kwara State. Nigeria. The simple random sampling technique was used to select two hundred and sixty (260) biology teachers as the representative sample of the population. A research questionnaire entitled, "Biology Teachers' Conceptions of the Nature of Biology Questionnaire" (BTCNBQ) was designed by the researchers to gather data in this study. The researchers adapted some of the items in the questionnaire from the works of Mayr (2004) and Narguizan (2015). The questionnaire contained three sections, namely, A, B and C. Section A of the questionnaire was for demographic information while items in Section B sought for the biology teachers' conceptions of the nature of biology. It consisted of forty items that were based on the main tenets of the nature of biology. Twenty of the items reflect the appropriate conceptions of the nature of biology, while the other twenty items were on misconceptions of the nature of biology. Respondents were required to indicate the statements that are compatible with their conceptions of the nature of biology by ticking the statements. There were three open-ended items that required short responses in section C. The researchers used the test-retest procedures and Pearson Product Moment Correlation statistics to determine the reliability

coefficient of the questionnaire, which was found to be 0.72. The researchers employed the service of Research Assistants to administer the questionnaire.

RESULTS

Research Question 1: What are the conceptions of the nature of biology held by biology teachers?

Analyses of the data gathered in the study clearly indicated that each biology teacher held admixture of informed conceptions and misconceptions of the nature of biology. Tables 1 shows the list of informed conceptions and misconceptions of the nature of biology held by the biology teachers. Table1 equally indicated the number and the corresponding percentage of teachers that held each conception. Only 8 out of 20 (40%) informed conceptions were held by between 69.62% and 50% of the teachers, whereas, 15 out of 20 (75%) misconceptions were held by between 83.08% and 53% of the teachers. This finding implies that most of the misconceptions are widely held by the teachers, whereas most of the informed conceptions were held by few teachers. The finding also, revealed that misconceptions and informed conceptions of the nature of biology coexisted in the cognitive structure of the biology teachers. This finding is in congruent with the results of similar studies on the nature of science, such as Bello (In press), Gulcan and Alev (2013), Hamza (2014), Mir (2009), and Vazquez, Antonia, Antonia, & Antonio, (2011).

Table 1 Conception of the Nature of Biology Held by Senior Secondary School Biology Teachers in Ilorin, Kwara State, Nigeria

S/N	Informed Conceptions	Frequency	Percentage
1	**Observation is a key factor in the establishment of biological knowledge.**	**181**	**69.62%**
2	Biologists have observed that nature apparently follows the same rules throughout the universe.	150	57.69%
3	There are two forms of biology; functional biology, which asks proximate questions, and; evolutionary biology, which asks ultimate questions.	140	53.85%
4	Comparative method is essential in biological science.	138	53.08%
5	The history of biology has been dominated by the establishment of concepts and by their maturation, modification, and - occasionally - their rejection.	138	53.08%
6	Historical narratives are strongholds of biological concepts.	135	51.92%
7	Biology specific concepts are non-reducible to the concepts and theories of the physical sciences	131	50.38%
8	Biological knowledge is tentative and thus, subject to change.	130	50.00%
9	Theories fit within certain paradigms, hence, if these are old or untrue these are still helpful to biologists.	128	49.23%
10	Biologists often try to test or disprove possible explanations about living organisms.	126	48.46%
11	Biological knowledge is characterized by a large degree of order or organization in hierarchically organized complex systems.	123	47.31%
12	Theories in biology are not strictly formalized unlike other physical sciences.	122	46.92%
13	A biologist should be curious about both the known and the unknown	122	46.92%
14	Chance is a major factor in the field of biology	114	43.85
15	Universal laws are not relatively important in the field of biology.	108	41.54%
16	Biology as a field of study is a pure science.	108	41.54%

17	A biologist should be able to suspend judgment in order to give room for review of phenomena.	103	39.62%
18	Biology is a product of the 19th century scientific enterprise.	101	38.85%
19	Researches in biology are less guided by theories as in other physical sciences.	87	33.46%
20	Biological knowledge is cumulative; it increases with observations.	75	28.85%
	Misconceptions		
21	Researches in biology are entirely guided by theories, just as in other physical sciences.	216	83.08%
22	Biological laws can be proven to be absolutely correct.	213	81.92%
23	A good biologist should recognise the important role of folk ideas and mysterious beliefs in the biological enterprise; hence, make judgement based on those beliefs.	184	70.77%
24	After a failed experiment, a biologist is justified if he abandons such an experiment	174	66.92%
25	Biology can use supernatural explanations, if necessary. For instance, humans were created by gods.	168	64.62%
26	Reductionism which is a theory used in reducing facts to the simplest forms is applicable in biology.	163	62.69%
27	Knowledge of biology as a subject can be used to solve any problem or answer any question.	161	61.92%
28	All theories in biology are based on natural facts and laws	157	60.39%
29	Biologists sometimes entertain biases depending on the situation at hand.	152	58.46%
30	A good biologist is right to reject the opinions of others when he is absolutely sure of his methods	147	56.54%
31	Theories in biology are strict and rigid as in other sciences.	143	55.00%
32	Biological rules depend on the locality of its application.	143	55.00%
33	Biology as a field of study entirely relies on laws and theories to explain concepts.	142	54.62%
34	Biology as a field of study is as old as science itself.	141	54.23%
35	Prediction is a major part of biology hence, it is a standard of the goodness of a test in biology.	138	53.0%
36	The cumulative nature of biological knowledge is a weakness of biology as a science subject	124	47.69%
37	Biological knowledge is formed through scientific and non-scientific means.	120	46.15%
38	The historical nature of organisms may not be fully considered in understanding biological concepts.	118	45.38%
39	Biology as a subject can be influenced by the race, gender, nationality, or religion of the scientists.	113	43.46%
40	Disagreement between biologists is one of the weaknesses of biology as a science subject.	102	39.23%

Research Question 2: Is there a gender difference in the number of informed conceptions and misconceptions of the nature of biology held by biology teachers? In order to provide the answer to this question, a corresponding research null hypothesis was generated from the question. The hypothesis was tested using the chi-square statistical technique at 0.05 alpha level as indicated below.

HO_1: There is no significant difference in the number of informed conceptions and misconceptions of the nature of biology held by male and female biology teachers.

Table 2 showed that there was no significant difference in the number of informed conceptions and misconceptions of nature of biology held by male and female biology teachers (χ^2 (1, 260)= 2.295, p = 0.130). The null hypothesis was, therefore, not rejected because the p-value (0.130) is greater than 0.05.

This result suggests that gender does not influence the magnitude of misconceptions and informed conceptions of nature of biology held by the biology teachers. This finding seems to be consistent with that reported by Bello (In press), and Suleyman and Hasret (2010).

Table 2: Chi square Analysis of Significant Difference in the Number of Informed Conceptions and Misconceptions Held by Male and Female Biology Teachers.

Gender	χ^2	Df	Sig
Pearson Chi-Square	2.295	1	.130
Likelihood Ratio	2.274	1	.132
Linear-by-Linear Association	2.286	1	.131
No of Valid Cases	260		

Not Significant at 0.05 alpha level of significance

Research Question 3: Is there any difference in the numbers of misconceptions and informed conceptions of the nature of biology held by qualified and unqualified biology teachers? The second null hypothesis (HO_2) in this study was generated from this research question. The hypothesis was tested at 0.05 alpha level using the chi-square statistical tool.

HO_2: Significant difference does not exist in the number of misconceptions and informed conceptions of the nature of biology held by qualified and unqualified biology teachers.

As shown in Table 3, the result of the chi-square analysis revealed that there was no significant difference in the number of misconceptions and informed conceptions of the nature of biology held by qualified and unqualified biology teachers ($\chi^2(1, 260) = 1.733$, $p = .188$) hence, the hypothesis was not rejected. This finding tends to indicate that the teachers' qualification does not influence the number of informed conceptions and misconceptions about the nature of biology in their cognitive structures.

Table 3: Chi square Analysis of Significant Difference in the Number of Informed conceptions and Misconceptions Held by Qualified and Unqualified Biology Teachers.

Qualification	χ^2	Df	Sig
Pearson Chi-Square	1.733	1	.188
Likelihood Ratio	1.718	1	.240
Linear-by-Linear Association	1.726	1	.189
No of Valid Cases	260		

Research Question 4: Do the numbers of informed conceptions and misconceptions of the nature of biology held by experienced and less experienced biology teachers differ? The third research hypothesis was generated from this question and also, tested using the chi-square statistical tool at 0.05 alpha level.

HO_3: There is no significant difference in the number of informed conceptions and misconceptions of the nature of biology held by experienced and less experienced biology teachers.

Table 4 presents the result of the chi-square analysis which showed that there was no significant difference in the number of informed conceptions and misconceptions about the nature of biology held by experienced and less experienced biology teachers (χ^2 (1, 260) = .001, p= .978). Since the p-value of .978 is greater than 0.05, the hypothesis was not rejected. This result suggests that both the experienced and less experienced biology teachers held a similar number of informed conceptions and misconceptions about the nature of biology.

Table 4: Chi square Analysis of Significant Difference in the Number of Informed conceptions and Misconceptions held by Experienced and Less Experienced Biology Teachers.

Experience	χ^2	Df	Sig
Pearson Chi-Square	.001	1	.978
Likelihood Ratio	.001	1	.978
Linear-by-Linear Association	.001	1	.978
No of Valid Cases	260		

Summary of the Major Findings

- Biology teachers hold admixture of informed conceptions and misconceptions about the nature of biology in their cognitive structures.
- There is no significant difference in the number of informed conceptions and misconceptions of the nature of biology held by male and female biology teachers.
- A significant difference does not exist between the number of misconceptions and informed conceptions about the nature of biology held by qualified and unqualified biology teachers.
- The number of informed conceptions and misconceptions about the nature of biology held by the experienced and less experience biology teachers is not significant.

DISCUSSION

Existing literature in the field of biology education revealed that biology teachers held misconceptions and alternative conceptions on a wide range of biology concepts and the nature of science (Buaraphan, 2009; Sangsa-arda, Thathongb, & Chapooc, 2014; Galvin, Mooney, Simmie & O'Grady, 2015; Yate and Marek, 2013). Findings of this study provided additional empirical evidence which indicated that biology teachers lack adequate knowledge of the unique nature of biology as a science discipline. Specifically, findings of this study indicated that there exists an admixture of informed conceptions and misconceptions about the nature of biology in the biology teachers' cognitive structures. This implies that the biology teachers held distorted conceptions of the nature of biology. The pedagogical implications of this finding could be enormous. For instance, biology teachers may erroneously employ certain principles and laws in the field of physical sciences that are not applicable to biology as a conceptual framework for explanation in biology. Such principles include essentialism / typology, determinism, and reductionism. Similarly, biology teachers may also, use an intuitive cognitive construct like, cosmic teleology, anthropocentric thinking, and vitalism in their explanations of biological phenomena and concepts thereby, introducing or reinforcing intuitive biological thinking in their students. Consequently, meaningful learning of biology concepts by the students would be impeded. Understanding the nature and structure of knowledge in a discipline is a crucial element in determining appropriate instructional strategies and material by the teacher. It is arguable, that the existence of misconceptions about the nature of biology in the cognitive structures of the biology teachers, could significantly contribute to the lack of meaningful understanding of biology concepts among biology students.

Findings of this study also, revealed that the disciplinary content knowledge and by extension the quality of the biology teachers cannot be said to be satisfactory. This has brought to light the need for biology curriculum experts to critically re-examine what should constitute disciplinary content knowledge in the biology teacher education curricular. The disciplinary content knowledge components of biology teacher education curricular in Nigeria are restricted to selected biology concepts and theories. It is imperative to consider the inclusion of the historical and philosophical foundations of biology in the curricular. This is to equip biology teachers with a holistic perspective of biology as a unique science discipline and thereby, improve their PCK and quality. High quality teachers often produce good students as noted by biology education scholars (Akinfe, Olofinniyi, and Fashiku,2012; Ferguson,1992; and Wenglinsky, 1992). Hence, improving the quality of Nigerian secondary school biology teachers could stem the abysmal students' performance in the biology.

This study revealed that significant difference did not exist between the number of misconceptions about the nature of biology held by male and female biology teachers. This result is in accord with that of Bello (In press), but it is at variance with that of Omoifo (2004).The fact that male and female biology teachers are not taught differently in teacher education institutions in the nation is a plausible explanation for this finding. Misconceptions in science are closely associated with the intuitive cognitive construct, which is not peculiar to neither male nor female biology teachers hence; they are likely to hold similar numbers of misconceptions and informed conceptions of the nature of biology.

Findings from this study also, indicated that there was no significant difference between the numbers of misconceptions and informed conceptions of the nature of biology held by qualified and unqualified biology teachers. The finding is contrary to report from the study conducted by Monther, and Abeer, (2013), but it is similar to that of Vazquez, Antonia, Antonia, and Antonio, (2011). This may be due to the non-inclusion of the nature of biology as a mandatory course in biology teacher education programmes, which could enhance the qualified teachers' informed conceptions about the nature of biology. In addition, results of this study revealed that biology teachers' years of teaching experience had no influence on the number of misconceptions and informed conceptions about the nature of biology in their cognitive structures. This finding could be partially attributed to the fact that in Nigeria, it is not mandatory for experienced in-service biology teachers to regularly undertake professional development programmes.

CONCLUSION

The study has established that biology teachers held an admixture of misconceptions, and informed conceptions about the nature of biology. Also, it has established that biology teachers' gender, qualifications, and years of teaching experience does not influence the number of misconceptions and informed conceptions about the nature of biology in their cognitive structures. The study concluded that biology teachers lack adequate knowledge of the unique nature of biology, and call to question the quality of the teachers. The teachers' inadequate conceptions of the nature of biology are arguably an indication that the biology teachers partially accounted for the persistent abysmal performance of students in biology. It is obvious that teachers can only teach what they already know hence, students' performance in biology cannot rise above the quality of their teachers.

The conclusion reached in this study brought to light the need to appraise biology teacher education curricular in the nation with the view of improving the quality of biology teachers. The disciplinary content knowledge of the biology teacher education curricular in the nation is limited to biology concepts and theories that are directly related to the contents of the secondary school biology curriculum. This seems to be insufficient to provide biology teachers with in-depth knowledge of the unique nature of biology. Teachers' mastery of the unique nature of biology is a pre-requisite for distinguishing between the functional and historical aspects of biology, and the development of appropriate PCK by the teachers. In view of the relative dearth of studies on biology teachers' conceptions of the unique nature of biology, it becomes necessary for other researchers to investigate the relationship between teachers' conceptions of the nature of biology, their PCK and students' performance.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made to improve the teaching and learning of biology:

1. Biology teacher educators, biology teachers associations and proprietors of schools should provide an avenue for biology teachers to improve upon their disciplinary content knowledge through workshops and seminars.
2. Biology textbook authors should include the nature of biology in secondary school biology textbooks through regular reviews and update of their textbooks.
3. Biology teachers should regularly identify their students' misconceptions about the nature of biology and biological concepts and take appropriate instructional measures to remediate them.
4. Curriculum planners should include the nature of biology in the teacher education and secondary biology curricular so as to help biology teachers and students to develop an understanding of the unique nature of biology.

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Examining the Relationships Between the Level of Schools for Being Professional Learning Communities and Teacher Professionalism

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ABSTRACT

The objective of this study is to examine the relationships between the levels of schools for being professional learning communities and teacher professionalism based on teachers' perceptions. The participants were a total of 543 teachers working at elementary, middle and high schools in the Eyüp District of Istanbul. The data were gathered through the "Professional Learning Community Scale" and the "Teacher Professionalism Scale". The results showed that the teachers' perceptions on schools becoming professional learning communities and teacher professionalism were above moderate level. There were positive and significant correlations between all dimensions regarding the levels of schools for being professional learning communities, and teacher professionalism. Besides, the only significant and positive predictor of teacher professionalism was found to be the dimension "collective learning and applications" of professional learning community scale.

Keywords: *Teacher Professional Learning Communities, Teacher Professionalism, Teacher Professional Behaviours*

INTRODUCTION

Education is vitally important in every country's social and economic development, citizenship education, and competition with the world. As the borders across the world faint gradually, this competition and need for qualified individuals have reached to the highest level. Therefore, schools are required to re-design themselves to address this need. However, within this new design, teachers' bringing the change and improvement to the school depends on certain organisational and personal characteristics.

Changes in the social structure, increasing expectations from schools, effects of scientific and technological developments on education, emphasis on lifelong learning, and sharing of the educational outcomes by means of international tests have been significant issues for schools' activities of improving their qualities (Fitzpatrick, 1994; Gould, 2005; US Department of Education, [ED],1998). It can be stated that with these issues, the functions and qualities of schools also started to be questioned. In this regard, the enhancement of schools could be possible by improving student learning and the quality of education. Teachers' qualifications are thus a key determinant in achieving these objectives (Hildebrandt & Eom, 2011; Mattar, 2012; Rolff, 2008). In order to yield desired results for schools, teachers should enhance student learning, produce solutions for their different educational needs, and exhibit behaviours in accordance with the requirements of the teaching profession.

In recent years, student learning has bee in the centre of efforts for educational reforms (Hoy &

Miskel, 2010). For this reason, teachers' performing behaviours towards improving student learning is of great importance. These characteristics of teachers are related to their professional behaviours. According to Hargreaves (2000), professional behaviours refer to efforts for increasing the quality of activities and setting high standards in a profession. Professional teacher behaviours enhance the quality of instruction and student achievement (Barrett, 2008; Cohen & Hill, 2000; Guskey, 1986). On the other hand, teachers' professional behaviours reduce the differences among students who have socioeconomic disadvantages (OECD [Organisation for Economic Co-operation and Development], 2016). Furthermore, teachers' professional behaviours are positively related to the practices towards increasing the quality of education (Cohen & Hill, 2000), classroom management (Guskey, 1986), and student learning (Hoque, Alam & Abdullah, 2011; McDonald, Son, Hindman & Morrison, 2005; Poekert, 2012). The increasing drop-out rates, escalation of violent incidents in schools, declines in student achievement and students' lack of thinking skills have led to discussions about teachers' professional behaviours (Darling-Hammond, 1990). Accordingly, it can be argued that teachers' being experts in their profession is an important variable in making schools more effective, improving student learning and yield positive outcomes in the quality of education. Teachers' performing more professional behaviours can thus make the existing structure of schools more effective.

In the Turkish context, there are a number of studies that reveal a relationship between teacher professionalism, and school culture (Kılınç, 2014), burnout (Çelik, 2015), the bureaucratic structure of the school (Cerit, 2012), confidence in the school principal, teacher self-efficacy (Koşar, 2015) and school development. In this respect, one of the aspects that are thought to be related to teachers' professional behaviours is the activities of professional learning communities in schools. Professional behaviours require teachers to do their jobs as experts (Hargreaves, 2000). Learning communities, on the other hand, refer to teachers' supporting each other in enhancing the quality of education in a school culture that is open to learning and development (DuFour, R. DuFour, R., Eaker & Many, 2006). In professional learning communities, teachers describe themselves as a community for improving the school based on a culture of collaboration (Hargreaves & Dawe, 1990). Within these communities, teachers are expected to develop themselves and perform more professional behaviours. Besides, based on both research and theory, it can be hypothesised that teachers' professional behaviours are related to learning communities. Collaboration among the personnel and professional cooperation are influential on the development of professional behaviours (Tschannen-Moran Parish, DiPaolo 2006). Teachers' perceptions of professionalism increase in a school where individuals support each other (Webb et al., 2004). The dominance of a support-oriented culture including school administrators and colleagues contribute to teachers' professional behaviours (Kılınç, 2014). Teachers who participate in professional learning communities feel less lonely, help the school reach its goals, gain a sense of responsibility for students' development, and have an increased satisfaction and high spirits (Hord, 1997). As teachers support each other in terms of instructional experiences, it can be argued that the level of sharing experiences and practice-based activities would increase, and in this way, they would perform professional behaviours at higher levels. Accordingly, it is of significance to examine the characteristics of professional learning communities that would ensure the development of professional behaviours in teachers.

In the Turkish context, studies on teachers' professional behaviours are quite new and limited in the literature (Cerit, 2012; Çelik, 2015; Kılınç, 2014; Koşar, 2015). Besides, investigating the relationship of this concept with different variables is expected to contribute to professional development. This gap in the Turkish context is a justification for conducting the present study. On the other hand, it is stated in the literature that studies on professional learning communities are mostly theoretical in scope, and it is of significance to reveal the relationships of this concept with other variables (Öğdem, 2015). Therefore, there is a need for different empirical studies related to professional learning communities in schools. In addition, results of this study can extend the literature by contributing to the accumulation of knowledge towards researchers and practitioners. Revealing the characteristics of professional learning communities that influence teachers' professional behaviours is expected to provide practitioners and policy makers certain findings related to the development of professionalism.

Teacher professionalism

Profession, professionalisation and teacher professionalism

In a profession, individuals do their job by using their training and experience, practise it in the best way with the least mistake, and prove this to other people. As for professionalisation, it is about gaining professional competence and characteristics (Gökçora, 2005). Professionalism emphasises the expert knowledge, autonomy and responsibility that direct the practitioners of a profession (Bayhan, 2011), and the behaviours towards increasing the quality of the service provided (Cerit, 2012). In this regard, it can be stated that the concepts of professionalisation and professionalism are related to each other. Gaining competence in the profession enables practitioners to take more initiatives, and thus, contributes to professionalism.

Studies on professionalism are new to the educational literature. Professionalism is a concept that is associated with a profession and professionalisation, and is still a matter of discussion (Raymond, 2006). The present study focused on teachers' professional behaviours in the field of education. Professionalism refers to implementing higher quality applications towards improving practice (Hargreaves, 2000), commitment to working with high standards (Agezo, 2009) and work with a researcher's rationale (Kincheloe, 2004). Teacher professionalism is related to teachers' commitment in their work, collaboration with colleagues, respecting and helping each other, job involvement and behaviours towards enhancing the quality of instruction (Tschannen-Moran, Parish & DiPaola, 2006). When teachers synthesise their knowledge, skills and experiences with practice and personal qualities, professional behaviours are exhibited (Gil'meeva, 1999). In education, professionalism is closely related to both teacher qualifications and how the society perceives the teaching profession (Demirkasımoğlu, 2010). Professionalism emphasises teachers' in- and out-of-class practices, and new applications to address high expectations related to students. Besides, teacher professionalism makes reference to the efforts for improving teachers' qualifications and expertise.

For Hargreaves (2000), teacher professionalism went through four different periods. These periods were pre-professionalism in which teaching was seen as a simple and technical profession, professional autonomy in which autonomy was highlighted and how instruction should done was questioned, collective working in which the professional learning culture that brought collaboration in schools emerged, and post-professionalism in which the school and the teaching profession were questioned and redefined.

Characteristics of teacher professionalism

Teacher professionalism has been discussed with reference to different contexts and approaches. According to Evans (2011), teacher professionalism consists of a competency dimension that improves learning, a dimension of attitudes towards the teaching profession, and a mental dimension that includes competence, producing new ideas, and making evaluations on how to teach. For Lai and Lo (2007), professional knowledge on teaching and learning strategies, responsibility and authority that represent teachers' duties and responsibilities, and teacher autonomy that is related to teachers' originality and taking initiatives in their profession are among the explicit dimensions of teacher professional behaviours. On the other hand, Rizvi and Elliot (2005) regarded professionalism in the context of teachers' competencies, applications, collaboration and leadership. Therefore, it is seen that teacher professionalism is of importance in taking responsibilities towards student learning (Timperley, 2008). In a comprehensive report on teacher professionalism by OECD (2016), it is addressed with the dimensions of autonomy, collaboration with colleagues and professional knowledge. Based on the studies cited above, it can be stated that teacher professional behaviours emphasise taking initiatives about instruction, being authorised, and taking responsibility for student learning as the technical essence of the school.

The characteristics examined in empirical studies on revealing teacher professional behaviours have common or different aspects. These characteristics include constant development through professional

collaboration and in-service trainings, in-class observation and assessment of students (Hoque, Alam & Abdullah, 2011), teachers' efforts in developing themselves (Murphy & Calway, 2008), increasing professional knowledge, contributing to the institution, and emotional labour (Yılmaz & Altınkurt, 2014). In addition, constant-learning-oriented expertise, autonomy that refers to individuals' commitment to their job, and responsibility that aims for the necessary technical skills are also addressed (Bayhan, 2011). In these studies, common behaviours of professionalism include teachers' professional development, efforts for improving expertise, and activities towards better practice in the profession.

Schools as professional learning communities

Professional learning and professional learning communities

Professional learning is individuals' accumulation of knowledge, skills and experience in their profession. In this process, teachers question themselves constantly, and think about what and how students learn (Timperley, Wilson, Barrar & Fung, 2007). As for professional learning communities, they are formed by combining the concepts of professional learning and community. The focus of professional learning communities at schools is on professional expertise, student learning and student needs (Morrisey, 2000).These communities are discussed with reference to change, school development, learning organisations, effective schools and innovations (Mullen, 2009). They initiate as teachers guide others with their experiences, and continue as they influence each other (DuFour, 2003). At the same time, while these communities feature collaboration among teachers, they also emphasise colleagues' supporting and improving each other to make the school more effective and conduct activities towards enhancing student learning and achievement (DuFour, 2003; Hord, 1997). Professional learning communities can be described as work groups that focus on developing teachers' capacity, knowledge, skills and experiences, and support efforts for student learning.

Professional learning communities have an important place in ensuring school effectiveness. They are related to creating a learning capacity in organisations (Hord, 1997). Professional learning communities enable the school staff to have a detailed look at the instructional process and focus on the practices that can be more effective for student achievement (Morrissey, 2000), whereas attribute great importance to address problems (Darling-Hammond & Sykes, 1999), and teachers work together to achieve what they cannot achieve alone (DuFour & Eaker, 1998). Members of these communities create a vision to help all students learn, and monitor and intervene in monitor student learning (DuFour, R. DuFour, R., Eaker & Many, 2006). Accordingly, it can be stated that professional learning communities are structures that aim for constant professional development in a collaborative environment by putting student learning and achievement in the centre.

Functions and dimensions of professional learning communities, and duties of teachers and administrators

Functionality of professional learning communities in schools is achieved with different elements. Professional learning communities have an important organisational function in teachers' development of skills and knowledge regarding instructional and educational processes. These communities at schools are related to improving and evaluating instruction, and colleagues' learning different practices from each other (Mangrum, 2004). Teachers' improving their instructional activities, generalising good practices and taking responsibility ensure the functionality of professional learning communities (Hiebert & Morris, 2012). By sharing knowledge and skills, and having professional development through professional learning communities at schools, the professional development of teachers who are not competent at the professional level are enabled, and by improving schools, school capacities are enhanced (Wang, Wang, Li & Li, 2017). Professional learning communities enable the sharing of practical applications among teachers

who have different levels of experience and knowledge, and indirectly affect school development. Teachers within a professional learning community can make learning constant with a set of activities. In professional learning communities, teachers' classroom observations, preparing common lesson plans and guiding new colleagues are among the important activities (Wang et al., 2017). In addition, student achievement is monitored across the school and measures are taken (Johnson, 2012). In other words, it can be stated that professional learning communities are in the centre of the activities towards ensuring the sharing of any type of experiences, and gathered teachers around a common vision.

The effectiveness of professional learning communities at schools can be addressed in different dimensions. In this regard, the models proposed by Hord (1997, 2004) and DuFour, DuFour and Eaker (2008) present conceptual frameworks in the literature There is a five-dimensional framework developed by Hord (1997, 2004) for organisations to be structured as effective professional learning communities. In an effective professional learning community, this framework includes the following: (a) shared beliefs, values and vision, (b) shared and supportive leadership, (c) collective learning and leadership, (d) supportive conditions, (e) shared personal practice. On the other hand, DuFour, DuFour and Eaker (2008) proposes a different model for professional learning communities. This model contains (a) having shared objectives, vision and values towards student achievement, (b) creative a learning-oriented collaborative culture, (c) collective openness to the best practices related to teaching and learning, (d) action learning: learning by doing, (e) commitment to constant improvement, (f) making evaluations based on concrete results. The common aspects of these two frameworks are features of professional learning communities such as teachers' planning, applying and evaluating any type of work towards student learning, and collaborating, assessing results and taking measures to improve the profession.

The conceptual framework adopted in the present study was a synthesis of the frameworks proposed by Hord (1997, 2004) and DuFour, DuFour and Eaker (2008) The dimensions of this synthesis were shared and supportive leadership, shared values and vision, collective learning and application, supportive conditions, and shared personal practice. These dimensions and their properties are as follows (DuFour & Eaker, 1998; Hord, 1997; Morrisey, 2000; Olivier, Hipp & Huffman, 2003; Öğdem, 2015): (a) *Shared and supportive leadership* is about ensuring the participation in decisions by sharing responsibility and power related to policy and practices. The school leader prepares the environment for collaboration and shared the leadership at school. (b) *Shared values and vision* focus on student learning. Teaching and learning processes are emphasised. (c) *Supportive conditions* enable professional learning communities to come together, and create a culture and climate for learning. (d) There are *supportive conditions related to the structure*. Elements such as sufficiency of resources, time capability and school size constitute this structure. (e) The dimension *supportive conditions related to relationships* refer to confidence, respect and positive relationships among community members. (f) *Collective learning and applications* represent specifying methods towards meeting different learning needs and sharing instructional applications. Teachers become more competent. They set high standards in all areas and find productive solutions to problems through professional relationships. The relationships between teachers and administrators get strengthened efforts towards improving schools increase.

In order for schools to be structured as professional learning communities, a set of duties fall to school administrators and teachers. Towards collective learning and practice inn schools as professional learning communities, teachers should be a source provider, an educational expert, an instructional expert, an instructional facilitator and a coach, and take the responsibility of the school leadership, follow students based on data, be a catalyst for change and a good learner (Harrison & Killon, 2007). They should also organise events in schools, determine shared vision and values, adopt the school vision, apply the determined vision to the school conditions, follow short- and long-term goals, and conduct studies as researchers (Cormier & Olivier, 2009). A healthy school culture, collaboration and professional development in schools can enable teachers to focus on student achievement (Cohen & Brown, 2013). In schools that are structured as professional learning communities, the role, responsibility and duty of school administrators can be described as leadership, empowerment, cooperation and communication (Öğdem, 2015). Besides, with regard to professional learning communities, school administrators should focus on student and teacher learning, create a culture of collaboration and development, monitor and evaluate

results, and ensure cooperation among teachers to improve student learning (Eaker, DuFour & DuFour, 2002; Hord & Sommers, 2008). It can thus be argued that organisational and personal variables related to administrators and teachers should be carefully studied to be able to form professional learning communities. In this respect, administrators should create environments that would encourage collaboration and in which they can share their leadership. Teachers, on the other hand, should protect and adopt the vision towards enhancing student learning at school. When these conditions are met, schools can be professional learning communities.

In terms of the school outcomes, learning communities can be thought to be related to teachers' professional behaviours. Professional learning communities enhance motivation in teachers and equip them with different skills. At the same time, a positive learning environment emerges with a positive learning climate and a support-based understanding (Stoll, Bolam, McMahon, Wallace, Thomas, 2006). A change begins within the organisation due to colleagues' improving each other at school (Johnson, 2012). Therefore, competences related to teaching improve, and an increase is achieved in student achievement (Jackson & Bruegmann, 2009). At this point, teachers would take more responsibilities towards student learning. In this case, they could start performing more professional behaviours.

Considering the arguments above, it is thought that there may be a relationship between teacher professionalism and the levels of schools for being professional learning communities. Therefore, in this study, the relationships between the levels of schools for being professional learning communities, and teacher professionalism were examined. The following research questions were addressed based on this aim:

1. What are the levels of schools for being professional learning communities, and the levels of teacher professionalism based on teachers' perceptions?

2. Is there a significant relationship between the levels of schools for being professional learning communities, and teacher professionalism based on teachers' perceptions?

3. Are the levels of schools for being professional learning communities a significant predictor of teacher professionalism based on teachers' perceptions?

the conversion can be either way.

METHOD

Research Design

In this study designed in correlational model, teacher professionalism was the dependent variables, whereas the sub-dimensions of schools being professional learning communities including shared and supportive leadership, shared values and vision, collective learning and applications, shared personal practice, supportive conditions related to structure, and supportive conditions related to relationships were the independent variables.

Participants

The participants of the study were teachers working in the Eyüp district of Istanbul during the 2016-2017 school year. A total of 543 teachers who were in this district and could be reached participated in the study. Due to certain limitations in terms of time, money and workforce, the sample was selected from units that were convenient and suitable for the research procedure. Among these participants, 344 were female (63%), and 199 were male (37%). Elementary, teachers at middle and high school located in the Eyüp district participated in the study. The age average of the participants was 35.5. Their year of service was 13 years in average, and the average time during which they worked at their current school was 4.77.

Data Gathering Tools:
Teacher Professionalism

This scale was developed by Tschannen-Moran, Parish and DiPaola (2006), and adapted to Turkish by Cerit (2012). It contained eight items and was rated on 5-point Likert scale from Strongly Disagree to Strongly Agree. The teacher professionalism scale measured the teachers' levels of exhibiting professional behaviours. Samples items included "In this school, teachers do their job with great enthusiasm", and "In this school, the communication among teachers is collaborative". The explained variance in this unidimensional scale was 61.62%. The analysis revealed a Cronbach's Alpha value of .90 for the scale (Cerit, 2012).

Confirmatory factor analysis (CFA) was conducted to determine whether the eight items and unidimensional structure of the teacher professionalism scale exhibited a good fit with the research data. According to the results of the CFA, there was an acceptable model-data fit. The factor loading values of the items in the scale ranged between .40 and .91 (X^2 =33.201; $p < .05$; sd = 16; X^2/sd = 2.07; RMSEA = .045; CFI = .99). In this study, the Cronbach's Alpha coefficient was calculated as .88. As a result, it was concluded that the unidimensional structure was valid for the present study.

Professional Learning Community Scale

The scale was developed by Olivier, Hipp and Huffman (2003), and adapted to Turkish by Öğdem (2015). It contained 48 items and six sub-dimensions. A 5-point Likert scale from "(1) Strongly Disagree" to "(5) Strongly Agree" was used in the scale. The dimensions were (i) shared and supportive leadership, (ii) shared values and vision, (iii) collective learning and applications, (iv) shared personal practice, (v) supportive conditions-relationships, and (vi) supportive conditions-structure. Sample items include "Members of the school can easily access the information related to school", and "Administrators and teachers take responsibility to enrich instruction". In his study, Öğdem (2015) reported Cronbach's Alpha coefficients of .80 and .90 regarding reliability.

Confirmatory factor analysis (CFA) was conducted to determine whether the 48 items and six-dimension structure of the Professional Learning Community Scale exhibited a good fit with the research data. The six dimensions in the scale were confirmed. The factor loading values of the items in the scale ranged between .57 and .85 (X^2 =3.083.38; $p < .05$; sd = 1058; X^2/sd = 2.91; RMSEA = .059; CFI = .91). The Cronbach's Alpha coefficients calculated in this study were .94 for shared and supportive leadership, .90 for shared values and vision, .93 for collective learning and applications, .92 for shared personal practice, .88 for supportive conditions-relationships, and .93 for supportive conditions-structure. The reliability coefficient of the whole scale was .98. As a result, it was concluded that the six-dimension structure was valid for the present study.

Data Analysis

SPSS 17 was used for data analysis. Whether there were multiple changes, missing data and outliers were examined. The arithmetic means of the levels of schools for being professional learning communities and teacher professionalism were calculated. In order to reveal the relationships between the variables, Pearson Produc-Moment Correlation Coefficient and the 'enter' method in Multiple-Linear Regression were employed.

Assumptions regarding regression analysis were tested in the study. As a result of the analysis, it was found that there was no tolerance value close to zero, the D-W value was 1.89, and the VIF values were lower than 10. Since the correlations between the predictive variables ranged between (r=.77) and (r=.86), multicollinearity was suspected. This is because tolerance value being lower than .20, VIF value being higher than 10, CI value being higher than 30, and the correlations between independent variables being .90 and above show that there is multicollinearity at a serious level (Büyüköztürk, 2010). However, when

the CI, VIF and tolerance values were evaluated together, it was assumed that there was no multicollinearity problem. The skewness and kurtosis values of the data were between -1 and +1, or were close to these values. The skewness and kurtosis values being between -1 and +1 show normal distribution (Şencan, 2005). Besides, the data were assumed to have a normal distribution based on mode, median and arithmetic mean values, normal Q-Q graph, and skewness and kurtosis values.

As for the fit indices used while conducting confirmatory factor analysis, GFI is accepted as good fit if the coefficient obtained from AGFI is .85 (Anderson & Gerbing, 1984 & Cole, 1987) or .90 (Kline, 2005; Schumacker & Lomax, 1996) or over .80 (Doll, Xia & Torkzadeh,1994). Values obtained from RMSEA that are .10 and below are regarded as sufficient for fitness. The ratio of $\chi 2/df$ being between 2-5 refers to good fit, whereas it being lower than 2 refers to perfect fit (Jöreskog & Sörbom, 2001).

FINDINGS

Relationships Between Variables

Table 1 presents the arithmetic means and standard deviations related to the dependent and independent variables, and the coefficients of the relationships between these variables.

Table 1. Relationships Between the Levels of Schools for Being Professional Learning Communities, and Teacher Professionalism

Variables		SD	1	2	3	4	5	6	7	8
1.Professionalism	3.91	.65	1	.42**	.44**	.48**	.45**	.44**	.38**	.47**
Professional Learning Community Scale										
2.Shared and supportive leadership	3.77	.79		1	.83**	.80**	.77**	.77**	.76**	.91**
3.Shared values and vision.	3.76	.80			1	.84**	.77**	.79**	.76**	.90**
4.Collective learning and applications.	3.76	.75				1	.86**	.84**	.77**	.93**
5.Shared personal practice	3.65	.80					1	.83**	.77**	.90**
6.Supportive conditions- Relationships	3.67	.78						1	.82**	.91**
7.Supportive conditions- Structures	3.71	.85							1	.90**
8.Whole Scale [Professional Learning Community]	3.72	0.71								1

** p < .05

Based on the arithmetic mean for teacher professionalism, it can be stated that the teachers' levels of exhibiting professional behaviours were high. The levels of schools for being professional learning communities were also examined in this study based on teachers' perceptions. It was found that the levels of schools for being professional learning communities were above the moderate level according to the perceptions of the teachers. The perceptions on the sub-dimensions of shared and supportive leadership, shared values and vision, and collective learning and applications were higher than those on shared personal practice, supportive conditions for relationships and supportive conditions for structures. Besides, the sub-dimensions were also found to be above the moderate level (see Table 1).

The results of the correlation analysis revealed significantly positive relationships between teacher professionalism, and shared and supportive leadership, shared values and vision, collective learning and applications, shared personal practice, supportive conditions for relationships and supportive conditions for structures. It can be inferred that professional behaviours would increase with the levels of schools for being professional learning communities (See Table 1).

Predicting Professionalism

Table 2 presents the results of the multiple-linear regression analysis regarding the prediction of teacher professionalism by the levels of schools for being professional learning communities.

Table 2. Results of the Multiple-Regression Analysis for the relationship between teacher professionalism and the levels of schools for being professional learning communities

Variables (Being professional learning communities)	B	SHB	β	t	p
Constant	2.32	.13		17.73	.000
Shared and supportive leadership	.05	.06	.07	.86	.390
Shared values and vision.	.06	.07	.08	.92	.357
Collective learning and applications.	.20	.08	.23	2.47	.014
Shared personal practice	.10	.07	.12	1.51	.132
Supportive conditions- Relationships	.10	.06	.13	1.58	.115
Supportive conditions- Structures	-.09	.06	-.11	-1.56	.120
	$R = .49$. $R^2 = .25$. $F = 29.28$. $p < .05$				

According to the results of the regression analysis, shared and supportive leadership, shared values and vision, collective learning and applications, shared personal practice, supportive conditions for relationships and supportive conditions for structures together explained 25% of the total variance in teacher professionalism. Based on the standardised regression coefficients, the variables were listed in order of importance as collective learning and applications, supportive conditions-relationships, shared personal practice, supportive conditions-structures, shared values and vision, and shared and supportive leadership, respectively. Collective learning and applications were found to be the only significantly positive predictor of teacher professionalism. Therefore, collective learning and applications can be said to be an important variable predicting teacher professionalism.

CONCLUSIONS

Significant results of this study can be summarised as follows: (i) The teachers' perceptions on schools being professional learning communities, and their performing professional behaviours were above the moderate level, (ii) There were significantly positive relationships between teacher professionalism, and shared and supportive leadership, shared values and vision, collective learning and applications, shared personal practice, supportive conditions for relationships and supportive conditions for structures; It was also seen that teachers' levels of performing professional behaviours could be high depending on the levels of schools for being professional learning communities, (iii) Among the professional learning community dimensions, only collective learning and applications were found to significantly predict professional behaviours.

In order for teachers to perform professional behaviours, there are certain practices that can be implemented by school administrators and teachers towards structuring a professional learning community. Teachers can share instructional materials with their colleagues, make discussions about the most suitable methods to teach students, follow new instructional techniques, set a model for new teachers, and taking the leader role from the administrator to actualise the school vision (Harrison & Killon, 2007). They can organise events in schools, determine shared vision and values, adopt the school vision, apply the determined vision to the school conditions, follow short- and long-term goals, and conduct studies as researchers (Cormier & Olivier, 2009). School administrators can focus on student learning, create a culture of development, and monitor and assess results through practices of leadership, empowerment, cooperation and communication (Eaker, DuFour & DuFour, 2002; Hord & Sommers, 2008). An sincere environment based on mutual understanding and collaboration is of great importance for school administrators and teachers to turn schools into learning communities. In this sense, the leadership of

teachers and administrators is key to structuring these communities in schools. Administrators' and teachers' participation in any activity that can contribute to the organisation and sharing innovations at school can strengthen professional learning communities. As a result, effectiveness can be ensured in schools with these practices.

In this regard, the following suggestions can be offered: School-based practices can be emphasised to improve the levels of schools for being professional learning communities, and teachers' professional behaviours. Sample class presentations towards enhancing collaboration among colleagues, and meetings for teachers to share experiences on the solution of problems can be planned. Different social activities can be done to form a positive school culture. Principals can share certain responsibilities with teachers, and reward good examples. Leisure time events can be organised in which teachers can talk about education and instruction, and share their experiences. Teachers can observe each other's classes, and prepare common lesson plans. Experience sharing days can be organised with the participation of retired teachers. Teachers in different subject areas in the same school can carry out interdisciplinary studies. In this respect, there can be an effort in forming a positive school culture in which collective learning and applications are emphasised.

The following suggestions can be offered for researchers; the relationship of professional learning communities at schools with different variables can be investigated. As schools have the characteristic of being professional learning communities, mixed-method studies can be conducted to reveal how this is achieved. In addition, the relationship of professionalism that is a variable influential in students' achievement can be examined with reference to different variables. In this context, causal studies can be carried out. Considering that the literature on professional learning communities in Turkish schools is quite new, scales that can be used in the Turkish context can be developed.

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Learner Diversity in Inclusive Classrooms: The Interplay of Language of Instruction, Gender and Disability

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ABSTRACT

The research was conducted to look into learner diversity in inclusive classrooms focusing on language of instruction, gender and disability issues, and their implications for education practices. A qualitative research approach was used to obtain data addressing the research problem from two inclusive secondary schools in Dar es Salaam region, Tanzania. A purposive sampling was used to obtain the schools, and research participants who were teachers and students. Open ended interviews, classroom observations, and focus group discussions were used in data collection. The findings have indicated challenges facing teachers in teaching mixed classes as well as students in such classes; especially those with disability. However, interactions between girls and boys were generally positive although the latter dominated in some classroom conversations. It is recommended that all teachers should be trained on how to handle students with special needs in particular and acquainted with general knowledge of learner diversity during initial-teacher training, and further enhanced through continued in-service trainings. Lastly, it is recommended that another study, using both quantitative and qualitative approaches, be conducted using a bigger sample involving other types of participants with special needs; and that parents of children in special needs should participate in the proposed study.

Keywords: *disability, gender dominance, inclusive education, language of instruction, learner diversity*

INTRODUCTION

Learner diversity is an issue worth addressing in education practices across countries if inclusive societies are to be developed, promoted and sustained. Towards realizing inclusive societies, employing inclusive best practices in education systems would be an important foremost step. Inclusive education is a process that involves the transformation of schools and other centres of learning to cater for all children: boys and girls, students from various ethnic groups and linguistic minorities, rural populations, those affected by HIV and AIDS, and those who have exceptional learning needs. In the context of Tanzania, inclusive education is viewed as a system of education in which all children, youths and adults are enrolled, actively participate and achieve in regular schools and other educational programmes regardless of their diverse backgrounds and abilities, without discrimination, through minimization of barriers and maximisation of resources (Ministry of Education and Vocational Training [MoEVT], 2009; 2013). Inclusive education facilitates learning opportunities for all youths and adults as well. It is aimed at eliminating exclusion resulting from negative attitudes and lack of response to diversity in race, economic status, social class, ethnicity, language, religion, gender, sexual orientation and ability.

Education takes place in many contexts, both formal and non-formal, and within families and the wider community. Consequently, inclusive education is not a marginal issue. It is central to the achievement of high quality education for all learners and the development of more inclusive societies, and an essential element to achieving social equity (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2009).

Worthwhile noting is that, Tanzania has adopted the inclusive education system. The country has also declared Kiswahili to be the language of instruction (LoI) at all education levels (United Republic of Tanzania [URT], 2014). Despite the move, the LoI could be one of the barriers to learners with disabilities' knowledge acquisition, if not properly handled in the teaching and learning processes. Principally, if the students in special needs are not involved or interacting well with their colleagues and teachers alike in the teaching and learning processes, their participation and success in school is likely to be constrained. This is because language, a system of using arbitrary meaningful symbols, is a means of communication; a process that allows individuals to express their ideas, feelings, perceptions, and opinions to others who understand the communicated information. Through this process, individuals can get acquaintance, form friendship as well as interactions.

In this regard, language is of paramount importance in education, especially in the teaching and learning processes since it allows educational messages to be transferred from teachers to learners and vice versa, hence reciprocal communication in both written and spoken language forms. Based on this understanding, intriguingly, what happens if the language used in the communication process is not adequately known or understood by either of the parties involved? In order for learning to be realized, the language of instruction should be well understood by teachers and learners (Qorro, 1999). Indeed, many learners fail in examinations set in English because of poor background in the language and that they probably understand very poorly what they are taught in the classrooms (Qorro, 1999).

The aims of the research

Debates on whether or not Tanzania should use Kiswahili as a medium of instruction in all learning institutions, as well as research findings that girls perform better in languages than boys and that girls talk more than boys in non-formal conversation (Chase, 2011), it was important to conduct a research on gender conversational dominance in the classrooms with students in special needs. The aim of the current study was to analyse learner diversity in the classrooms focusing on language of instruction, gender and disability issues. This research was a timely endeavour in discerning the extent of gender conversional dominance among learners with hearing impairment and albinism in Dar es Salaam region inclusive secondary schools. Further, it was the interest of the researchers to find out whether or not learners in inclusive secondary schools interacted more in Kiswahili than in English classes or vice versa. To achieve these general aims, the following questions were addressed.

i. How are the classroom seating arrangements during the teaching and learning of English and Kiswahili languages?
ii. What is the frequency of teachers' asking questions to male and female learners with or without hearing disability or albinism in English and Kiswahili language classes?
iii. To what extent do male and female learners with or without hearing disability or albinism respond to teachers' questions posed in English and Kiswahili languages?
iv. Who, between male and female learners with or without hearing disability or albinism, dominate the classroom in asking questions using English language?
v. What are the challenges facing teachers in handling students with hearing impairments and those with albinism in inclusive classrooms?

Significance of the study

The present study provides insights into the actual teaching and learning processes in inclusive classrooms. The findings of this study offer important information about teachers' awareness of learner diversity in their classrooms. This information is expected to help improve in-service teacher practices with regard to meeting individual needs of learners, and significantly establish the need to revisit pre-service teacher preparation in Tanzania. Furthermore, since Kiswahili has been recently declared the medium of instruction at all levels of education in the country by the Government of Tanzania, the findings are

expected to assist in improving the teaching and learning through English and Kiswahili languages, taking into account gender and disability issues in inclusive secondary school classrooms.

LITERATURE REVIEW

Language of instruction and learner diversity nexus in the classrooms

Language of instruction has long been an issue in the delivery of education in Tanzania whereby more than 130 ethnic tribes exist in the country, each of which has their own mother tongue. The long-standing debate has been on whether Kiswahili or English languages be the medium of instruction at all levels of education. The issue of the language of instruction in Tanzania dates back to colonial period. Revisiting on the language of instruction in the country during this period, Swilla (2009) states that;

'from 1919 to 1961, the British colonial administration maintained Swahili as the LoI in the first four years of primary school education for Africans. A gradual transition to English-medium of instruction took place in the fifth year, and English became the sole LoI from the sixth year through secondary and postsecondary levels. Swahili remained a compulsory subject in primary education and in the first four years of secondary education' (p. 2).

At independence, Tanzania was left with different colonial legacies within the education sector that required urgent change in national ideology, which in turn informed about the kind and focus of education in the country (Swilla, 2009). In attempts to make education more relevant to independent Tanzanians, making reforms in the education sector was inevitable. Among the Tanzania's major education reforms after independence was the enactment of the 1962 Education Act that made Kiswahili to be the language of instruction and assessment in primary education (Bikongoro, 2015).

Not only that but also it is worth noting that, right after Tanganyika's independence in 1961, Kiswahili language was declared the national language. It was, and still is, the language spoken and appreciated by majority of the people in the country. However, since independence, it has never been officially used as a medium of instruction in secondary education and above.

All in all, Kiswahili has long been the medium of instruction in almost all primary schools, with the exception of a few of them such as those owned by private entities as well as international organizations, *the English medium institutions*. The latter use English as the language of instruction. The language is taught as a subject in primary and junior secondary schools. Furthermore, it is used as a medium of instruction in all secondary schools. Not only that but also, the language is taught as a subject in Teacher Training Colleges for Grade "A" student teachers prepared to teach in primary schools. At Diploma level, the language is taught as a subject and used as a medium of instruction for all subjects with the exception of other foreign languages and Kiswahili (Mwakasendo, 2011).

From the aforementioned, one learns that using English as a medium of instruction at secondary school level is *a big jump* from the use of Kiswahili which is a local and second language to most Tanzanians, and a medium of instruction in many primary schools. It is indeed, a sudden switch from Kiswahili to English as a medium of instruction without prior orientation. In fact this shift has been reported to be one of the contributing factors to students' poor academic performance at secondary school level. To many stakeholders, using English as a medium of instruction from primary through tertiary levels of education in Tanzania would solve the mismatch (Godfrey, 2014). Certainly, it is of no wonder that code switching in secondary school teaching is a reality and common in almost all classes. Teachers give various reasons for the situation, the major one being that English is an international language and that Kiswahili lacks technical terms in science and other subjects (Ministry of Education and Culture, 1995). Teachers have to know that code switching in the classroom affects teaching and learning and hinders learners' eloquence in both Kiswahili and English languages.

Focusing on the use of Kiswahili as the medium of instruction in our educational institutions, as well as the actual practice of teachers in their day to day teaching, the following questions are worth posing: If

there is still some hesitation of using Kiswahili as a medium of instruction at secondary school level because of the fear that students will have deficits in English language, which is an international language, and if there are teachers who are practising code switching in their classrooms, where are we heading to? Why shouldn't the authorities and stakeholders make a firm decision on the language of instruction? To save the boat from sinking, should Form One students be given a comprehensive English course after primary school education for them to grasp the English language well at secondary school level? On the other hand, countries such as China, Russia, North Korea to mention some, are using their national languages as media of instruction and have developed well. Could these countries serve as role models for Tanzania?

Arguments for using English in teaching and learning are in line with what is contained in the report by the Ministry of Education and Culture (1995). The report indicates that English is an international language which makes it easy for people to communicate internationally. In the document it is contended that Kiswahili lacks technical terms which can make it difficult for people to understand and grasp well the science terminologies. The report also shows that since translation is expensive, the use of Kiswahili is uncalled for. In that report, a question was raised as to why code switching should not be legalized, if Kiswahili was to be used as a medium of instruction. It was also learned that teaching through a bilingual system could be another approach that facilitates teaching and learning. Another argument against the use of Kiswahili in teaching and learning was that it might not be possible to use the language in teaching and learning since teachers have not been well prepared. It is also argued that there are insufficient teaching and learning materials (Mwakasendo, 2011). These arguments need to either be challenged or supported through scientific research.

Various researches have been conducted on the use of Kiswahili and English in teaching and learning as well as on students' performance. In her research, Vuzo (2010) found that through classroom interactions, teachers and students work together to create intellectual and practical activities that shape both form and content of the target subject. Further, the author has indicated that students' participation is low where English is used as a medium of instruction in comparison to classes where Kiswahili is used as a medium of instruction. It was therefore important to find out if the findings apply to students in special needs that is, those with albinism and hearing impairments.

However, not much has been done on gender dominance in Kiswahili classes. In terms of language differences and students' performance, a research conducted in Kenya by Moochi et al. (2013) showed that girls outperformed boys in overall performance in Kiswahili creative writing, style and spelling conventions. In the same research however, the two sexes were at par in content presentation, vocabulary use and use of grammatical elements in Kiswahili creative writing. Further, a study by Pajares and Valiante (1999) cited in Chase (2011), established no significant differences between boys and girls in writing performance yet girls were rated as "better writers" than boys. There is indeed paucity of research in Tanzania on the use of Kiswahili in teaching children in special needs. It is even worse to state that not a single research was found on albinism and hearing impairment focusing on gender conversational dominance in inclusive secondary school classrooms for children in special needs in Tanzania. The aforementioned observations, questions, and arguments have led to the current study, focusing on gender dominance in Kiswahili and English classes in two secondary schools in the country. From what has been raised in the previous paragraphs, one would have wished to find out which gender dominates the other in the classroom in terms of language classes.

Gender and learner diversity nexus in the classrooms

Generally, research indicates that males dominate in most conversations. Data from the United States of America (Wood, 1996) have shown that men try to control conversations and are concerned with using conversations to establish status and authority, compete for attention and power, and achieve instrumental status and goals. Other research findings show that women tend to use communication to build connections with others, to be inclusive, supportive, cooperative, and responsive to others (Woods cited in Lips, 2005). The author also argues that gender plays a role in verbal and nonverbal communication which includes facial expression, tone of voice, gesture, posture, touch, and eye contact. On the other hand, men tend to talk more than women and hold the floor, even when they are not saying anything.

Further, men interrupt women when talking. Another aspect is that women keep conversations going by asking questions, responding to what others say and probing for more information.

In the classroom contexts, there are a number of gender issues which may create barriers to students' learning if they are not well considered. These issues or aspects can be related to teachers, students or specific to the physical environments within the classrooms. Literature on classroom interaction shows that teacher-student interaction is characterised by the teacher's attempt to influence learning mainly by controlling the learners' exposure to learning and providing them opportunities to practise language (Verplaetse, 1998). Further, teachers control the learning content and direction of the discourse by asking questions and reformulating the answers given by leaners. Also, research findings indicate gender and sex differences in conversations. For instance, it is said that men do not give verbal recognition of contributions made by women, women are more communicative, women talk more with one another than men, and that women speak more comfortably than men in public (Lakoff, 1975; Spender, 1980). With respect to the classroom arrangement, traditional models of classroom setting has in most cases been affecting students' participation in the classroom discourses, especially girls (Mlama et al., 2005) making them being excluded from the teaching and learning processes. After reviewing the international research literature on the gender socialization process in schools across countries, Stromquist (2007) found that 'boys continue to dominate classroom time and space, a practice that seems to create subdued girls and naturalizes differences between men and women' (p. 30). Teachers need to be aware of such practices and use teaching methods which can make girls more engaged than what is considered normal in many societies (Mlama et al., 2005).

Classroom conversational dominance, which refers to control over conversation in terms of speaking time in the classroom, is among critical issues while teaching in inclusive classrooms that teachers need to be aware of and respond accordingly. Learners should be encouraged towards producing meaningful interactions which can facilitate the learning and understanding of subjects taught (Lewis-Moreno, cited in Mwakasendo, 2011). Classroom conversations are important in learning for both male and female learners. Equitable conversational practices in the classrooms between the two genders are important as a means of appreciation individual differences in the teaching and learning processes. Coupled with disability issues in the classrooms, teachers become more loaded with responsibilities.

Classroom conversations, discussions and the medium of instruction used in teaching and learning do not exclude learners in special needs receiving their education in special or inclusive schools. Sometimes it may be difficult for teachers and nondisabled learners to interact with learners in special needs due to the fact that the latter might feel uncomfortable or be neglected by their teachers and fellow learners. At times they may not be able to participate in classroom conversations due to their being handicapped through language.

Learners' classroom conversations can be hindered by a number of factors, one of them being the teacher-student and student-student interactions. The interactions can be worsened by the stigma attached to learners with disabilities. Research findings from Tanzania show that learners with visual impairment or health conditions, such albinism are segregated in classrooms and other arenas due to sustained stigma (Moshy, 2013). It is a lament filled with grief which also shows that learners with albinism are isolated, feared by their classmates and have a sense of being disliked. Definitely, such children may not be given time to speak or participate well in the classrooms. Further, findings indicate that in co-education classes for nondisabled learners, teachers ask more questions to boys than they do to girls (NESSE, 2009). All in all, no study on gender dominance in Tanzania was found in the literature reviewed, hence the current study.

It was therefore important to find out who dominates during the teaching and learning process in the classroom so as to control conversations and give chance to all learners in the teaching and learning process.

Conceptual and theoretical considerations of the study

In this study, both *Flander's Model of Classroom Interaction* and *Gender Role Theory* were used. The modified Flander's model of classroom interaction as indicated in Table 1 was used to discuss and find out the extent of gender dominance and interactions among male and female as well disabled and nondisabled learners in inclusive classrooms.

Table 1: Modified Flander's Interaction Analysis Technique

		Categories
Teacher-student Interaction	Teacher's direct influence:	Teacher calls on boys and girls equally Teacher calls mainly on girls Teacher calls mainly on boys Teacher provides praise to all children Teacher provides praise mainly to girls Teacher provides praise mainly to boys Teacher involves all children
	Teacher's indirect influence	Praises and encourages boys/girls
		Accepts boys'/girls' ideas
		Asks boys/girls questions
		Gives directions to boys/girls
		Criticizes boys/girls
Student Talk (Boys and Girls)		Students (boys/girls)' responses
		Students (boys/girls) talks' initiations
		Silence and confusion (boys/girls)

Source: Modified Flander's Interaction Model

To complement the Flander's model, *Gender Role Theory* guided the study in analyzing gender dominance in classroom teaching and learning environments. The theory emphasizes nurture and the contribution of the social environment to learning gender-related behaviours. It also indicates that reinforcement increases gender appropriate behaviours. Proponents of *Gender Role Theory* assert that observed gender differences in behaviour and personality characteristics are, at least in part, socially constructed, and therefore, the product of socialization experiences which may come about due to classroom teaching and learning (Loreman, Depeller & Harvey, 2010). . In this study, presenting information in multiple formats, that is, the use of direct teaching, and group discussions which were used in classroom observations.

3RESEARCH METHODOLOGY

Research approach and design

Qualitative approach as explained by Ary, Jacobs and Sorensen (2010) was employed to obtain data addressing the research problem. The approach assisted in exploring participants' issues and insights on the topic. A case study design was used to get the required data from two secondary schools enrolling students with hearing disabilities and albinism.

Research site, study population, and sampling procedures

The study was conducted in Dar es Salaam region in which two secondary schools enrolling learners with hearing impairments and albinism. The study population included teachers and students because the two spend time with disabled children in classrooms. A non-probability purposive sampling technique was employed to select the schools and participants. The study sample consisted of 109 participants as summarized in Table 2.

Table 2: Study Sample

School and Type of Participants	Disability	Number of Participants	
School A:	Albinism	Female	Male
Teachers		2 (1.83%)	2 (1.83%)
Students		22 (20.1%)	28 (25.69%)
Sub Total		54 (49.5%)	
School B:			
Teachers		-	5 (4.59%)
Students	Hearing Impairment	15 (13.76%)	
	Visual Impairment	10 (9.17%)	
	Multiple Handicapped	25 (22.93%)	
Sub Total		55 (50.46%)	
Grand Total		109 (100%)	

Data collection methods

Open ended questionnaires, semi-structured interviews, classroom observations and focus group discussions were used in collecting the relevant data for the study. Following are their descriptions:

Semi-structured interviews: Semi-structured interviews with open ended questions were conducted with teachers as well as learners at School B to enable the researcher get a clear understanding of gender dominance in language teaching in the classroom. Teachers and students at School A declined to participate in interviews without giving concrete reasons.

Focus group discussions (FGDs): Four Focus group discussions with eight participants each, were conducted with students in School B to get information on the methods used to teach male and female learners in the classrooms. They were also used to obtain data on whether or not there was gender dominance in the classrooms when asking and responding to questions. Each group had two female participants. At School A, 16 student participants were purposely selected to participate in focus group discussions. There was a gender balance of four female and four male participants. Only five male teachers participated in the study leading to 21 participants from the school. Female students did not want to participate in focus group dissuasions. They declined outright for unknown reasons since they did not want to disclose the reasons for the decline.

Classroom observations: Four non participatory classroom observations were used to gather data on how teachers interact with learners as well as on the learner-learner interaction in each school (two for each language. Data were collected focusing on the level of questions according to Bloom's taxonomy levels of questions while referring to gender dominance and finding out whether or not there was gender bias and/or gender stereotyping. Two classroom observations were conducted at School A while four of them were conducted at School B.

Trustworthiness of the study.

Trustworthiness in research may entail building confidence of the research process to ensure reliability of its findings. In this study, this was arrived at through adhering to credibility, dependability, confirmability and transferability criteria for evaluating qualitative research proposed by Guba as cited in Shenton (2004). The constructs were used as defined by Ryan, Coughlan and Cronin (2007, p. 743) in the following ways:

- *Credibility:* 'addresses the issue of whether there is consistency between the participants' views and the researcher's representation of them'. In this study it was achieved through triangulation technique whereby different methods were employed in data collection. Additionally, familiarity with the areas of study was made to allow for minimization of potential barriers to carrying out the study effectively.
- *Dependability:* 'involves the researcher giving the reader sufficient information to determine how dependable the study and the researcher are'. To achieve this, the researchers ensured that questions were flexible and also allowed clarification for consistency. The participants were allowed to listen to the information collected by the researcher through interpretation and tapes to ensure if information in the text was what was aired by the participants. The questions were repeated to various participants to get similarities and/or differences.

- *Confirmability:* 'requires the researcher to demonstrate how conclusions and interpretations have been reached'. The procedure for confirmability was twofold: First, the researchers acknowledged the weaknesses of the study and offered suggestions on how to improve the areas of weaknesses in similar future studies. Second, like credibility criterion, multiple data collection methods and sources were applied to ensure triangulation of the data.

- *Transferability:* 'whether or not findings can be applied outside the context of the study situation'. The context of the study has been sufficiently provided, and the findings have been clearly described to allow for comparisons between and among contexts.

Ethical considerations

The researcher obtained informed consent from the participants after they were clearly told that no force would be used to make them participate in the study. Further, the participants' rights were not violated during the research process. Participants' names and identities were kept confidential through the use of numbers. There were no harmful instruments or items used while interacting with the research participants. Further, the research was not intended or expected to involve risk of harm to subjects. The participants were not exposed to any physical or psychological harm such as stress, discomfort, or embarrassment, hence no adverse effects. Consent was sought from the Heads of the sampled schools, and the participants themselves. The researcher also asked for consent from subject teachers after taking steps to ensure that they had complete understanding of the procedures to be used, as well as demands placed on them.

Data analysis

The analysis of data was done thematically leading to the emerged themes as presented in the findings section. Since the study was qualitative in nature, data coding and categorisation were used to get meaningful units of analysis through the use of words, phrases and sentences. The aforementioned enabled the researchers obtain the exact picture of learner diversity in the inclusive classrooms.

FINDINGS

Gender conversational dominance was analysed in secondary schools with a special interest in Kiswahili and English languages, and students in special needs. The goal was to arrive at a detailed description and understanding of gender dominance in the use of the two languages in teaching and learning for the named students and what implication does it have for inclusive education best practices among teachers, other education stakeholders and the general community. In this section, the findings are presented according to the research objectives.

Seating arrangements

The study sought to find out the classroom seating arrangements in order to determine whether they meant to address and respond to learner diversity in the teaching and learning processes with respect to disability and gender. Through classroom observation, it was found that teachers took into consideration students' disabilities and arranged their seats according to their visual acuity. Those with albinism as well as

partial sightedness were required to sit in the front row for them to easily see what is written on the chalkboard. Further, students with hearing impairment had to seat where they could easily see their teachers to facilitate total communication which included both lip-reading and the use of sign language. It was also noted that there were classrooms with students who knew sign language, and thus assisted their fellow students with sign language translation. As for the gender aspect, the classrooms were not separated according to sex. However, there was some kind of positive segregation in seating arrangements. There were separate rows for boys and girls. There were no reasons given for this kind of seating arrangement. The arrangement, however, is considered too traditional such that subtler forms of gendered stereotypes and socialization are likely to be perpetuated in the classrooms, especially when teachers do not make deliberate efforts to positively engage girls in classroom interactions (Mlama et al., 2005). Teachers need to use instructional strategies and employ classroom arrangement styles which provide equal opportunity in classroom participation during the teaching and learning processes.

The frequency of teachers' asking questions to male and female learners with /without hearing impairment and/or albinism in English and Kiswahili language classes

Generally, there was no indication of gender preference in asking questions to students. Students were picked to ask or respond to questions according to their frequency in raising up their hands. However, when students in focus group discussions were asked to explain the extent to which teachers asked questions to male and female students, participants with hearing impairments from School B said that teachers who lacked sign language knowledge did not ask questions to students with hearing impairments because of communication breakdown. The explanations were qualified by some students who contended that they did not have qualified teachers to consult in the classroom. In terms of lip-reading, the students reported that it was difficult for them to lip-read their teachers in the classroom, especially when they were asked questions, since the teachers speak very fast in classrooms and at times do not face students with hearing impairments. The following is a quotation from one of the student respondents in the research.

Teachers in Kiswahili do not know sign language. There is one teacher in English who is at least knowledgeable of sign language. However, he struggles hard while teaching. Further, some teachers do not attend classes while others sometimes forget about us.

Another statement to qualify the response was as follows:

Students do not understand the English language subject because they are not taught by qualified teachers. There is also shortage of specialized teachers in sign language. The shortage has led to lack of expertise assistance offered to students with disabilities in all classrooms during the teaching and learning process.

Definitely, the aforementioned problems affect the teaching and learning of students with hearing impairments as well as their participation in the classroom.

Results from FGDs with Form Three learners indicated the presence of teacher-student interactions problems in teaching and learning, especially in asking questions. It was reported that the teachers did not have skills in sign language. It was also obvious that there was lack of cooperation between learners with hearing impairment and those without disability, possibly because of lack of knowledge in sign language. Knowledge of sign language among learners was said to be better for those who got their primary education in English Medium Primary Schools than those who got their education in public secondary schools. From classroom observations, it was observed that girls were more daring in asking questions. One of the participants in form Three D said the following in one of the FGDs:

The girls are daring in asking questions. Many girls ask questions. It may be due to the fact that all students except one of the boys are deaf. Further, a big percent of learners are girls. However, during English and Kiswahili language lessons, when the teacher asks a question and points to learners, some of

them do not respond because they do not understand the language. Likewise, their teachers do not know sign language. Consequently, teachers write on the chalk board for learners to copy. In fact, he /she can just leave the classroom after writing the notes on the board. All in all, girls try a lot.

Another issue raised was shortage of special teaching and learning materials. Information from teachers showed that shortage or lack of special equipment affects the learning of students with hearing impairments. The participants argued that the availability of hearing aids for example would make both boys and girls learn well. The following sentence was given during a focus group discussion: "Both boys and girls with hearing impairment struggle hard to ask questions and learn equally regardless of their gender, as long as they use hearing aids''

During focus group discussions at School B, responses from teachers glaringly showed that more male than female learners ask and respond to teachers' questions. One male teacher said, "Boys ask more questions than girls. It is not that they are cleverer than the latter. No, girls just fear asking questions.''

Another teacher said the following:

It is the boys who ask more questions. Girls are afraid of being laughed at, especially when they happen to use broken English. Also girls lack the confidence of standing up in front of the class to answer questions. They simply do not have confidence. Generally boys dominate in asking and responding to teachers' questions because they are brave and girls are fearful.

Gender dominance among learners with albinism and hearing impairment in responding to teachers' questions posed in English and Kiswahili language classes

Another objective of the research was to analyze gender dominance among learners with albinism in responding to teachers' questions posed in English and Kiswahili language classes whose findings are presented here. At School A, the results from FGDs showed that girls were leading in responding to questions asked in both Kiswahili and English languages as well as in literature. When asked to state why girls were good at languages, one male participant, while laughing, said, "It is because languages are simple. Boys are good at structure and understand it well. Boys in Form Three preferred science to arts subjects''. This teacher is gender biased because he thinks that the reason why girls do well in languages is due to the fact they are simple.

At School B, results showed that all students participated in responding and answering questions. However, despite the fact that they were given hearing aids, the latter were not working well. In terms of comprehension, summary, debates and structure, both boys and girls did well and got support from their subject teachers.

All in all, several issues were raised in FGDs with Form Three D students. The students said that those with hearing impairments were not well assisted by both teachers and students which made them fail in their examinations. At the same time, the participants said that teachers teach without writing on the chalk boards. Only those who studied in English medium schools perform well. Girls were reported to perform even better in English because most of them came from English medium schools. They also performed better in Kiswahili.

Further to that, the researchers wished to know the performance of students in special needs from the teacher in charge of academics at School A. The latter said the students were performing well. On the other hand, when asked about the reasons of low performance in the two languages by some students, especially those with hearing impairments, one student said:

There are very few sign language teachers. Those without knowledge in sign language fail to translate some words. Sign language teachers do a good job. They teach well. The rest who do not have sign language education ignore us. They neither teach nor care about us. They do not use sign language.

Conversational dominance in language comprehension

When teachers in School B were asked to state the position of conversational dominance in language comprehension, they stated that girls dominate more than boys in responding to comprehension questions because most girls know how to express themselves. The reason given was that girls like languages.

However, when the participants were asked to say who were more dominant in both Kiswahili and English Literature classes, the response was that there was no difference between boys and girls. They gave a reason that it may be due to the fact that languages are easy. This argument does not hold water since there could be a position whereby one gender would outperform the other that is, boys could also outshine girls in subjects considered to be easy and vice versa.

In terms of structure and composition, boys were said to be better than girls in structure while girls were said to be good in composition as well as in written tasks. Following is what one of the teachers said:

Both boys and girls are good in Kiswahili and English. People consider languages to be easy. Why boys are good in language structure and not in summary is unknown. On the whole, girls are very good in writing. Not only that but also boys are very careful and kin to learn. They are cooperative and are not fearful to one another.

The results are a bit different from the report on Boys' Reading Commission (2012) which indicated that girls engaged more in reading and outperformed boys in reading tests.

At School A, the results were different to a certain extent. Initially, discussions with participants in focus groups indicated no big difference in the extent of asking questions between boys and girls. However, as time went on in the discussions, it was clear that boys dominated in asking questions to teachers. When asked to state clearly who ask more questions in both Kiswahili and English classes, the participants said that boys asked more questions than girls. The following statements support the case:

Generally, boys dominate in asking questions in the classrooms. Girls are afraid of being laughed at if at all they happen to be using broken English. Girls do not have confidence to stand up and answer questions.

Surprisingly, one teacher in the same school did not find any difference in terms of dominance in language use and said as follows:

I do not find a line of demarcation. There are female learners with HI who dominate in conversation and in other classes it is boys. So, I cannot say exactly who does it. In some classes it is the males while in others it is the females.

Another teacher said, "I do not get a line of demarcation. In some classes it is the males. In others it is the females. I have a class where a girl with hearing impairment performs well …."

Challenges in handling students with hearing impairment and those with albinism in inclusive classrooms

The research also looked into challenges facing students with hearing impairments and those with albinism. Responses from research participants in both schools showed lack of cooperation between disabled students and their nondisabled colleagues in classrooms for students with hearing impairments. Lack of cooperation was also evident between specialised and non-specialised teachers. The problems resulted from inability to use sign language among teachers and students.

Challenges in handling students with hearing impairment

When the Headmaster in the school for students with Hearing Impairments was asked to indicate how teachers handle or assist learners with hearing impairment in classroom interactions several responses

were given, especially on whether or not learners with disability were being asked questions by their teachers, or whether or not the learners were interactive and cooperative. He said that both male and female learners with and without disability did not fear each other. With respect to students' participation and involvement in the teaching and learning processes, the Headmaster was of the view that teachers on the whole use student-centred methods of teaching as he put it that, "We try to reflect constructivism and the student is at the centre of learning and expect to involve students in experiments and presentations".

In the process of the discussion, contrary to the Headmaster's views, one of the teachers said that it is difficult to tell which approach or teaching method works well in enabling learners to be actively responding in class. The teacher said,

It is difficult. We have mainstreamed classrooms. There are teachers who have not specialised in special needs education and cannot interact well with the learners. This is really an impediment. The students are not getting what they are required to get like other learners. We need to have in-service training.

Another teacher said,

There are many factors affecting the teaching of learners. Communication barrier is rampant because some language teachers are not well trained. In fact there are very few teachers with specialised training for teaching students in special needs. This school is for learners with hearing impairment. However, the teachers do not have training. The setting is not even appropriate for the learners. We do not have teaching and learning materials.

Further, in the same vein, the Headmaster had the following concerns:

Teachers relax a lot despite the fact that they lack the skills to enable them interact with students with hearing impairments. So they are not proactive in assisting students. They leave them alone. The students are not getting what they are supposed to get. This is because of communication barrier. There are very few trained teachers to handle the students. Not only that there is lack of teaching and learning materials. For example, we do not have Power Point presentations.

At School A, the participants complained that the Syllabi are very long making it difficult for the teachers to complete subject syllabi. One teacher from School A reiterated the following: "There are nine topics in the English syllabus, so time is too short. The exams are composed from the first to the last topic..."

From the findings, it is clear that teachers have challenges in teaching students with hearing impairments and that students with the disability are facing problems in their learning since the teachers are not proactive in teaching them. On the side of students from School B, communication barrier was said to be the main challenge. Those with hearing impairment do not interact well with their fellow students and teachers because the latter do not understand sign language. They also mentioned that lack of reaching and learning materials to be among the hindrances.

Challenges in handling students with hearing albinism

The following were concerns with regards to problems facing learners with albinism: "The learners have problems with lighting and that classroom windows do not have curtains so the light affects learners with albinism. For learners with albinism, lighting is a problem and they cannot learn well".

Another finding was stigma in the classroom. Unfortunately, all students with disability, majority being those with albinism, were at one time placed in one classroom and that teachers teaching the students in the classroom were stigmatizing and labelling them. Fortunately, the students were distributed to other classrooms.

One teacher complained about the challenges of inclusion and said as follows:

These students have to fit in the social system. I like inclusion but what preparations are there for inclusive education in terms of infrastructure, teaching and learning materials. We have to get prepared for that. The policy is there but not well implemented.

DISCUSSIONS

Data on student diversity in inclusive classrooms were analysed focusing on three learner diversity nexuses: language of instruction, gender and disability issues. The findings have clearly indicated the complexity of teaching in classrooms having students with varied educational needs and backgrounds which requires a great deal of teachers' attention in the teaching and learning processes. The findings have indicated that some teachers were speaking very fast while teaching in such classrooms as opposed to slowing down their pace of teaching in order to allow for lip-reading by the students with hearing impairment. The findings are similar to those by Safder, Akhtar, Ghulam and Misbah (2012) who found out that, teachers did not make sure that students understood what was being instructed in the classroom.

The study has also revealed that, the classroom interaction between students with hearing impairments and those without hearing disability and teachers was hindered by lack of knowledge in sign language. It has also been found that, more girls than boys in one of streams were dominating classroom conversations as reflected in asking more questions, because in this classroom girls outnumbered boys. These findings match with what was reported by Zhang (2010) who investigated on differences in the classroom participation for girls and boys, in terms of amount of talk and styles of talk. On the contrary, Shomoossi, Amouzadeh and Ketabi (2008) in their study found male dominance despite the fact that female students outnumbered their male counterparts. This was partly because of teachers' controlling the patterns of student behaviours during their teaching. The differences in the findings imply having a big number of students of a particular disability may not be necessarily the sole determining factor of gender conversation dominance in the classrooms. Instead, it signifies teachers' lack of gender responsive pedagogy practices, whereby teachers do not pay attention to the specific learning needs of girls and boys (Mlama et al., 2005). Training teachers in this area is therefore critical to achieving equal learning opportunity for girls and boys.

In analysing gender dominance among learners with albinism and those with hearing impairments in responding to teachers' questions posed in English and Kiswahili languages classes, the findings have indicated that, girls took the lead in responding to teachers in both cases at one of the two schools. On the other hand, there were no differences in response between girls and boys in the other school.

In terms of academic performance of students in special needs, it has been indicated that, a good number of these students were doing well in their studies despite the challenges they encountered in their learning such as lack of teachers specialized in sign language for students with hearing impairments. This finding is similar to what Alahmadi (2001) discovered. The author recommended that it is necessary to consider the facilities and services available in schools and universities which need to be adapted to the needs of special needs students. The design of classrooms requires special considerations to adjust students with disabilities.

Language of instruction has been markedly observed to be an issue in the teaching and learning at secondary school levels; where students are seriously challenged in their learning. While students with good background in English language (those from English medium primary schools) were less affected by language barrier in the teaching and learning processes, those who did not get their primary education in English language faced difficulties interacting and participating in the classroom teaching and learning processes conducted in English language, the current language of instruction at this level of education in the country. The findings concur with what was revealed by Qorro (1999), Vuzo (2010) and Godfrey (2014) calling for the need to address the problem. Could Tibategeza's (2010) proposal for 50-50 bilingual education be a promising solution to the issue of the language of instruction in the country?

Indeed, in inclusive education best practice perspective, the findings inform about the increased learner diversity in the classrooms signified by different language backgrounds of learners with respect to

the language of instruction. It is therefore important for teachers to consider this variable as they teach at secondary school level so that justice is done to all students. In this way, the inclusion of students in regular schools is deemed to succeed.

In regard to the challenges facing teachers in handling students with hearing impairment and those with albinism, the findings have vividly indicated teachers' incompetence in dealing with the students of the said exceptionalities coupled with a lack of the necessary teaching and learning materials in order to facilitate learning for students in special needs. The findings support what was raised by Booth, Elliott-Johns and Bruce (n.d.), who are questioning the training of teachers as well as effective instructional frameworks, and teaching/learning strategies which might appropriate for teaching inclusive classrooms. Some teachers complained about some of the subject syllabi being too long to be covered adequately within the specified time. .

Existence of some forms of stigma has also been pronounced as a problem facing students in special needs particularly those with albinism in the results of the present research. This is evident when all the students with disabilities with the majority being those with albinism were placed in one classroom. It is clear from the findings that changes have to be made in terms of teacher training, availability and use of exchange and learning environments.

LIMITATIONS

Some teachers who participated in the study disallowed the researchers to sit behind their classes for data collection. This situation marred the data collection from classroom interactions. To circumvent the situation, the researchers used triangulation of three data collection techniques namely; open ended questionnaires, semi-structured interviews, and focus group discussions. Another hindrance was that in Tanzania there is no secondary school specifically designated for inclusive education serving learners with hearing impairment and visual impairment. The researcher used schools for students with hearing impairment and albinism. The study was limited to only two secondary schools; there is a need for another study comprising of a relatively bigger sample to be done on the topic.

CONCLUSIONS AND RECOMMENDATIONS

The paper has presented findings on a research that was carried out to unpack learner diversity issues in two inclusive secondary schools from Dar es Salaam region. It looked into classroom interactions among learners with hearing impairment and albinism with the purpose of analyzing gender conversional dominance in Kiswahili and English language classes. The findings have shown that background differences in terms of the LoI perpetuate exclusionary practices to some learners through classroom instructions. Additionally, some shortcomings in the use of sign language by teachers and students, availability and use of special equipment for student with hearing impairment, stigmatisation and poor teacher-student interactions, as well as lack of training on how to handle students with hearing impairments and those with albinism have been evident. Consistent with the findings, the following recommendations are offered for action, policy issues and further research.

1. Teachers should consider background differences in language among learners as an issue that needs to be appreciated in order accommodate all learners in their classrooms especially when they start teaching new students who join secondary education.
2. The government should train and employ sign language teachers. All teachers already in inclusive schools with students with hearing impairments should learn sign language. This implies that all teacher trainees should be trained on how to handle students with special needs in their courses; it should be a requirement for all trainees aspiring to teach in inclusive schools making it possible for teachers to accommodate all learners.
3. Teachers should get in-service training so that they can be able to recognize and handle learners with disability in their classrooms.
4. Learners with and without disability should be encouraged to work together, taking into account that Tanzania cherishes inclusion.

5. The teaching and learning equipment for students with hearing impairment should be purchased and used by teachers and students.
6. This study should be replicated in other regions using a bigger sample schools with different types of disability.

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Perceptions of Generation Y Undergraduate Students on Career Choices and Employment Leadership: A Study on Private Higher Education Institutions in Selangor

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ABSTRACT

The crucial step for organisations which are recruiting Generation Y into their workforce is to understand their perceptions and expectations. This would help organisations emerge with the right strategies to attract and retain the Generation Y cohort. The aim of this paper is to contribute to the body of knowledge base in respect of Generation Y expectations and perceptions on their career choices and its influence on leadership. However, due to lack of academic research on the career expectations and perceptions of Generation Y that deems to be important, popular literature and researches were included in this research (Vieira, 2010). The target sample and population were focused on Generation Y who is undergraduates within the Selangor area. A qualitative method was used in this study to gather perceptions. Although twenty participants were targeted as the sample, the findings and discussions of this research are based on fifteen responses due to the invalidity of the remaining five. The findings generated from the responses were found in line with the theories adopted and explained. Moreover, recommendations for both organisations in Malaysia and future researches are discussed..

Keywords: *Generation Y, career choice, expectations, perceptions, leadership style*

INTRODUCTION

Comprising babies born between the years of 1980 and 2000, Generation Y grew up in an era when the world was going through a period of adjustment, a tide of change. Their growing years were marked with phenomenal technological advancement, economic disruption and worldwide integration or globalisation. Thus, Generation Y-ers as they are referred to, have a vastly different outlook on life, not to mention their mind set and behaviours. This is basically due to the different experiences they grew up with (compared to their predecessors). According to Fernandez (2009), Generation Y is described with the characteristics of creating a fun working environment, non-monetary work perks, and flexible hours besides Martin (2005) addressed them as technology savvy, independent, self-reliant, and entrepreneurial thinkers.

Jahn, Riphahn & Schnabel (2012) commented companies are facing difficulties trying to find the right balance between creating a work environment suitable for the emerging younger employees and continuous engagement with senior staff helping them retain their skills and knowledge. Organizations are now adopting a new generation specific human resources coupled with contemporary leadership strategies

to develop and retain a modern workforce. Employers today may not have had experience in hiring and managing this generation for they do not know what to expect from them and what their possibilities are, thus treating Generation Y as a threat (Ng and Gossett, 2009). Amagoh (2008) stated that the ability of an organisation to manage and survive change is becoming increasingly important in an environment where competition and globalisation of markets are ever intensifying.

However, when leaders show a commitment, employees are encouraged to proof their loyalty to their organization as their contributions are being acknowledged by the leadership from time to time. Managing employees by inflicting fear amongst them will create a lot of unwarranted stress that will eventually affect their brain function. The quality of work produced employees is also different when they are guided by acknowledgement and appreciation. In other words, employees produce better quality if work when they are recognised by leaders. Generation Y has the capability to encourage the best out their team, advocate for their team, show support for training and development that is beneficial to them. Decades ago, some of the trends included the creation of newer leadership styles and recognition of how important a leader's emotional attachment with subordinates for instance intellectual leadership style. Ever growing recognition for leadership development that now includes greater focus on how leadership is developed, thoughtful consideration on how to use competencies better and a balance between work/life. In the future, the trends of leadership development may take into consideration advances of globalisation, technology, new ways defining leadership and its development.

Generation Y will demand less command and control from their superiors and prefer a more cooperative type leadership that gives them more autonomy and freedom of choice in the way their work is done. Such changes will certainly test the organization in newer ways (Kerr & Robinson, 2011). Flexible team based approach will need to be adopted. There will be no more room for multi-layered designs where managers manage managers. A more purpose based work groups are established with flatter reporting structures which in turn will result in a new workplace culture that can adopt a transformational workforce.

Problem Statement

Generation Y seems to be highlighted as the reason for the issue of employee turnover (Queiri et al., 2014) Therefore, it has been the concern of organisations, especially HR managers, regarding the high turnover stream from the Generation Y employees. Besides retaining, there is also the concern of organisations on recruiting current and future Generation Y graduates.

As the generation of generation X gradually retires from the workforce, it is essential to give priority to the recruitment and retention of Generation Y. Therefore, this research is to determine the perceptions and expectations of Generation Y as a means to enhance the recruitment and retention process of organisations in Malaysia. The impact of non-availability of the suitable workforce and leadership qualities can bring negative impact of the overall growth of Malaysian economy and social status. Latest report (Star Business, 2016) had stated that a total of 600,000 graduates are expected to be jobless by 2018. This is mainly due to the fact that the graduate (who belongs to Generation Y) does not have the necessary skill to be employed by the employers, especially in the private sector and unavailability in measuring generation Y career expectations. Such unemployment rate affects image of Malaysia on managing human resources. This study is to fill the gap of research in terms of graduates' expectations in the beginning of early stages as employee on employment that may attract and retain them for period of time. This brings us to a more important question; do they have the rightful leadership quality which entails the organisational retention?

Research Objectives

a) To study the expectations that Generation Y has towards their career choices.

b) To understand the perceptions and attitudes that Generation Y has towards their career choices.

c) To identify the perspective and driving forces of Generation Y towards their career choices

d) To identify the perspective and driving forces of Gen Y towards change management and leadership.

Research Questions

a) What are the expectations of Generation Y towards their career choices?

b) What are the perceptions that Generation Y has towards their career choices?

c) How can organisations in Malaysia improve their recruitment and retention process through the perceptions and expectations of Generation Y?

d) What are the perspective and driving forces of Gen Y towards change management and leadership?

Significance of the research

Currently, there are three generations namely Generation Y, Generation X and Baby Boomers dominating the workforce in Malaysia. As suggested by Muthu. K and Ya Yee. T (2011), the generational differences between these three generations should be identified to eliminate failure to understand the demands of each generation that could lead to misunderstanding and conflict in organisations. According to Ng et al. (2010), organisations face a crisis as "they strive to recruit and retain the younger generations, who purportedly hold significantly different values, attitude and expectations from the generations of workers who preceded them".

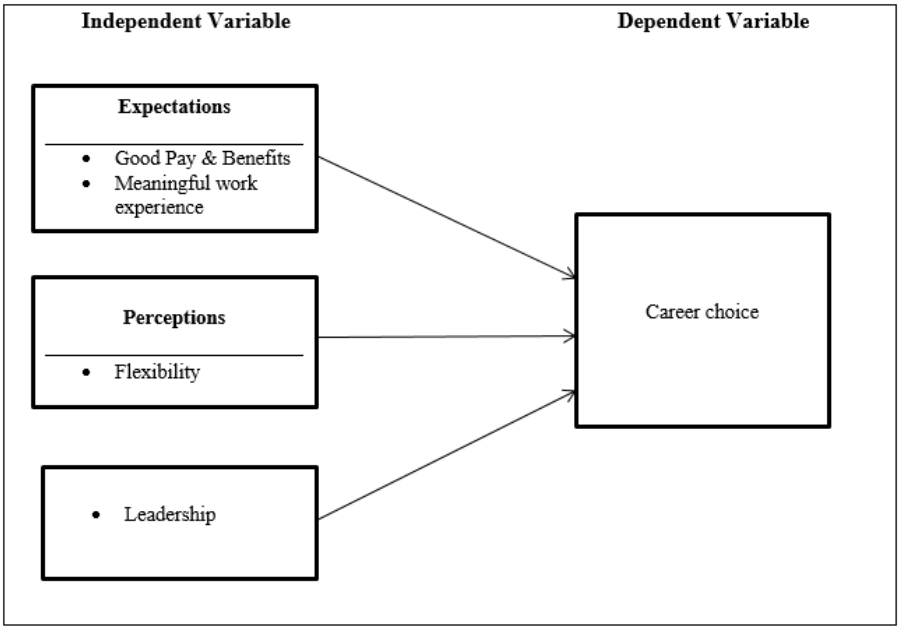
Therefore, this research would identify the expectations and perceptions of Generation Y specifically, to provide organisations in Malaysia with an overview of their characteristics and attitudes and how this will have an impact on organisation culture, especially leadership. The results from this research study would help improve the recruitment and retention process of those organisations. Ultimately, the management would be able to capitalise the skills of these potential graduates and generate maximum value for the organisation. Generation Y should possess certain qualities that will entail them to be a good leader in future.

Theoretical Framework

Generational theory by Strauss and Howe (1991) is the theoretical component of the framework from which this research is adapting (Linden. 2015). The generational theory is one of the studies that help to introduce and justify the concept of generational differences. Unlike other studies on this concept, the generational theory by Strauss and Howe (1991) argues that, "*as a result of significant life event experiences, each generation forms shared yet distinct frames of references, values, attitudes and traits making them unique*" (Radford. K and Shacklock. K, 2012, p. 4).

The generational theory could be used to predict attitudes and behaviours of generations (Linden. 2015). This theory could also be used by organisations to meet job expectations of the Generation Y graduates (Strauss and Howe, 1991; Linden. 2015).

Table 1: Research Framework



Source: Developed for Research

LITERATURE REVIEW

Good pay and benefits

In accordance to McClelland (1965, p. 7), "the person with a high need (for achievement) is interested in money rewards or profits primarily because of the feedback they give him as to how well he is doing… the money reward is not the incentive to effort" (McClelland, 1965, p. 7). Thus, the expectation of good pay and benefits may also reflect the sense of entitlement of which Generation Y desires (Ng et al., 2010). In the study by Ng et al. (2010), it mentioned that pay was found to be the single most important motivational factor for the Generation Y cohort (Ng et al., 2010). However, according to Hill (2002), the term 'ability-performance nexus' is used to describe the "disconnect between what Generation Y expect to achieve and what they are capable of achieving" (Hill, 2002). In addition, according to Ng et al. (2010), previous researches by Bartol and Martin (1987), Roth (1996) and Vinchur et al. (1998) has stated that "higher grades and achievement motivation are indeed related to graduation salaries and higher job performance" (Ng et al., 2010).

Lyons, Duxbury, and Higgins (2005) have found that the benefits Generation Y expects include a high salary and a prestigious title, while Dries, Pepermans, and De Kerpel (2008) suggested that "markers of wealth and prestige are less important to Millennials than their overall satisfaction". However, it is agreed upon that good pay and benefits are the expectations of Generation Y, as it is also one of the themes adapted by this research from Ng et al. (2010).

Meaningful work experiences

Generation Y is said to be a generation who seeks a much more returns for their hard work, besides just a pay check (Ng et al., 2010). According to Yang and Guy (2006), Generation Y tends to seek for work that is meaningful and fulfilling, thus their search for companies with values and missions that goes beyond simply making money (Yang and Guy, 2006). Moreover, to some individuals of the Generation Y cohort, meaningful work experiences would mean availability of opportunities to broaden their horizon through

job mobility and international assignments (Ng et al., 2010). Besides that, according to the Corporate Leadership Council (2005), the Generation Y cohort would also define meaningful work experiences as being assigned and trusted with challenging assignments (Corporate Leadership Council, 2005). In support to that, one of the main concerns of Generation Y is "what can the organization do to help them to lead more purposeful and meaningful lives" (Corporate Leadership Council, 2005; Ng et al., 2010, p. 283), therefore, reflecting Generation Y's sense of global engagement and responsibility (Kyra Friedell et al., 2013).

Moreover, researches have also found the desire of Generation Y to be given direction and support by their employers (Kyra Friedell et al., 2013). Similarly, according to Hauw and Vos (2010), the Generation Y expects job training and career development resources to be provided as part of their work experiences. The results of the research by Hauw and Vos (2010) also identified the probability for Generation Y employees to leave the job if those expectations are not met especially on career development.

Flexibility

According to Lindsay and Norman (1977), perception is "*the process by which organisms interpret and organize sensation to produce a meaningful experience of the world*" (Lindsay and Norman, 1977). Lloyd (2007) identified three perceptions namely (1) *a desire for flexibility*, (2) *a desire for continual learning*, and (3) *a preference for team-oriented work* (Lloyd, 2007). Therefore, the study on perceptions by Lloyd (2007) is the variable in which this research is working upon. From the perceptions by Lloyd (2007), one of the three was chosen as the independent variable for this research study.

According to Lloyd (2007), Generation Y desires work flexibility where they believe they can 'do more with less' (Lloyd, 2007). In other words, Generation Y prefers to work for fewer hours while still taking up challenging jobs (Lloyd, 2007). As the Generation Y cohort lives in the era of technology, they believe that they can work more efficiently and eliminate non-essential efforts such as, face-to-face interaction (Brown et al., 2009). As a result, with the fading boundaries, the Generation Y cohort is said to be more integrated in their personal life compared to their professional life (Kranenberg, 2014). However, as Generation Y becomes too accustomed with flexibility, issues of job hopping may occur. In support to that, the study by Cruz (2007) has stated that the Generation Y cohort has indeed "shown a willingness to change organizations when they perceive new opportunities that may offer greater levels of appreciation" (Cruz, 2007).

Besides that, according to Lloyd (2007), individuals of Generation Y are more associated to the types of work which they perform and less with the particular organisation that employs them. Similarly, Generation Y also places more importance towards family relationships rather than work place relationship, thus the idea and interest in working from home (Brown et al., 2009). Ultimately, with the advancement of technology today, it is possible for the Generation Y cohort to fulfil their desires (Brown et al., 2009).

Leadership

Based on the survey conducted on Generation Y by London Business School in 2009, 54% of respondents have committed loyalty to the organizations they work for. The figure 54% can't be accounted as a majority figure, it is however considered as a significant number despite huge portion of respondents are in this favour. This turns the classic idea of employer value proposition on its head. There is a greater responsibility than ever for team leaders and department heads to consciously and proactively develop team cohesion, a tangible community. Today, long-term company benefits such as pension, steady but gradual promotion, means less to the Generation Y employee than immediate challenge, development, opportunity, and meaning (Adam, 2010).

Change management has been implemented across various industries, despite this, a large number of leaders have still not equipped themselves to carry out and execute change fearing for business disruptions (Glenn, 2014). For Majority of the organizations advance preparations always starts with leadership involvement , it should encompass all the levels in the organization and it should also contain crystal clear clarification with its purpose and focus it must further also be synchronised with organizations

goals, strategy and resolution.

One of the greatest stumbling blocks in implementing change in management is that their existing policies make it impossible for them to have a unanimous agreement at all the levels of leadership. This occurs even when the organization needs an urgent change management implementation. This is one of the reasons why organizations lose their grip when change comes at a slower pace and eventually lead to their rivals overtaking the organization in the market place Glenn (2014) in his article "Change Management Requires Leadership Clarity and Alignment" had argued that Generation Y may not tolerate such policies.

It would be impossible for any business organization to have a clear direction when the key leadership team remain disconnected and not unified, instead of combining each other's expertise and intelligence to move the organization forward the team is however severely disconnected from each other.

Amagoh(2008) commented that it would be difficult to cultivate a work environment that is clear in its direction when the leadership itself lacks transparency. It becomes even more challenging to implement management change when the leaders across all the levels are reluctant to contribute their intellectual capital to enhance the overall organization. Leaders most often are very cautious and reluctant to share intelligence that they have contributed towards their individual success. They hold on to information due hidden agenda, they refuse to share information that can contribute towards a healthier growth for the organization.

Due to the above mentioned reasons, that is why it is compulsory that leaders come up with a clear purpose, focus, strategic philosophy, resolutions and end goals as objectives for their change management. It is a must that there is commonality that leads to the execution, progress monitoring and allows for corrections along the implementation (Andrea, 2004). A culture must be created whereby leaders would voluntarily share their intelligence capital with everyone for the betterment of the organization in addition , this said culture should also ensure that leaders will play importance to teamwork and breaking down barriers . There most important fact is , there must be a clear cut and carefully defined strategy as a background to management change activity and it must also detail when and how the organizations begins the change and what they want to achieve with management change (Glenn, 2014).

METHODOLOGY

This section introduces the appropriate method to collect and the analysis of this is based on interview methodology. Research approach refers to which technique that had been adapted to conduct the research.

As the objective of this research is to explore the 'why', 'which', 'when' and 'how' questions related to Generation Y and their career choices, Lim Kee Choon (2014) has suggested that the preferred approach is to use a qualitative methodology According to Lim Kee Choon (2014, p. 91), the qualitative approach "*makes the informants more human and related to people's environments instead of comprising objective statistics with no emotions and feelings attached*" (Lim Kee Choon, 2014, p. 91). The qualitative approach is adopted to serve the objective of obtaining direct contributions from participants (Generation Y undergraduates) to the research interpretations and findings, and not just based on the analysis, deduction and evaluation of the researcher (Bryman and Bell, 2007; Lim Kee Choon, 2014).

In contrast with the quantitative method, the qualitative approach results verbal data, and not numerical. According to Mack et al., (2005), research questions in the nature of qualitative approach have the ability to affect responses that are (1) *meaningful and culturally salient to the participant*, (2) *unanticipated by the researcher*, and (3) *rich and explanatory in nature*, which are advantages to exploratory researches. Moreover, Guba & Lincoln (1994), and Lincoln & Guba (1985) proposed that trustworthiness and authenticity are used in qualitative research as an alternative to reliability and validity, which are used in quantitative research (Lim Kee Choon, 2014). The variables of trustworthiness and authenticity were among the few discovered by Lincoln and Guba (1985) (Bryman and Bell, 2007). Thus, the methodology process of this research would be done through taking of notes, to ensure authenticity of data.

The method for gathering data for this research is through individual interviews. Individual interview or also known as personal interview is one of the data collecting methods, which is conducted by the researcher through "*a rigid procedure and seeks answers to a set of pre-conceived questions*" (Kothari, 2004). The output of this method typically depends on the ability of the researcher in carrying out the interview in a structured way (Kothari, 2004). According to O'Leary. Z (2004, p. 164), a structured interview uses "*pre-established questions, asked in a predetermined order*" (O'Leary. Z, 2004, p. 164). The interview questions are adopted from the research study '**Work-Values Differences within Generation Y: Recommendations for HR Management in the Hospitality Industry**' by Ellis Kranenberg (2014).

Sampling

According to Kothari (2004), random sampling is also known as chance sampling or probability sampling "where each and every item in the population has an equal chance of inclusion in the sample and each one of the possible samples, in case of finite universe, has the same probability of being selected" (Kothari, 2004). Therefore, the sampling chosen for this research would be random sampling.

The sampling population targets Generation Y's who are currently still studying at either the public or private higher educational institutions in Selangor including colleges, universities, and university-colleges (Woon Kong Yik, 2012). In other words, this research aims towards undergraduate students to understand their point of view on aspects of their career choices.

In support to that, researchers suggested a sample of not more than twenty for, "this number gives them the experience of planning and structuring interviews, conducting and partially transcribing these, and generating quotes for their papers" (Baker and Edwards, 2012). According to Kothari (2004), the size of sample in a research refers to the number of participants selected from the whole population to constitute a sample (Kothari, 2004). Moreover, as the participants for this research are entitled to be an undergraduate of the Generation Y cohort, the focus age group would be 15-24 years old born between years 2001-1992. As conveyed by the Department of Statistics Malaysia, there would be a total of 1 million people (precisely 1,028,000) in the Selangor district for the year 2015 (Department of Statistics Malaysia, 2015).

The target location in search for the participants is within the Selangor district for according to Woon Kong Yik (2012), "many of the younger generations from all over Malaysia will be concentrated in Kuala Lumpur and Selangor due to the opportunity to work and availability of many prestigious higher educational institutions" (Woon Kong Yik, 2012)

Twenty participants of Generation Y are who are currently still studying at private higher educational institutions in Selangor were interviewed for the findings of this study. However, due to the invalidity and inappropriateness of some answers, five out of twenty interview responses were excluded, as they were not in relation with the questions. Therefore, the findings and discussions in this chapter are based on the remaining fifteen interview responses.

Analysis

A total of thirteen interview questions were asked by the researcher to the participants. The first three questions were titled **Generation**. In this section, participants were asked general questions regarding generations in general and the Generation Y cohort. The purpose of these questions was to understand their insights on generational knowledge. However, with the different opinion and mind-sets, naturally the answers of each participant differ from the other.

Although, the one question which obtained mutual agreement from all the participants, is the question concerning the major happenings in the world and its influence on Generation Y. The fifteen participants agreed that technology were the main influential factor as the advance of technology today has enabled an easy and convenient lifestyle.

The subject of monetary rewards was one of the questions asked. When asked about the importance of pay or monetary rewards, every participant agreed that it is highly important. They reasoned their

answer stating that monetary rewards play a role in influencing their motivation and commitment in a workplace. In justification to that, the author Ng et al. (2010) has mentioned that pay was found to be the single most important motivational factor for the Generation Y cohort (Ng et al., 2010). Besides the motivation factor, a number of participants have added that monetary rewards also fuels their sense of entitlement, thus making them individuals with a high need for achievement as money reward is not the only incentive to effort (McClelland, 1965, p. 7). Other benefits expected by the participants were mentioned. Some of the participants are interested in a relaxing workplace which provides them with traveling benefits, additional leaves, and company trips.

Furthermore, the participants were also asked about the kind of career advancement they are expecting and from their answers, they showed desire of the need for power. With the opportunity to advance in their career ladder, participants are anticipating the increase in responsibilities, pay and control over their work, therefore illustrating the expectation for a promotion.

For meaningful work experiences, before questioning the main question for this theme, the participants were asked about the importance of their family and friends. This is to understand the mind-sets of the participants and the significance of their family and friends, as it has an impact on the characteristics they aspire for, their career choices. As expected, the response from all fifteen of the participants was positive as they strongly agreed that family and friends are their priority and "*pillar of strength*". They also play an important role in ensuring participants live in a work-life balance environment.

As much as work is important to the participants, they also added that it is not as important compared to their family and friends. Work is said to be important as it is a survival need for the participants especially with the increase in the standard of living. In relation to those responses, the participants were then asked about the kind of characteristics they aspire for, to experience a meaningful work life. A challenging work is the motivating factor of most participants as they desire for the sense of responsibility and achievement. In support to the responses, the researcher, Kyra Friedell et al. (2013) has also agreed that Generation Y desires the sense of global engagement and responsibility (Kyra Friedell et al., 2013).

However, two out of fifteen participants were not able to respond as they have not thought about their working life, as their current focus is to complete their undertaking education.

Whereas flexibility, participants added that their productivity is influenced by a less stressful working environment. Participants believed that a rather fun and interesting workplace could help enhance their creativity and productivity. In support to that, the researcher, Lloyd (2007) has also acknowledged that Generation Y desires work flexibility as they believe they can 'do more with less'.

The perception of flexibility was highly agreed upon by the majority of the participants, when asked about its importance. In reference to the responses on family and friends, participant's desire for flexible working hours as they would like to ensure that there is work-life balance. Participants also mentioned their priority of spending time with their loved ones therefore, supporting the findings of Kranenberg. E (2014) quoting that, "*the Generation Y cohort is said to be more integrated in their personal life compared to their professional life*".

However, one out of fifteen participants prefers the old fashioned working hours (9 a.m. – 5 p.m.). That particular participant reasoned her answer stating that, the usual 9 a.m. – 5 p.m. working hours would provide her with "*something to look forward to, and something to achieve every day*."

Lastly, Majority of the participants agreed that a leader is very important in determining the pathway a company will take in ensuring its objectives are achieved. Participants believe that a leader will be able to influence their team to achieve a better result. However, there seems to be a variance in the importance of Emotional Intelligence aspect of a leader. Even though majority of the participants did agree that age and experience is important is for a leader, five participants are of the opinion that personality determines the ability of a leader Emotional Intelligence.

DISCUSSION

Generation Y has the priority of seeking the opportunity for advancements. It is an evidence of their "*ambitious and impatient nature, and also elevated expectations for rapid promotions and pay increases*" (Ng et al., 2010).

The need for good pay on the other hand, is driven by the increase in the standard of living. This factor reflects the **generational theory** by Strauss and Howe (1991) where significant life event experiences, shapes and differs each generation from the other (Radford. Shacklock 2012, p. 4). Besides that, Gen Y desires good pay to support their way of living, for they are willing to spend on entertainments.

One of the traits of the Generation Y cohort is the willingness "*to be loyal and work hard*" (PrincetonOne and Hobart, 2014). However, in return, Gen Y expects a workplace with the ability to enhance their skills, the delegation of interesting work or tasks, feedback and guidance from their employers, change to advance, and rewards for their hard work (PrincetonOne and Hobart, 2014). Though, there is the reputation for job hopping after a year or two, Generation Y can be the most loyal employees when they find an organisation of their best interest.

One of the common myths of the Generation Y cohort is how lazy they are. However, in reality, the advancement of technology today has enabled Gen Y to multitask and find shortcuts to achieve the desired task. As quoted by PrincetonOne and Hobart (2014), "*as Generation Y members tackle new tasks, they are constantly thinking about how to do them better and faster*" (PrincetonOne and Hobart, 2014). Consequently, the newest generation lives by the motto 'working smarter, not harder' (PrincetonOne and Hobart, 2014). Therefore, Gen Y desires for flexibility, as the freedom enhances their productivity and creativity.

The desire of flexibility is also driven by the "*high value on family, friends and leisure*" Generation Y has. Though, the Generation Y cohort may not seem to work as hard as previous generations, they do "*possess a good work ethic"* (PrincetonOne and Hobart, 2014).

As observed during the interview process, the participants have mutual agreements and responses on certain questions. This shows that the perspectives of the Generation Y cohort are to a certain extent, pretty similar. Depending on the findings and discussion of this research, it can be concluded that the Generation Y cohort in Selangor, have the expectations and perception of good pay and benefits, meaningful workplace experiences, and flexibility on their career choices. The responses from the participants, illustrated that Gen Y have certain criteria's that would influence their motivation, productivity, commitment and so on. Also, for the purpose of this research, the findings could also generate recommendations for organisations which are or will be recruiting the Generation Y cohort into their workforce.

RECOMMENDATIONS

From the findings of this research, the main concern of the participants besides pay, were career advancements. Therefore, organisations in Malaysia are advised to consider programs that can enhance their work skills, such as "training or professional development programs" (Forbes, 2016). In addition to that, authors with similar findings such as Ng et al. (2010), have suggested recommendations to "offer competitive salaries, interesting and challenging work, and opportunities for advancement, if they (organisations) are to attract the, be stand brightest of talents" (Ng et al., 2010).

Moreover, the results from this research study would help improve the recruitment and retention processes of organisations in Malaysia. Though it may be a challenge for some organisations to recruit this generation, once the challenge is overcome, the new and upcoming workforce of Gen Y would be "just the latest challenge and opportunity" (Forbes, 2016). Ultimately, the management would be able to capitalise the skills of these potential graduates and generate maximum value for the organisation.

LIMITATIONS

One of the main limitations experienced since the start of this research is the availability of resources or journals, in terms of the lack of latest resources or journals. In addition to that, majority of the journals obtained were specified to an industry (nursing, retail, etc.). In support of Vieira (2010), there is lack of academic researches on generational cohort theory, therefore resulting in the adoption of independent variables from two separate studies.

The target sample of this research was focused on a specific location, Selangor. The reason being, "many of the younger generations from all over Malaysia will be concentrated in Kuala Lumpur and Selangor due to the opportunity to work and availability of many prestigious higher educational institutions" (Woon Kong Yik, 2012). However, the findings only represent a small number of the Malaysian population. Therefore, the results of the study may not apply to other parts of Malaysia such as Penang, Johor, Sabah or Sarawak, for naturally every individual have his or her own perceptions and expectations.

Time constraint is one of the other major limitations for this research. This research was concluded based on a research undertaken in a timeframe of 3 months. More research related-articles and journals could have been critically analysed should time was not an essence.

Directions for Future Research

Future studies on Generation Y's perception on career, leadership and organisational development could consider directing their focus on other geographical locations. Due to the limited time, this research was only conducted in the region of Selangor and within the perspective of undergraduates only. This may not represent the overall feedback of a more affluent group of participants. The future research should include employed staff so that a more variant feedback could be obtained.

With that, researchers could compare the findings and understand the perspective of the Generation Y cohort in a different location and background. Moreover, in the study of expectations and perceptions, this research adopted four themes as the independent variables. Therefore, future studies could look into other variables that were not included in this research.

Furthermore, with the availability of journals which are specified to an industry (nursing, retail, etc.), future studies could conduct a research on the expectations and perceptions of Generation Y towards a specific choice of career which will eventually determine their leadership skill and impact on organisational culture.

According to Sean Graber, Senior Consultant and CEO of Virtuali (2016), Generation Y is motivated by a desire to transform themselves, their colleagues, and the world around them. Study reflects that Generation Y respond and aspires to this type of transformational leadership. The future research could look into how this is viable and relevant to organisational culture.

CONCLUSION

Generation Y, while showing many characteristics typically associated with young age and little employment experience, are overall not very different from other generations of employees. They have similar hopes and fears, hope for development and career, and fear job loss and economic turmoil. This holds true for professionals and managers alike. However, organisations that look at the sustainability of their leadership pipeline can increase their attractiveness to Generation Y talent by offering a variety of learning opportunities, and offering them in attractive formats. When there is good interaction between the leader and subordinates, there will be contributions to team communication and collaboration, and encouragement of subordinates to accomplish the mission and objectives assigned by the organization, which in turn enhances job satisfaction.

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The Examination of the Attitudes of Secondary School Students Towards Physical Education Course

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ABSTRACT

The aim of this study is to examine the attitudes of primary education students towards physical education courses according to certain variables. 640 students from elementary schools in the city center and several counties of Sakarya participated in the study. In the designating of the students' attitudes towards the physical education courses, the Physical Education Courses Attitude scale, which was developed by Güllü & Güçlü (2009), was used. In the statistical analysis of the acquired data as a result of the study, frequency, One-Sample Kolmogorov-Smirnov, Mann-Whitney U, and Kruskal-Wallis H analysis were conducted in SPSS 15.0 for Windows software. As a result of the study, it is concluded that a large part of the students (63.9%) have a habit of doing sports regularly and the number of students who practice sports in a sports club is considerably high (43.8%). When the attitudes of the students towards the physical education courses are examined, it is discovered that the attitudes of students towards the physical education courses are generally high. It is also concluded that the attitudes of students towards the physical education courses do not demonstrate a statistically significant difference in terms of gender and age groups (P>0.05). On the contrary, it is determined that the students' involvement in practicing sports with a license in a sports club and attending to tournaments affected their attitude towards the physical education courses positively and this acquired result is statistically meaningful.

Keywords: *Physical Education, secondary school, student, attitude, gender, age.*

INTRODUCTION

Education plays a major role in the process of acculturation of societies (Demirel & Kaya, 2007). Accordingly, education contributes to teaching cultural values to individuals. Education, socially, is a fact that supports the cultural development of countries (Hoşgörür & Taştan, 2007). The main goal of education is to reveal the talents and hidden potentials of individuals and support the development of the mentioned features to the peak. The physical, mental, social and emotional raising of students as a whole is one of the basic principles of modern education system. Within this scope, the fact that the maintained education activities have a modern understanding supports students' development. Within the modern education system, the course which provides the teaching of primary movement skills and ensures the learning of students through movements is physical education. Based on these features, physical education courses have become an inseparable part of the modern education system (Kangalgil et al., 2006).

Physical education, conceptually, is defined as "an effective educational activity that is directly related to human health, character development and increasing morale efficiency, and the upbringing of a

human being who is strong in a national sense with high collective spirits and behaviors (Aras, 2013). According to another definition, physical education is defined as "a field of science that provides the spiritual and physical education of individuals without harming their organism integrity and aims to raise individuals in a manner that they are beneficial to their environment and society (Açak, 2006).

It is known that participating in sports and physical activities has positive effects on public health (Keskin, 2014; Güner, 2015). Physical education course has several positive effects on students' various development areas. Primarily, it is a fact that physically active students have higher levels of academic motivation (Aras, 2013). Besides, physical education is an effective way of providing and maintaining a physical coherence (Heper, 2012). It is known that physical education courses and physical activity programs are beneficial in order to maintain and improve health in school environments (Stratton & Mullan, 2005). On the other hand, it is pointed out that being involved in physical education and sports is highly beneficial in supporting social, physical, mental and motor developments (Açak, 2006; İmamoğlu, 2011; Şahin et al., 2012; Açak, 2006; Küçük & Koç 2004). In children and youth, it is stated that sports play a major role in reducing aggressive behavior to a minimum (Vardar, 2015). It is also known that participating in sports is an element that directly increases assertiveness level (Eraslan et al., 2015). On the contrary, especially in our country, several obstacles keep children and youth from participating in sports. The primary ones of the mentioned obstacles are the sufficiency in facilities and equipment (Hergüner et al, 2004).

Attitudes are elements which affect human life in various extents. In the literature, several definitions regarding the term, attitude, which affects human life on a significant level, were made. Alport defined attitude as "a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects and situations with to which it is related". On the other hand, Katz defined attitude as "an individual's tendency of evaluating a symbol, an object or an event in the environment positively or negatively (İnceoğlu, 2010). On the attitudes of people, especially their experiences in early life, previously obtained prejudice, dogma, beliefs and values, place of individuals in a group or society, "sense of self" of individuals and an individual's education are significant determiners (Özyalvaç, 2010).

The attitudes of students towards coursess affect their academic success throughout their education life. Attitudes of students towards physical education courses, as well as other courses, affect their motivation and interest towards the physical education courses. Findings of studies in the literature also support that opinion (Hünük, 2006); Sproule et al., 2007). It is known that physical education courses not only contribute to physical, mental and spiritual health development, but also to forming of national integrity and a healthy society (Hergüner, 1992). In this regard, major responsibilities fall onto the shoulders of families and education facilities in order to motivate children to sports and physical education activities in early ages. If this is provided, it can be expected that the students demonstrate a positive attitude towards physical education courses. However, initially, it is important to determine the factors which affect students' attitudes towards the courses. Within this scope, in this study, it was aimed to examine the attitudes of secondary education students towards physical education courses according to gender, age, doing sports regularly and participating in tournaments variables. The study aims to seek answers to the following questions;

1. Do the attitudes of the participants toward physical education class display statistically significant difference according to the gender variable?
2. Do the attitudes of the participants toward physical education class display statistically significant difference according to the age groups?
3. Do the attitudes of the participants toward physical education class display statistically significant difference according to the variable of doing sports?
4. Do the attitudes of the participants toward physical education class display statistically significant difference according to their status of attending sports competitions?

MATERIAL AND METHOD

In the study, the survey model, which is a frequently used model of the descriptive research model, is used. As the data gathering tool for the study, a likert type scale, which is commonly utilized in the

education field, is employed (Karadağ, 2010). In the detection of the students' attitudes towards the physical education courses, the Physical Education Courses Attitude scale, a 5-point likert type scale developed by Güllü & Güçlü (2009), is used.

The population of the study comprises of secondary school students from the city center and several counties of Sakarya. The sample group of the study comprises of 640 secondary school students who receive education in different secondary schools from the city center and several counties of Sakarya. In the determination of the sampling of the project, the simple unbiased sampling model was utilized.

Data Collection Tools

As the data gathering tool for the study, surveys were used. The used survey comprises of two sections and in the first section of the survey includes questions to determine the demographic characteristics of the students. In the second section of the survey, the "Physical Education Courses Attitude Scale", which was developed by Güllü & Güçlü (2009), was employed in order to determine the students' attitudes towards the physical education courses. The used survey includes a total of 35 questions as 11 negative and 24 positive questions. The scale has one dimension and the variance value that a factor expresses is 36,19% and the eigenvalue was determined to be 12,67. After conducting the reliability tests of the survey, it was determined that the Cronbach Alpha value is 0,94 and the reliability coefficient is 0,80. The scale is a 5-point likert type and the rating form consists of "Strongly Agree (5), Agree (4), Indecisive (3), Disagree (2), Strongly Disagree (1)". Out of the 35 matters in the scale, 11 of them are negative (matter 3, 17, 19, 20, 24, 25, 26, 29, 30, 34, 35) and 24 of them are positive. While the lowest point to acquire from the scale is 35, the highest possible point is 175 (Güllü & Güçlü, 2009). High scores received from the scale show that the participants' attitudes were positive toward physical education class, while low scores show that their attitudes are negative toward physical education class. The questionnaire which was used as a data collection tool was filled through face-to-face technique. Questionnaires which were found to be incomplete or filled incorrectly were not included in the study.

Statistical Analysis

In the analysis of the acquired data, SPSS 15.0 for Windows package software was used. In the determination of the percentage distribution of the demographic data of the students, frequency analysis was conducted. One-Sample Kolmogorov-Smirnov test was conducted to determine whether the points acquired from the attitude scale have a normal distribution and it was observed that the data do not demonstrate a normal distribution. Thus, non-parametric tests from basic statistics were used. Within this scope, Mann-Whitney U test was conducted to examine the effects of gender, age group, state of practicing sports and participating in sports tournaments on the attitude towards physical education courses.

Findings

The percentage distributions of the students in terms of gender, age group, regular sports activities and participating in sports competitions are given at Table 1.

Table 1. The Percentage Distributions of the Participants in Terms of Gender, Age, State of Doing Physical Exercises and Participating in Sports Competitions

Gender	F	%
Male	322	50,9
Female	311	49,1
Total	633	100,0
Age groups		
11-13 years	304	47,5
14-15 years	336	52,5
Total	640	100,0
State of Doing Physical Exercises Regularly		
I do physical exercises regularly	405	63,9
I do not do physical exercises regularly	229	36,1
Total	634	100,0
Participating in Sports Competitions		

I participate sport competitions	278	43,8
I do not participate sport competitions	356	56,2
Total	634	100,0

50,9% of the participants are male and 49,1% of them are female. It is seen that 47,5% of the students are in the 11-13 age groups and 52,5% of the are in the 14-15 age group. It is observed that 63,9% of the students do physical exercises regularly while 36,1% of them do not do exercise. Furthermore, it is determined that 43,8% of the students participate in sports competitions while 56,2% them do not take part in competitions.

At Table 2, the students' average points regarding physical education courses are given.

Table 2. The Students' Average Points Regarding Physical Education Courses

N	The Lowest	The Highest	X	Ss
644	51	175	147,37	18,282

It is identified that the students' average points regarding physical education courses are 147,37±18,282. As the fact that the lowest possible point is 51 and the highest possible point is 175 is taken into consideration, it is determined that students' attitude points towards physical education courses are high.

The findings regarding comparison of the students' attitude levels towards physical education courses in terms of gender, age, states of doing physical exercises and participating into sports competitions are given at Table 3.

Table 3. Comparison of The Participants' Attitude Levels Towards Physical Education Courses In Terms of Gender, Age, States of Doing Physical Exercises And Participating Into Sports

Gender	N	X	Ss	Z	P
Male	322	148,44	16,241	-,381	,703
Female	311	146,55	19,879		
Age					
11-13 years	304	148,16	17,469	-,667	,505
14-15 years	336	146,79	18,893		
State of Doing Physical Exercises Regularly					
I Do Physical Exercises Regularly	405	151,32	16,352	-7,229	,001
I Do Not Do Physical Exercises Regularly	229	140,82	19,364		
State of Participating into Sports Competitions					
I Participate	278	149,69	16,357	-2,272	,023
I Do Not Participate	356	145,81	19,481		

As the Table is examined, it is not identified any statistically significant difference between the participants' attitude levels towards physical education courses with regard to their gender ($p>0,05$). It is identified that the attitude levels of the participants in 11-13 age groups are higher than the attitude levels of the participants of 14-15 age group. However, it is not found statistically significant difference between the participants' attitude levels in terms of age groups ($p>0,05$). It is seen that the attitude levels of the participants who do physical exercises regularly towards physical education courses are higher than the attitude levels of the participants who do not do physical exercises. That differentiation between the

participants' attitude levels with regard to their state of doing physical exercises regularly is statistically significant (p<0,05). Besides, it is found out that the attitude levels of the participants who participate in sports competitions towards physical education courses are higher than the attitude levels of the participants who do not take part in competitions. It is identified statistically significant difference between the attitude levels of the participants regarding their state of participating in sports competitions (p<0,05).

DISCUSSION AND CONCLUSION

It is determined that the general attitude levels of the students participated in the study are high. It might be thought the facts that students like physical education course and the courses are productive for them are influential factors in such a result. In a similar study by Aybek et al (2012), the students' attitudes towards physical education courses have been found to be high. In another study conducted by Çelik and Pulur (2011), students' attitudes for physical education courses have been found to be at high levels. When the research findings of similar studies conducted in our country are evaluated, our study shows parallels with the literature.

It is found that attitude levels of secondary school students towards physical education classes do not differentiate significantly based on gender variable. When the findings of similar studies in the literature are examined, it is seen that results of several studies support the findings of our study (Gürbüz & Özkan, 2012; Başer, 2009; Taşmektepligil et al, 2006). On the contrary ,some other research findings in the literature suggest that gender effects general attitude levels towards physical education class significantly (Ekici et al 2011; Aybek et al, 2012; Koca et al, 2005; Willams & Bedward, 2001; Flores et al, 2008; Zeng et al, 2011). In this scope, it may be said that research findings in the literature regarding attitude levels towards physical education courses show contradictory results for gender variable. In the literature ,different findings regarding general attitude levels towards physical education courses stemming from gender specifications are found to be based on psychological characteristics of different genders, and different attitudes of male and female students towards physical education teachers (Aybek et al 2012; Alparslan, 2008)

It is found that the attitude levels of students participated in this study towards physical education do not differ significantly based on age groups. When we evaluate the research findings in the literature, it is found that some research findings show parallelism with our study while findings of some studies do not support our research findings. In a study conducted by Doğan (2011), it is found that attitude levels of students towards physical education do not differ significantly based on age groups. Furthermore, in a study conducted on primary school students which shows parallelism with our study, it is found that attitudes towards physical education do not differ substantially based on age groups (Gürbüz, 2011). In the study of Gürbüz & Özkan (2012), it is stated that new researches are to be conducted on the attitudes towards physical education courses on the primary school students of different age groups. Kangalgil et al (2006) examined the attitudes of primary, high school and university students towards physical education courses in terms of different variables and found that attitude levels of the students towards physical education courses increase as the students grow older.

Attitude levels of secondary school students towards physical education courses differ significantly based on their status of doing physical exercises. According to our results, the attitude levels of the students who do physical exercises regularly towards physical education courses are found to be significantly higher than the students who do not do physical exercises regularly. It may be expected that the expectations of the students who have the habit of doing sports regularly from sports activities are higher than the expectations of sedentary students. For this reason, it can be thought it is a possible result that attitude levels of students who do sports regularly and have high expectations from sports activities towards physical education courses are higher. Hence, research findings in the literature support this argument (Zengin, 2013; Chung & Philips;2002; Çelik & Pulur,2011).

The states of students' practicing sports in a sports club and participating in sports competitions are found to be an important determining factor on attitude levels towards physical education courses. Accordingly, it is concluded that attitude levels of the students practicing sports in a sports club are significantly higher than those students who do not practice sports in a club. In a similar study conducted by Alparslan (2008), it is found that students participating in sports activities with formal licenses have

higher attitude levels towards physical education courses than those students without formal licenses. Fundamental reason of this result is that students with formal licenses come together with physical education teachers in extracurricular activities and trainings more frequently and have disciplined approach toward learning from training sessions. In Karadağ (2010)'s study on primary and high school students, it is found that students who practice sports in a sports club have higher attitude levels towards physical education courses than those students without club membership. Similar study results in the literature show that students with formal sports activities have higher attitude levels towards physical education courses (Balyan et al, 2012; Doğan, 2011; Hünük, 2006). As a result of extensive evaluation of literature shows that our findings are supported by the literature results and in parallel with those results.

In conclusion, it is determined that most of the primary school students participated in our study do physical exercises regularly and mostly have high level of attitude towards physical education courses, that attitude levels towards physical education courses do not differ depending on age and gender. Besides this, it is found that the students' practicing sports in a sports clubs and participating formal matches affect their attitude towards physical education courses positively.

SUGGESTIONS

Based on the findings obtained through literature review, in order that students to be healthy it is suggested that they should start doing exercises and sports activities in early ages and render these activities life-style activities.

In this scope, families should prioritize exercise and sports activities among social activities for their children. Students should be directed to sports clubs depending on their talents and should be encouraged to do sports activities by their physical education teachers and school principles.

Successful sports students must be rewarded and introduced to other students in special events for motivation enhancing reasons.

It might be suggested that this study should be conducted depending on different age groups, and different school types (primary, high school, Anatolian, Super, Commerce, Religious high school etc.) and must be conducted in different regions of Turkey at state and private schools. And findings must be compared and combined.

According to our findings and research results, in order to increase attitudes of secondary school students toward physical education courses, they must be supported by their families and school administrations materially and morally. Therefore, they will set role models for other students, motivate on courses and sports and display more positive attitudes.

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Turkish Science Teachers' Attitudes towards the Constructivist Approach

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ABSTRACT

In this study, the attitudes of physics, chemistry and biology teachers towards constructivist approach were investigated in terms of participants' demographic information (e.g. subject area, professional seniority, education, participation to in-service training or not…). In total, 1958 teachers, who are working at high schools of Turkish Ministry of National Education in different cities, from all aforementioned subject areas participated in the study. The constructivist approach questionnaire used in the study was developed by Balım, Kesercioğlu, İnel and Evrekli (2002). Aforementioned questionnaire is designed in 5-point Likert type and consists of 20 items, which are divided into three factors. The Cronbach-Alpha reliability of sub-factors of the questionnaire is 0.93, 0.91 and 0.90 respectively. Demographic information used in the study was formed by the participants. The results of the study revealed that there is a positive correlation between the attitudes of the teachers towards constructivist approach and their demographic information, and the findings have been reported.

Keywords: *Constructivism; Attitude; Science Teachers*

INTRODUCTION

Primary issues emerging from the traditional instructional practices are that the taught knowledge is not permanent, that it is memorized as a preparation for exams and not remembered afterwards, that a vast majority of the knowledge are learnt incompletely or misunderstood by the students, and that students fail to use the attained knowledge and skills effectively in their future lives. These issues, which are the results of traditional instruction, lead educators to probe on developing more effective, productive and attractive instructional practices. Traditional instruction practices are principally based on the objectivist approach. Constructivism has the capability to address a majority of the problems experienced in traditional instruction practices.

According to constructivism, learning is an internal process that occurs in an individual's mind. The individual is the active creator and assimilator of his/her behaviors rather than being a passive receptor of the external stimuli. Knowledge is not stored in the human mind as in the way it was carried into. Human mind is not an empty storage where all the information is stored. Constructivist theory is based on the hypothesis that all learning occurs as a result of the structuring process in the mind. According to this hypothesis, individuals construct the elements to be learned through establishing relations with the previously learned ones in their minds. During the construction process, individuals try to establish meanings using the knowledge in their minds and try to adopt the constructed meaning. In other words, individuals do not process learning in the way it is presented to them; however, they process it in the way they have constructed in their minds (Arslan, 2007; Glaserfeld, 1995). In the light of these, it can be claimed that the most important aspect of the constructivist education is that it enables learner to structure,

construct, interpret and develop the knowledge. Constructivist approach is closely related to constructing the knowledge and it aims to reflect on how learners locate and place the knowledge in their minds. As a philosophical trend, constructivism states that individuals themselves construct their own knowledge and world-view. The principles of constructivism with respect to the learning practices are based on the idea that "learning emerges from the attribution of meanings by the individuals" (Brooks & Brooks, 1999; Glasersfeld, 1998; Glatthorn, 1994; Hein, 1991; Piaget, 1973; Saban, 2002; Vygotsky, 1978; Wilson, 1996; Cited by Duman, 2007, p. 328-330). According to the philosophers of the constructivist approach, all individuals should not be assumed to observe the same objects in the same way (Öztürk, 2008).

Before Constructivism was applied in our education system, a teacher-centered approach used to be adopted at schools. In other words, the topic to be taught, the aims to be achieved at the end of the lesson, the method of teaching and the evaluation techniques used to be determined beforehand by the teachers. Teachers used to prepare lesson plans (daily plans), write all the steps to be followed during the lesson and teach the content verbally. In this way, all the decisions were taken by the teachers in this teacher-centered environment while students listened to and watched the presented content passively. The greatest challenge of this teaching method was that it eliminated the creativity, self-respect and sense of responsibility in the learner. The passive learner in this situation forgets what s/he has learnt in a short time. Many science educators and education researchers have suggested that constructivist theory is an important strategy and relevant authorities should be encouraged to apply it in teaching (Hançer & Yalçın, 2007; İngeç & Aytekin, 2010; Koray, Akyaz & Köksal, 2007; Önder & Beşoluk, 2010; Özsevgeç & Ürey, 2010; Özmen, 2003; Özmen & Yıldırım, 2005). In this respect, teachers have the most important role. In this study, it is aimed to analyze the attitudes of physics, chemistry and biology teachers towards the constructivist approach according to certain demographic variables. The current study investigates the demographic characteristics of science teachers working in Turkey in a detailed way. The aim was to examine the attitudes of science towards in Turkey toward the constructivist approach in terms of dynamic characteristics. However, many studies conducted in the field emphasize that dependent variables that are examined need to be addressed with regards to the demographic features (Buluş, Duru, Balkıs & Duru, 2011; Cengiz & Serbes, 2014; Kurtdede Fidan & Duman, 2014; Toker, 2007). Moreover, the correlations between the demographic characteristics of science teachers and their attitudes toward the constructivist approach have been studied. It has been speculated that demographic features such as gender have crucial effects on their attitudes regarding how the constructivist approach can create an effective teaching process in the long run.

METHODOLOGY

This study is based on the idea that the analysis of teachers' attitudes towards constructivism in terms of certain variables would contribute to increase the levels of achievement and satisfaction in their profession. Accordingly, it was believed that certain demographic characteristics of teachers would also contribute to the interpretation of this correlation, and surveys that reflected the opinions of teachers were used. In the quantitative dimension of the research, data were collected through Constructivist Approach Attitude Scale (Balım, Kesercioğlu, İnel & Evrekli, 2002). The opinions of teachers in the sampling were determined through the survey questions. Furthermore, statistical analysis were performed and interpreted with the aim of revealing demographic characteristics of teachers. It was identified whether the attitudes of teachers towards the constructivist approach varied in a statistically significant way in terms of their demographical characteristics such as subject area, professional seniority, education, participation to in-service training or not.

Sampling

Constructivist approach has been employed in the secondary education programs of Turkey since 2004. With this aim, the Ministry of Turkish Education prepared secondary education programs and introduced them (Boydak, 2008; MEB, 2005; Sünbül, 2007). These changes which were carried out without a serious preparation phase and procedures and gathering the opinions of teachers were not accepted as they were targeted. Therefore, some important problems showed up. While many teachers could not adapt

themselves to what the new approach brought, some others decided to retire at their most experienced and effective age. Moreover, many teachers followed their traditional ways of teaching despite the new program and the new approach. These program changes on the paper were difficult to put into practice as they were not accepted both in the heart and the mind. In this regard, the present study has been conducted with the aim to determine the phase of constructivist approach after nearly 10 years of its introduction in terms of science teachers. For this reason, it has been tried to clarify the issue with regard to significant demographic features (e.g. subject area, professional seniority, education, participation to in-service training or not…).

The universe of the study consisted of physics, chemistry and biology teachers teaching at secondary schools of the Ministry of National Education in various cities of Turkey. With the aim of limiting the universe for generalizing the results according to the purposes of the study, the purposive sampling method was applied. The sampling was composed of 1958 teachers teaching at the secondary schools of the Ministry of National Education in different cities of Turkey. The data was collected by the Ministry after the teachers granted their consents to take part in the present research.

Data Collection Tools

Constructivist approach attitude scale: Constructivist Approach Attitude Scale was developed by Balım, Kesercioğlu, İnel and Evrekli (2002) for science teachers. During the analysis of the data obtained, researchers observed that the scale could be developed in diverse factor structures; therefore, they proposed three different factor structures and tested through the confirmatory factor analysis. According to the confirmatory factor analysis results, it was determined that two- and three-factor models were more coherent with the data. In other words, the questionnaire could be used with one, two or three factors based on the aims of the researchers. The sub-factors of the questionnaire are named as “Positive attitudes towards Constructivist Approach”, “Negative attitudes towards Constructivist approach” and “Attitudes towards self-improvement in Constructivism”. As a result of the validity and reliability studies performed by the researchers, the Cronbach Alpha values of the scale according to the one-, two- and three-factor structures were computed as 0,93, 0,91 and 0,90 respectively. The scale, which consisted of 20 items, was developed in Likert-type.

RESULTS

Results about the attitudes of science teachers towards the constructivist approach

In order to determine the attitudes of teachers towards the constructivist approach, Constructivist Approach Attitude Scale, developed by Balım, Kesercioğlu, İnel and Evrekli (2002) was administered to the teachers. The results were obtained from the evaluation of the scale with three factors as the interpretation of the analysis revealed the model with three factors was more appropriate to the purpose of the study. Firstly, the data obtained were analyzed through the Levene Test.

Table 1. The homogeneity test of the data obtained from the constructivist approach attitude scale according to the demographic characteristics

	Levene Statistics	sd1	sd2	p
Gender	4.857	1	1956	0.208
Field of study	2.017	2	1955	0.133
Experience	0.452	3	1954	0.716
Education	1.066	1	1956	0.302
Participation in in-service training	0.003	1	1956	0.958
Implementation of constructivist approach	0.390	1	1956	0.532
Perception of professional competence	1.960	1	1956	0.162

*p<0.05

As can be seen in the Table 1, the values indicate the homogeneity of the variances. Therefore, the administration of variance analysis and t-test for the data analysis was found statistically appropriate.

The relationship between the attitudes of teachers towards the constructivist approach and the gender variable

The results of the t-test analysis, which was performed in order to determine whether there were differences in the attitudes of teachers towards the constructivist approach according to their genders, was displayed in Table 2.

Table 2. The comparison of the attitude scores regarding the constructivist approach according to the gender variable

Constructivist Approach Attitude Scale	Gender	N	$\bar{X}$	SD	df	t	p
Positive Attitude	Female	954	3.98	0.580	1956	2.12	0.034*
	Male	1004	3.92	0.628			
Negative Attitude	Female	954	2.82	0.284	1956	-3.51	0.000*
	Male	1004	2.87	0.328			
Attitude Towards Self-Improvement	Female	954	3.69	0.408	1956	-0.37	0.970
	Male	1004	3.67	0.440			
General Attitude	Female	954	3.98	0.580	1956	1.01	0.310
	Male	1004	3.92	0.628			

*p<0.05

As indicated in Table 2, female teachers had more positive attitudes towards the constructivist approach than the male teachers, and the male teachers had higher negative attitude scores than female teachers. The most important statistical proof of this finding was the significant difference at the p=0.05 level in the positive attitude and negative attitude sub-dimensions of the scale according to the gender variable.

The relationship between the attitudes of science teachers towards the constructivist approach and their education levels

The relationship between the attitude scores of participant teachers in terms of their education levels was evaluated according to the t-test analysis results and the findings were displayed in Table 3.

Table 3. The comparison of the attitude scores regarding the constructivist approach according to the gender variable

Constructivist Approach Attitude Scale	Educational background	N	$\bar{X}$	SD	df	t	p
Positive Attitude	Undergraduate	1587	3.95	0.600	1956	0.506	0.613
	Graduate	371	3.93	0.631			
Negative Attitude	Undergraduate	1587	2.81	0.296	1956	2.41	0.016*
	Graduate	371	2.85	0.311			
Attitude Towards Self-Improvement	Undergraduate	1587	3.98	0.640	1956	-0.815	0.415
	Graduate	371	4.01	0.645			
General Attitude	Undergraduate	1587	3.68	0.421	1956	0.588	0.556
	Graduate	371	3.67	0.439			

*p<0.05

Table 3 shows the t-test results of the attitude scores of participant teachers in terms of their education levels. Teachers with undergraduate degrees were observed to have more positive attitudes towards the constructivist approach; however, it was reversed in the dimension of attitudes towards self-improvement, and teachers with graduate degrees obtained higher scores. Yet, the analysis indicated that the significant difference was only observed in the sub-dimension of negative attitudes towards constructivist approach, and this difference was in favor of teachers with graduate degrees. That is, teachers having graduate degrees have much more negative attitudes for the constructivist approach than other teachers.

The relationship between the attitudes of teachers towards the constructivist approach and in-service training

Table 4 displays the results of the analysis carried out to compare the participating teachers' attitudes towards constructivist approach according to their participation in at least 5-days in-service training activities in last 3 years.

Table 4. The comparison of the attitude scores regarding the constructivist approach according to the participation in in-service training programs

Constructivist Approach Attitude Scale	In-service training	N	$\bar{X}$	SD	df	t	p
Positive Attitude	Yes	927	3.97	0.610	1956	1.238	0.218
	No	1031	3.93	0.601			
Negative Attitude	Yes	927	2.82	0.313	1956	2.88	0.004*
	No	1031	2.86	0.303			
Attitude Towards Self-Improvement	Yes	927	4.01	0.626	1956	1.098	0.273
	No	1031	3.97	0.654			
General Attitude	Yes	927	3.69	0.427	1956	0.778	0.439
	No	1031	3.67	0.423			

*p<0.05

According to Table 4, the negative attitude average scores of teachers, who did not attend in-service training activities, were higher than the average scores of teachers who participated. These differences in values were also reflected on statistical differences [$t_{(1956)}$= 2.88; p<0.05]. In other words, teachers who did not attend in-service training activities had more negative attitudes towards constructivist approach than those who participated.

The relationship between the attitudes of teachers towards the constructivist approach and implementation of the constructivist approach

In this part of the study, t-test was administered in order to determine whether there was a significant difference in the attitude scores of teachers with respect to the implementation of the constructivist approach and the results were displayed in Table 5.

Table 5. The comparison of the attitude scores regarding the constructivist approach according to the implementation of constructivist approach

Constructivist Approach Attitude Scale	Implementation of Constructivist Approach	N	$\bar{X}$	SD	df	t	p
Positive Attitude	Yes	909	4.12	0.577	1956	12.5	0.000*
	Sometimes	1049	3.79	0.588			
Negative Attitude	Yes	909	2.82	0.315	1956	-2.99	0.003*
	Sometimes	1049	2.86	0.302			

Attitude Towards Self-Improvement	Yes	909	4.08	0.647	1956	5.78	0.000*
	Sometimes	1049	3.91	0.625			
General Attitude	Yes	909	3.79	0.416	1956	10.9	0.000*
	Sometimes	1049	3.58	0.409			

*p<0.05

According to Table 5, there were differences between the average scores of teachers who implemented the constructivist approach and those who sometimes implemented the approach. These differences were found to be statistically significant.

The relationship between the attitudes of teachers towards the constructivist approach and their professional competence

Table 6 displays the results of the t-test analysis, which was administered in order to evaluate the attitude scores of teachers who found themselves competent or partly competent in their professions.

Table 6. The comparison of the attitude scores towards constructivist approach according to the professional competence

Constructivist Approach Attitude Scale	Professional Competence	N	$\bar{X}$	SD	df	t	p
Positive Attitude	Yes	1589	3.98	0.598	1956	4.48	0.000*
	Partly	369	3.82	0.622			
Negative Attitude	Yes	1589	2.84	0.310	1956	-1.34	0.166
	Partly	369	2.86	0.302			
Attitude Towards Self-Improvement	Yes	1589	4.00	0.639	1956	1.23	0.217
	Partly	369	3.95	0.649			
General Attitude	Yes	1589	3.70	0.420	1956	3.62	0.001*
	Partly	369	3.61	0.437			

*p<0.05

Table 6 displays values and figures, which indicate that the attitude scores of teachers, who found themselves competent in their profession, had more positive attitudes than other teachers. In other words, teachers, who accept themselves as competent in their profession, had more positive attitudes towards the constructivist approach.

The relationship between the attitudes of teachers towards the constructivist approach and their fields of study

The mean and standard deviation scores regarding the attitudes of participating Physics, Chemistry and Biology teachers towards constructivist approach were displayed in Table 7.

Table 7. Average attitude scores and standard deviations regarding the constructivist approach according to their fields of study

Constructivist Approach Attitude Scale	Subject Field	N	$\bar{X}$	SD
Positive Attitude	Physics	709	3.88	0.644
	Chemistry	426	3.93	0.600
	Biology	823	4.01	0.568
	Total	1958	3.95	0.606
Negative Attitude	Physics	709	2.88	0.318
	Chemistry	426	2.86	0.302
	Biology	823	2.81	0.300
	Total	1958	2.84	0.308
Attitude Towards Self-Improvement	Physics	709	3.96	0.679
	Chemistry	426	3.95	0.613
	Biology	823	4.03	0.619
	Total	1958	3.99	0.641
General Attitude	Physics	709	3.65	0.450
	Chemistry	426	3.67	0.427
	Biology	823	3.71	0.398
	Total	1958	3.68	0.425

Data in Table 7 shows the mean attitude scores. Table 8 displays the data required in order to determine whether there was a significant difference in the attitude scores of physics, chemistry and biology teachers towards the constructivist approach.

Table 8. Attitudes of teachers towards constructivist approach according to the field of study variable: One-way ANOVA

	Source of variance	Sum of squares	df	Mean of squares	F	p
Positive attitude	Intergroup	6.204	2	3.102	8.509	0.000*
	Intragroup	712.694	1955	0.365		
	Total	718.898	1957			
Negative attitude	Intergroup	1.964	2	0.982	10.391	0.000*
	Intragroup	184.741	1955	0.094		
	Total	186.705	1957			
Attitude Towards Self-Improvement	Intergroup	2.637	2	1.319	3.212	0.040*
	Intragroup	802.474	1955	0.410		
	Total	805.111	1957			
General Attitude	Intergroup	1.722	2	0.861	4.781	0.000*
	Intragroup	351.987	1955	0.180		
	Total	353.708	1957			

*p<0.05

As displayed in Table 8, the one-way variance analysis over the attitudes of physics, chemistry and biology teachers towards the constructivist approach indicated significant differences at the p=0.05 level in all the sub-dimensions. In other words, teachers' attitudes towards the constructivist approach showed significant differences according to their fields of study. To determine the differences among the groups, they were compared to each other and significant differences were found between the physics and biology teachers.

The relationship between the attitudes of teachers towards the constructivist approach and their

professional experiences

Table 9 displays the results of the analysis regarding the positive, negative and self-improvement attitude average scores of teachers towards constructivist approach according to their professional experiences.

Table 9. Teachers' average attitude scores and standard deviations regarding the constructivist approach according to their professional experiences

Constructivist Approach Attitude Scale	Experience	N	$\overline{X}$	SD
Positive attitude	1-10 years	341	3.98	0.597
	11-15 years	441	3.93	0.586
	16-20 years	587	3.94	0.622
	More than 20 years	589	3.94	0.609
	Total	1958	3.95	0.606
Negative attitude	1-10 years	341	2.80	0.272
	11-15 years	441	2.84	0.297
	16-20 years	587	2.85	0.314
	More than 20 years	589	2.86	0.329
	Total	1958	2.84	0.308
Attitudes towards self-improvement	1-10 years	341	4.03	0.619
	11-15 years	441	4.00	0.623
	16-20 years	587	3.98	0.657
	More than 20 years	589	3.97	0.650
	Total	1958	3.99	0.641
General attitude	1-10 years	341	3.70	0.406
	11-15 years	441	3.67	0.420
	16-20 years	587	3.68	0.435
	More than 20 years	589	3.68	0.429
	Total	1958	3.68	0.425

Table 9 displays the differences among the average attitude scores of teachers towards the constructivist approach according to their years of experience in the profession. ANOVA analysis was performed in order to determine whether the differences were significant and the results were presented in Table 10.

Table 10. Attitudes of teachers towards the constructivist approach according to the experience variable: One-way ANOVA

	Source of variance	Sum of squares	df	Mean of squares	F	p
Positive attitude	Intergroup	0.558	3	0.186	0.506	0.678
	Intragroup	718.340	1954	0.368		
	Total	718.898	1957			
Negative attitude	Intergroup	0.810	3	0.270	2.839	0.037*
	Intragroup	185.894	1954	0.095		
	Total	186.705	1957			
Attitude Towards Self-Improvement	Intergroup	1.057	3	0.352	0.856	0.463
	Intragroup	804.054	1954	0.411		
	Total	805.111	1957			
General Attitude	Intergroup	0.129	3	0.043	0.238	0.870
	Intragroup	353.579	1954	0.181		
	Total	353.708	1957			

*p<0.05

The values in Table 10 indicated that there was not a statistically significant difference in all sub-dimensions; however, there was a statistically significant difference in the negative attitude dimension. Tukey tests, which were performed to identify in which experience levels these differences in question occurred, indicated that there was a significant difference between the 1-10 years of experience and the experience of 20 years and more. There were no significant differences in other experience groups.

CONCLUSION AND DISCUSSION

In this study, attitudes of Physics, Chemistry and Biology teachers towards the constructivist approach were analyzed in terms of certain variables. One of the characteristics of the constructivist approach practices that distinguish them from the other practices is the teachers who guide their learners' thoughts instead of transmitting the knowledge and act as an individual to ensure their students' questioning the knowledge (Vermette & Foote, 2001). Teachers guide their students to structure the knowledge and provide them with examples from everyday life to associate the new knowledge with the previous ones. Briefly, the role of the teacher in the constructivist approach is a guider creating appropriate opportunities for the students to structure the knowledge (Taber, 2000). It is believed to be quite essential for the education and training practices to understand the reasons of teachers' attitudes, to identify the factors developing these attitudes and to learn about the competencies of teachers. Teachers need to have more personal competencies and qualifications in order to ensure that students structure, interpret and develop the topics. Hence, changing understandings and life opinions, which are continuously shaped through attaining new dimensions, require reshaping in the teaching profession in order to comply with these rapid changes. Rather than being an individual that teaches in front of the board in the classroom, a teacher is defined as an actor in a play, who appears in a different identity every day in the classroom.

Changes in the world of education about teaching and learning have led to changes in the definition of a teacher as well as introducing a new model, which is quite different from the traditional one (Borko & Putnam, 1996; Sallouma & BouJaoude, 2008; Shulman, 1986; 1987). Today, teachers are perceived as the interpreters of scientific phenomena and play an important role in presenting students with appropriate, meaningful and exemplified definitions (Mortimer & Scott, 2003; Ogborn, Kress, Martins & McGillycuddy, 1996; Scott, Mortimer & Aguiar, 2006; Stefani & Tsaparlis, 2009). The analysis of the correlations between the attitudes towards constructivist approach and the variables of gender, education level, participation in in-service training activities, professional competence experience indicates that female teachers have more positive attitudes towards the constructivist approach than the male teachers. In the same way, teachers with graduate degrees and participating in in-service training have higher attitude scores for the constructivist approach. Moreover, teachers who find themselves competent in their professions and are senior teachers have more positive attitudes towards the constructivist approach. In a study conducted by Ocak (2010) to determine the attitudes of primary school teachers towards constructivist learning practices, it was concluded that the attitudes towards the constructivist approach did not vary according the gender variable. In the same study, it was specified that the attitudes of teachers with 1-5 years of experience towards the constructivist approach were significantly lower than the attitude scores of teachers with 11 or more years of experience. According to another study by İnel, Türkmen and Evrekli (2010) to investigate the prospective primary school teachers' attitudes towards the constructivist approach, it was highlighted that prospective female teachers have more positive attitudes than prospective male teachers. Eskici (2013) found out that the attitudes of primary school teachers towards the constructivist approach practices showed no significant differences according to the years of experience, fields of study, gender, work department, education level (undergraduate or graduate); however, the attitudes were significantly different in terms of the in-service training activities regarding the constructivist approach. The present study investigated the attitudes of teachers towards the constructivist approach according to their professional competence perceptions. As a result, it was concluded that teachers who accept themselves as competent in their professions had positive attitudes. The related literature includes studies to determine the relationship between the attitudes of teachers towards the

constructivist approach and their self-efficacy feelings, perceptions and beliefs. According to these studies, it can be claimed that there is a correlation between the attitudes towards the constructivist approach and self-efficacy (Çayak, 2014; Eskici, 2013; Kasapoğlu & Duban, 2012; Narayan & Lamp, 2010).

The findings of many research studies are also consistent with the findings of the current study. Karadağ, Deniz, Korkmaz and Deniz (2008) concluded that although the teachers had positive attitudes for the constructivist approach, they were doubtful about its practices. Evrekli, İnel, Balım and Kesercioğlu (2009) found out that teachers had 853 positive attitudes towards the constructivist approach. The present study also came to the conclusion that teachers had generally positive attitudes towards the constructivist approach. Çınar, Teyfur and Teyfur (2006) investigated the opinions of primary school teachers and administrators regarding the constructivist approach and program. As a result of the research, teachers and administrators had generally positive opinions about the constructivist approach and the lack of infrastructure in the schools was an inhibiting factor in applying the new programs.

The constructivist approach has changed the quality and the roles of education programs, teachers, learners and parents, and the structure of the training practices. The role of authoritarian teacher at the setter of teacher practices has been replaced with an understanding which guides and creates learning opportunities for learners to structure the knowledge. The student profile has gradually changed; s/he has started to develop qualities to think, search and generate ideas. However, the constructivist approach has both negative and positive sides. The related literature criticizes that the constructivist approach highly rejects the objective knowledge by grounding on the subjectivity; undesirable learner behaviors occur as a result of excessive freedom; individuality comes to the forefront (Şimşek, 2004); there are some uncertainties in the practices; technology is intensively needed; it is difficult to administer in crowded classrooms; there are time and evaluation problems. For the constructivist approach, which have many positive results in lots of contemporary countries, to achieve successful results in our country, it is required by the shareholders in the education system (teachers, students, administrators) and the parents to adopt the approach without prejudices, and especially students and teachers must have the necessary qualifications and positive attitudes regarding this education approach. To provide learners with the appropriate constructivist approach practices, biology, physics and chemistry teachers need to develop positive attitudes for the implementation of this education approach. The related literature indicates that gender is an important variable in the use of constructivist approach and many techniques, methods and strategies that support constructivist approach (Aktaş, 2013; Çınar, Teyfur & Teyfur, 2006; İzci & Şardağ, 2016; Ocak, 2010). The aim has to be reducing the differences between the genders and eventually eliminating them. However, as the current study is a case study, it has been found appropriate to examine gender factor among the other demographic variables.

Eventually, today, individuals live in such an environment, where the amount of scientific knowledge continuously increases and great changes are observed in technological innovations. In such a world, where rapid and continuous changes are experienced, various innovations are observed to occur in various fields of the education as well as the science education. The developments and trends in science education ensure continuous improvement in the teaching environments of physics, biology and chemistry, and even it is a must. The quality of biology, physics and chemistry education has an essential role in the future of the societies. Therefore, in the current changing education and teaching approach, all societies are trying to improve the quality of science education. Effective science teaching not only involves searching for the scientific facts by the students but also is essential for ensuring that students develop a life philosophy, which enables them to learn about experimental measures as well as logical, critical and reflective thinking. In biology, physics and chemistry teaching environments, students learn about the processes of observation, hypothesis development, testing, data collection, data-interpretation and presentation of the findings by using scientific methods, and they attain scientific thinking skills through integrating their imagination and creativity into these processes. In order students to have these skills and competence, science teachers need to adopt the constructivist approach. Therefore, science teachers at upper-secondary schools should have the required knowledge and skills to train their students in accordance with the aforementioned objectives. At this point of view, science teachers at secondary schools should implement the constructivist approach in their lessons as much as possible. Hence, although constructivism

has been criticized for its certain aspects, it is still an approach that needs to be adopted in terms of providing positive feedback to teachers about student attainments, improving potentials of the students and increasing the level of performance.

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Understanding of Macroscopic, Microscopic and Symbolic Representations Among Form Four Students in Solving Stoichiometric Problems

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ABSTRACT

The purpose of this article is to determine the levels of understanding for solving Stoichiometry problems from the aspect of macroscopic, microscopic and symbolic representations of high, average and low achieving students after infusion of metacognitive skills. Nine form four students aged sixteen years old from a secondary school in Kuala Lumpur, Malaysia were involved in this research. Data were collected through thinking aloud sessions and documents of students' worksheets. Findings showed that the level of understanding from the aspect of the macroscopic, microscopic and symbolic representations among high achieving students appeared high and solved all the Stoichiometry problems related to balancing chemical equations at the end of the infusion. The average and low achieving students also seemed to understand the three levels of representations and could solve most of the problems except that they could not understand the mole ratio in balancing chemical equations. This implies that the understanding of the mole ratio is necessary for solving stoichiometric problems.

Keywords: *Metacognition, metacognitive skills, macroscopic representation, microscopic representation, symbol representation, think aloud, Stoichiometry.*

INTRODUCTION

Chemical knowledge and understanding of our world is generated, expressed, taught, and communicated at three different "levels", traditionally called the macroscopic, the submicroscopic, and the symbolic levels. It has been one of the most powerful and productive ideas in chemical education for the past 25 years (Gilbert & Treagust, 2009a; Johnstone, 1982; Talanquer, 2011).

Stoichiometry is one of the most basic topics in learning chemistry. Hence, understanding the concept of Stoichiometry is critical to solving chemistry problems. For example, a chemistry equation is the basic concept for solving various chemistry problems. Thus, without understanding the chemistry reaction indicated in an equation, it will be difficult to solve problems (Chandrasegaran et. al, 2007; Davidowitz, et. al, 2010; Laugier & Dumon, 2004). Understanding concepts in chemistry can be achieved if the students are able to perform higher levels of mind processing using an internal representation or a mental model which has been constructed using all three macroscopic, microscopic and symbolic representations (Sunyono, Yuanita, & Ibrahim, 2015, Chandrasegaran et al., 2007; Johnstone, 1991).

According to Talanquer (2011) the nature of the macroscopic level has also been the subject of various interpretations. Some authors characterise the macroscopic level as mainly including the actual phenomena that we experience in our daily lives or in the laboratory; it is the level of the observable and tangible (Treagust, Chittleborough & Mamiala, 2003). However, others describe the macro level as representational in nature, mainly shaped by those concepts and ideas used to describe the bulk properties of matter, such as pH, temperature, pressure, density, and concentration (Chandrasegaran, Treagust & Mocerino, 2007; Gilbert & Treagust, 2009b; Nakhleh & Krajcik, 1994). Submicroscopic models of matter relate to the importance of identifying and differentiating between relevant size or length scales for the chemical theories and models of matter (Johnstone,1991). According Talanquer (2011) the visual language of chemistry can be thought of as comprised of symbols and icons used to represent the properties and behaviour of chemical substances and processes. Symbols include those signs used by convention to represent, for example, the composition of matter (e.g. H, O, H_2O), or its properties and behaviour (e.g. +, (g), →). In many cases, the signs used in chemistry combine both symbolic and iconic values (Hoffmann & Laszlo, 1991). Talanquer (2011) explained the students have an easier time grasping ideas at the macro than at the submicro levels (Johnstone, 1982, 1993).

In learning Stoichiometry, students should not only be able to learn using algorithms, but also understand the phenomena at a molecular level through imagination from the macroscopic, microscopic and symbolic aspects. Chemical learning which only focuses on algorithms will result in a shallow understanding (Dahsah & Coll, 2008). As such, the roles of imagination in chemistry learning become very important.

According to Brown et al (2003), Stoichiometry is a study of quantitative relationships in chemical formulae. Lack of skills in constructing chemical formulae, writing balanced chemical equations, lack of understanding of the mole concept, molar mass, molar volume, quantitative limiting reagents can cause students to be unable to solve Stoichiometry problems, (Glazer & Devetak, 2002; Furio, Azcona, & Guisasola, 2002). Therefore, Stoichiometry is a collective term for the quantitative relationships between the masses, number of moles and the number of particles (atoms, molecules and ions) of the reactants and products in a balanced reaction. A Stoichiometry quantity is the amount of product or reactant in a balanced reaction (Averill & Eldredge, 2007)

A chemical equation is an expression that gives the identities and quantities of the substances of reactants and products in a chemical reaction. A chemical equation displays the exact mole ratio of reactants and products which is the coefficient. Converting amounts of substances to moles, and vice versa, is the key to all Stoichiometry problems. The amounts of substances are given in either units of mass (grams or kilograms), weight (pound or tons) or volume of gases (liters or gallons) (Averil & Edredge, 2007).

Metacognition is defined as awareness and management of one's thinking or "thinking about thinking", (Kuhn & Dean, 2004). Metacognition is also thought of as the capacity to reflect upon one's actions and thoughts, (Schraw, 2001) or knowledge and regulation of one's own cognitive system (Brown, 1987). Theoretical models support two main components of metacognition: metacognitive knowledge or knowledge of cognition, and metacognitive skillfulness or regulation of cognition, (Schraw, 2001). Knowledge of cognition refers to the explicit awareness of the individuals about their cognition; that is, knowing about things (declarative knowledge), knowing how to do things (procedural knowledge), and knowing why and when to do things (conditional knowledge). Metacognitive skillfulness or regulatory metacognition is the executive component that comprises the repertoire of activities used by individuals to control their cognition while performing a task (Schraw, 2001; Schraw, Crippen & Hartley, 2006). The regulatory aspect of metacognition, as regulatory activities are believed to be integral to the development of problem-solving skills.

Several different metacognitive regulatory activities have been identified that can be grouped into three categories: planning, monitoring, and evaluating. These regulatory skills guide the problem-solving process and their refinement is believed to bring improved efficiency and learning (Sandi-Urena, Cooper & Stevens, 2012). In general, past research suggests that metacognitive strategy instruction can promote increased problem solving in the classroom (Lin, Schwartz & Hatano, 2005).

Metacognition has been shown to lead to deeper, more durable, and more transferable learning (Bransford, Brown, & Cocking, 2000). Students come to understand the difference between superficial memorization and real learning through specific classroom interventions, which were also designed to help students develop metacognitive learning strategies (Zhao, Wardeska, McGuire & Cook, 2014).

Metacognition is necessary in solving stoichiometric chemistry problems involving the visualization of the macroscopic, microscopic and symbolic levels. Solving Stoichiometry problems as a very difficult concept in chemistry subject (Sanger, 2005; Haidar & Naqabi, 2008; Chandrasegaran, Treagust & Waldrip, 2009). In Malaysia, the researches has been done by several researchers as Karuppiah (2004), Boon (2014) and Hafsah et. al (2014). Students were facing difficulties because this concept involving varieties of skills which were writing chemical formula, chemical equations and mathematics skills. Zvia Kaberman and Yehudit Judy Dori (2008) investigated stimulating chemistry students to generate complex questions enabled with a metacognitive strategy which enabled them to be aware of their own cognitive process and to self-regulate it with respect to the learning task. In relation to this, previous qualitative research has indicted that science students also model their teachers in relation to the cognitive and metacognitive skills that are demonstrated to them (Butler & Winne, 1995). Therefore, there is a clear necessity to infuse metacognitive strategies within the teaching and learning process in a science classroom (Pintrich 2002). A quantitative study used by Nyanhi (2013) revealed that the non-emphasis of chemistry teachers in the microscopic level lead to misconceptions.

The Present Study

This section will begin with how the instructional materials and tasks for infusion were carefully thought off. This will be followed by how the data was collected during infusion. The infusion was done among students of a whole class. Nevertheless, nine students (3 high achieving, 3 average achieving and 3 low achieving students) were purposefully selected. Finally, how the analysis was done is described.

Instruction materials and problem solving task.

Instruction Materials and the Stoichiometry Problem Task were prepared. Preparation of the instruction was referred to Specification of Curriculum Form Four Chemistry, Integration Curriculum of Secondary School, Ministry of Education (2005), Chemistry references and activities of metacognitive skills, (Flavell, 1987; Gama, 2004).

The Stoichiometry Problem Task consisted of seven structured Stochiometry questions. There were two sections, the first section contained three questions to construct empirical and molecular formulae. The aim of this section was to identify the ability of students to convert macroscopic to microscopic and to symbol representations. The second section contained four Stoichiometry questions involving balanced chemical equations. The aim of this section was to identify students' ability to convert from macroscopic, to microscopic then to symbols and back to macroscopic representations while solving Stoichiometry problems. The fourth and seventh questions were not given the balanced chemical equations. This was to identify the students' ability to write the balanced chemical equations. The fifth and sixth questions included the balanced chemical equations. Both the Instructional Materials and Problem Solving Task were validated by an expert panel. The expert panel consisted of two excellent chemistry teachers and two university lecturers who are in the field of metacognition and science education. Explanations for the conversion between macroscopic, microscopic and symbolic representations in Stoichiometry Problems Task is given in Table 1. The single direction arrows mean that the conversion is one way, whereas, double sided arrows mean that the conversion can be either way.

Table 1 Conversion of Macroscopic, Microscopic and Symbols representations In Stoichiometry in the Problem Tasks

Question No.	Aim of Questions	With/ without Chemical Equations	Conversion of representation
1	Empirical Formula with two elements.	Without chemical equation was given.	Macroscopic →microscopic →symbol
2	Empirical Formula with three elements.	Without chemical equation was given.	Macroscopic →microscopic →symbol
3	Empirical Formula and molecular formula with two elements	Without chemical equation was given.	Macroscopic →microscopic →symbol
4	To calculate number of particles of atoms	Without chemical equation was given.	Macroscopic → microscopic↔ symbol → microscopic.
5	To calculate the mass of product	With chemical equation was given.	Macroscopic →microscopic ↔ symbol → macroscopic.
6	To calculate the mass of reactants.	With chemical equation was given.	Macroscopic →microscopic ↔symbol → macroscopic.
7	To calculate the volume gas of product	Without chemical equation was given.	Macroscopic →microscopic ↔symbol → macroscopic.

(Modified from Chandrasegaran, Treagust & Mocerino, 2007)

Infusion of Metacognitive Skills.

Once the activities were ready, the activities for infusion of Metacognitive skills was carried out in two phases. The First phase was infusion of metacognitive knowledge and metacognitive regulation in teaching and learning. The Second stage was infusion of metacognitive knowledge and metacognitive regulation explicitly in Stoichiometry problems.

The first phase involved the teaching and learning of the topic chemical formula, chemical equation and Stoichiometry problems together with the infusion of metacognitive skills for eight weeks. These teaching and learning phase consisted of 14 sessions and each session was about 70 minutes. The Teaching and learning of metacognitive knowledge and metacognitive regulation in the first phase consisted of four stages for every lesson as shown in Figure 1.

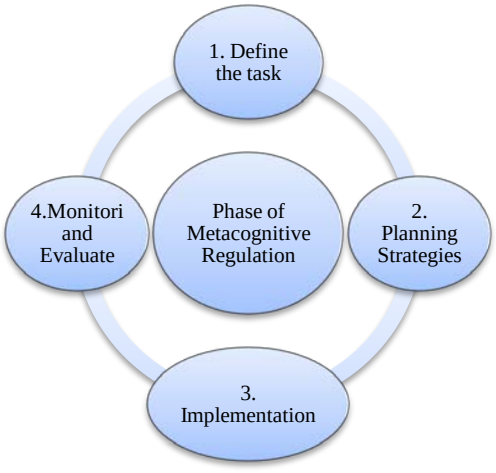


Figure 1 **: Phase of Infusion of Metacognitive Knowledge and Metacognitive Regulation**

The first stage needed students to define problem, analysis the problem and the information given. The second stage was to state the goal and design the solution plan. Third, was the implementation of the solution plan. The fourth stage was monitoring and evaluation as verification of the solution. Then there is a check as to whether all pertinent data had been used and whether the solution could have been obtained differently.

The Second phase was the infusion of metacognitive knowledge and metacognitive regulation explicitly in solving the Stoichiometry Problem Task which had seven questions. Students completed the exercises on the Stoichiometry questions using metacognition skills. The Students also needed to monitor and evaluate the Stoichiometry questions at the end of their work.

Data Collection and Analysis

There were nine participants in the study. Qualitative data collection techniques were used in the study namely from the think aloud method and supporting data were gained from documents of students' class work. Nine verbatim transcriptions of think aloud sessions were collected from the nine participants after they completed the Stoichimetry Problem Task questions.

Data transcripts of think aloud sessions were coded and categorised. Furthermore, every question in the Stoichiometry Problem Task was guided by the M-Demand for number of minimum steps needed to solve the problems. Students' answers were compared with a rubric for the questions of the Stoichiometry Problem Task. Table 2 shows the coding of each step to solve the questions and the conversion levels of representation. The steps and the conversion levels were modified with reference to the definition of macroscopic, microscopic and symbolic by Chandransegaran, Treagust and Mocerino (2007). The modifications were verified by the panel of experts.

Table 2 Solving Steps of Empirical Formula, Molecular Formula and Stochiometry Problems in Stoichiometry Problem Task

Encoding Steps	Explanation	Conversion of representation
Step Zero	Identify type of elements and mass of elements	Macroscopic
Step 1	Writing balanced chemical equation	Symbolic
Step 2	Calculating molar mass	Symbolic ↔macroscopic
Step 3	Calculating number of mole atom of element from its masses	Macroscopic ↔microscopic
Step 4(a)	Calculating mole ratio to become integer number	Microscopic↔ microscopic
Step 4(b)	Calculating the simplest mole ratio.	Microscopic↔ microscopic
Step 5	Writing empirical formula	Microscopic ↔symbolic
Step 6(a)	Determining mole ratio from balanced chemical equation	Symbolic ↔ microscopic
Step 6(b)	Calculating number of mole from balanced chemical equation	Microscopic↔ microscopic
Step 6(c)	Calculating number of atom from number of mole	Microscopic↔ microscopic
Step 7	Converting number of mole to volume of gas	Microscopic↔ macroscopic
Step 7	Converting number of mole to mass	Microscopic ↔macroscopic

(*Rearranged from Chandransegaran, Treagust & Mocerino, 2007)*

There was M-Demand for every question in the Stoichiometry Problem Task. Table 3 shows the M-demand (Niaz, 1989) for every question.

Table 3: Question and the M-Demand

Question Number	M-Demand
1	3
2	4
3	5
4	5
5	5
6	6
7	6

A rubric for every question was prepared. Table 4 shows an example of the rubric analysis for question seven.

Question 7; In industrial countries, mostly older people suffer from gastric pain. Medicine that can reduce gastric pain is called anti-acid. Anti-acid is a chemical compound which neutralises acids in the stomach. Acids in the stomach contain hydrochloric acid (HCl) which dissolve in water, which react which anti-acids to form water (H_2O), carbon dioxide (CO_2) and calcium chloride ($CaCl_2$). Generally, an anti-acid is a carbonate salt, mostly calcium carbonate, $CaCO_3$. If we see the content at the label outside the bottle, the formula of the compound is calcium carbonate ($CaCO_3$) which is an as anti-acid.

What is the volume of carbon dioxide produced if 20g of calcium carbonate is used? [Relative Atomic Mass; Ca, 40; C,12; O,16; H,1; Cl; 35.5, molar volume; 22.4 dm^3 mol^{-1} at s.t.p]

Table 4 Rubric for question Seven of the Stoichiometry Problem Task

Question 7

0. Mass of calcium carbonate is 20g. — Step zero
1. Writing balanced chemical equation, $CaCO_3+2HCl \rightarrow CaCl_2 + CO_2+H_2O$ — Step 1
2. Molar calcium carbonate, $CaCO_3$= $CaCO_3$ = 40 + 12 + 16 x 3 =100$gmol^{-1}$ — Step 2
3 Number of moles of 20 g calcium carbonate = 20 /100= 0.2 mol — Step 3

6(a). Mole ratio $CaCO_3$: CO_2 = 1:1 — Step 6(a)

6(b). Number mol of carbon dioxide = 0.2 mol — Step 6(b)

7. Volume of carbon dioxide = number mole x molar volume
= 0.2 x 22.4 dm^3 mol^{-1} =4.48 dm^3 — Step 7

M-Demand= 6 (This is because Step zero does not involve conversion)

An example of analysis for a thinking aloud transcript for Syih-H (high achieving student) for question number seven of the Stoichiometry Problem Task by using the rubric for question number seven. Syih-H showed six steps as shown below,

Row number	Thinking aloud Transcript Syih-H for question seven	Step
81	Equation, $CaCO_3 + 2HCl \rightarrow H_2O + CaCl_2 + CO_2$	Step 1
82	Mole ratio $CaCO_3$: HCl : H_2O : $CaCl_2$: CO_2= 1:2:1:1:1	Step 6(a)
83	Molar mass $CaCO_3$ = (Ca=40) +(C=12) +(O=48)=100	Step 2
84	Mole $CaCO_3$ = 20÷(100) = 0.2 mol	Step 3
85	(Mole $CaCO_3$ = mole CO_2)	Step 6(b)
86	Mole CO_2 = 0.2 mol	Step 6(b)
87	Volume CO_2 = 0.2 x 22.4 dm^3	Step 7
88	= 4.48 dm^3	Step 7

(Excerpt from Thinking Aloud Transcript of Syih-H for Question seven)

A description table was prepared to identify students' level of understanding in term of macroscopic, microscopic and symbols in solving questions in the Stoichiometry Problem Task. The description table for analyzing students' level of understanding in terms of macroscopic, microscopic and symbolic conversion representation was prepared based on steps of problem solving by students answered correctly the questions. The descriptions were validated by the expert panel. Table 5 shows the level of understanding and explanation for steps of macroscopic, microscopic and symbolic conversion representation.

Table 5 Level of Understanding and Macroscopic, Microscopic and symbolic Conversion Representations

Level of Understanding	Explanation of Understanding in term of Macroscopic to Microscopic and to Symbol Conversion Representation
Level One	Refer to students' ability to convert all macroscopic, microscopic and symbolic representations for six to seven questions in the Stoichiometry Task and can write clearly empirical formulae, molecular formulae and balanced chemical equations, and mole ratio of reactant and product in their answer.
Level Two	Refer to students' ability to convert macroscopic, microscopic and symbolic representations for at least four of the seven questions in the Stoichiometry Problem Task and are less able to write empirical formulae, molecular formulae, balanced chemical equations and mole ratio of reactant and product in their answer.
Level Three	Refer to students' ability to convert macroscopic, microscopic and symbolic representations for only three or less of the seven questions in the Stoichiometry Problem Task and lack the ability to write empirical formulae, molecular formulae, balanced chemical equations and mole ratio of reactant and product in their answer.

FINDINGS AND DISCUSSION

Findings from data collected related to the number of terms of multiple representation used by students from transcripts of think aloud sessions were compared between high, average and low achieving students. Table 6 below shows the comparison of terms utilised by high, average and low achieving students.

Table 6: Terms of multiple representations used by high, average and low achieving students.

Terms in multiple representation	Number of terms used by high achieving students	Number of terms used by average achieving students	Number of terms used by low achieving students
Mass (*macroscopic*)	30	24	25
Volume of gas (*macroscopic*)	6	6	4
Number of mole (*microscopic*)	33	31	29
Mole ratio(m*icroscopic)*	9	8	7
Number of particles (m*icroscopic*)	6	4	3
Stoichiometry ratio (*microscopic)*	18	6	6
Writing balanced chemical Equation (s*ymbol)*	12	10	7
Molecular Formula(*symbol*)	9	8	7
Molar Mass(*symbol)*	18	10	13
Total	141	107	101

Findings from the analysis of a think aloud transcript for one high, average and low achieving students is shown in Table 7. The Table shows the sequence of steps for each of the seven questions in the Stoichiometry Problem Task for one selected high, average and low achieving students. By using the descriptions in Table 5, the level of understanding of students from the aspect of, microscopic and symbolic representations were determined. Table 7 shows that the high achieving student was at level 1, the average achieving student was at level 2 and the low achieving student was at level 3.

Table 7: Example of Sequence of Steps in solving questions from the Stoichiometry Problems Task For selected High, Average and Low Achieving Students

Question number and answers	M- Demand	Syih-H (one of High Achieving Students)	Nabila-A (one of Average Achieving Students)	Najiha-L (one of Low Achieving Students)
1	3	Step 3 Step 4(a) Step 5	Step 3 Step 4(a) Step 5	Step 3 Step 4(a) Step 5
Answer		SCl_3	SCl_3	SCl_3
2	4	Step 3 Step 4(a) Step 4(b) Step 5	Step 3 Step 4(a)	Step 3 Step 4(a)
Answer		$Na_2S_2O_3$	Na_2SO_2 (Wrong)	NaSO (Wrong)
3	5	Step 3 Step 4 Step 5 Step 5(a) Step 5(b)	Step 3 Step 4 Step 5 Step 5(a) Step 5(b)	Step 3 Step 4 Step 5 Step 5(a) Step 5(b)

Answer		C_6H_6	C_6H_6	C_6H_6
4	5	Step 1 Step 3 Step 6(a) Step 6(b) Step 6(c)	Step 1 Step 3 (Total 2 Step)	Step 1 Step 3 Step 6(a) Step 6(b) Step 6(c)
Answer		4.515×10^{23} atom of copper	Wrong answer	4.515×10^{22} (Wrong answer)
5	5	Step 1 Step 3 Step 6(a) Step 6(b) Step 7	Step 1 Step 3 (2 Step)	Step 3 Step 7 (2 Step)
Answer		Mass=0.36 g	Wrong answer	0.36
6	6	Step 1 Step 2 Step 3 Step 6(a) Step 6(b) Step 7(a) Step 7(b)	Step 1 Step 2 Step 3 Step 6(a) Step 7(a) Step 7(b)	Step 1 Step 2 Step 3 Step 7(a) (4 Step)
Answer		Mass of HCl = 2.7 kg Mass of NH_3= 1.3kg	Mass of NH_3 =1.275kg Mass of HCl=2.73kg	Mass of NH_3=1271.09
7	6	Step 1 Step 2 Step 3 Step 6 (a) Step 6(b) Step 7	Step 1 Step 2 Step 3 Step 6(b) Step 7 (5 Step)	Step 1 Step 2 Step 3 Step 6(a) Step 6(b) Step 7
Answer		Volume of carbon dioxide, CO_2 =4.48 dm^3	4.48 dm^3	4.48dm^3
Level of Understanding		First Level	Second Level	Second Level

To elaborate further the results in Table 7, an example from the high achieving student Syih will be discussed. Syih could understand the conversion of the macroscopic concept to the microscopic level and then to the symbolic representation and vice versa for all the seven questions in the Stoichiometry Problem Task. Syih was also able to solve all the empirical formulae, molecular formulae in all the Stoichiometry questions. Syih could write balanced chemical formulae, and showed understanding of the mole ratio concept (symbolic level of representation). She was also able to apply the mole ratio or the Stoichiometry ratio from the balanced chemical equation to elicit the number of moles and then to mass or volume gas of products. Figure 2 illustrates the answer for question 7 of the Stoichiometry Problem Task by Syih. Nevertheless, Syih did not clearly indicate the units to be used.

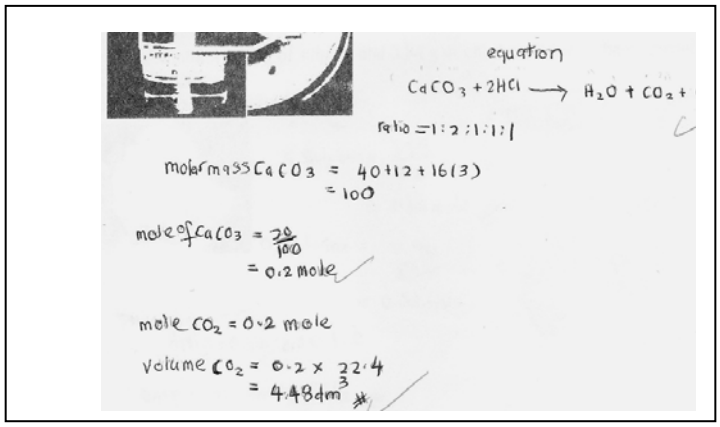


***Figure 2*: Example answer of Syih- for question seven – level 1**

With reference to Figure 2, it can be seen that Syih showed the correct balanced chemical equation in step 1. Step 2 shows the calculation for molar mass of calcium carbonate, $CaCO_3$ is equal to one hundred. Step 3 shows the calculation for the mole number of calcium carbonate which was equal to 0.2. Step 6(a) shows the Stoichiomery ratio from the balanced chemical equation which was 1:2:1;1:1. Step 6(b) shows the mole of carbon dioxide, CO2 which was equal to 0.2. Step 7 shows the calculation and the answer of the volume of carbon dioxide, CO2 which was equal to 4.48 dm^3. Therefore, Syih demonstrated all the conversions of macroscopic, microscopic and symbolic representations for question number seven. In the same way, the analysis was done for the selected average and low achieving students.

Figure 3 shows an example of Nabila's work (an average student) for question seven. The chemical equation written by Nabila-was not balanced but the mole ratio is correct, so the answer was correct. Hence, it appears that although Nabila could not convert from the symbolic level to the microscopic level and then to the macroscopic level, because the mole ration was correct, the problem was solved.

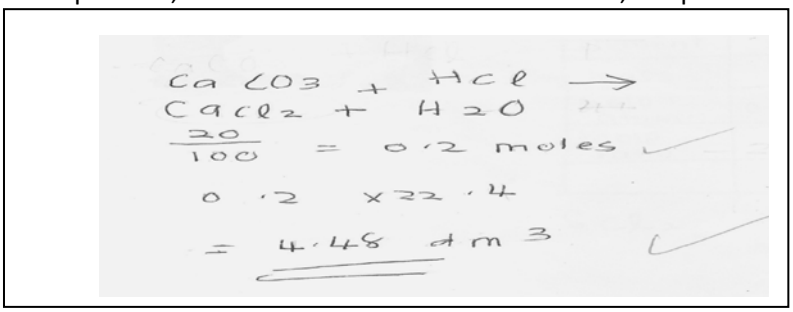


***Figure 3*: Example of Nabila's answer for question seven – level 2**

Figure 4 shows Najiha's (low achieving student) answer to question seven in the Stoichiometry Problem Task. She has written an incorrect chemical formula of calcium chloride but the correct chemical equation, as she probably managed to convert through all the three levels.

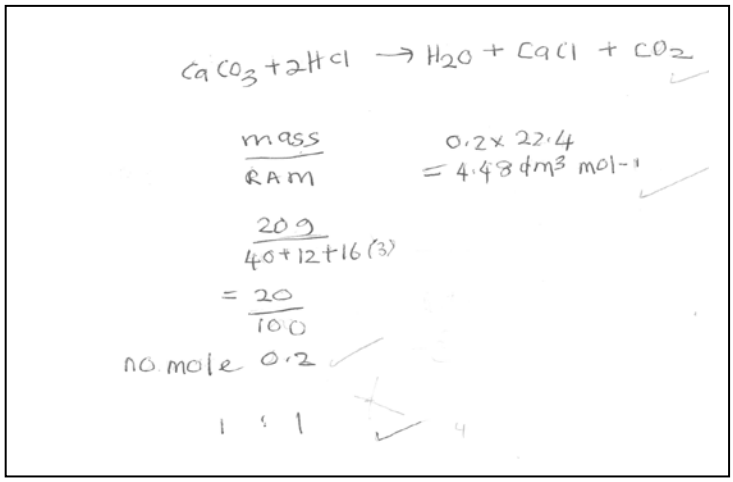


***Figure 4*: Example answer of Najiha for question seven – level 3**

Difficulties encountered by the average achieving and low achieving students were writing balanced chemical equations and to identify the mole ratio or Stoichiometry ratio in balanced chemical equations. Nevertheless, data analysis has indicated that infusion of metacognitive skills supported Stoichiometry Problem solving, in enhancing the ability to convert through the three levels as a form of scaffolding towards the teaching and learning process of Stoichiometry to push students to achieve a higher level of achievement along the Zone of Proximal development as proposed by Vygotsky.

Past studies such as by Hafsah et al. (2014) have also concluded that students' success in Stoichiometry problem solving depends mainly on their understanding of the concept of mole and conceptual understanding of the problems. Students have difficulties in 'making sense' of the chemical reaction itself. Students difficulties in having the conceptual understanding of the problem, namely, being able to translate the worded problems into a suitable chemical and mathematical equation, and using the correct formula to calculate the mole, before they able to solve the problem. In addition, Fach, Boer and Parchman, (2007) also found that students lack understanding in the number of moles and number of particles also contributed to being not able to solve Stoichiometry problems.

CONCLUSION

Based on the results in the study, it appears that students of different achievement can slowly succeed in solving Stoichiometry problems by teaching metacognitive strategies, especially in being able to convert their visualization from macroscopic to microscopic and to symbolic levels. However, the medium and lower achieving students perhaps need more time to enhance their understanding and application of the mole concept which can be seen in their errors in balancing equations.

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