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ASSESSMENT OF SCIENCE TEACHERS' AWARENESS AND PERCEPTION OF ANALOGY USE IN ILORIN, NIGERIA

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Abstract

Analogies are useful tools for teaching difficult scientific concepts and clearing learners' misconceptions. However, when teachers do not properly perceive analogies, they will be misused, leading to further misconceptions. This study assessed science teachers' level of awareness and perception of analogies in secondary school classrooms in Ilorin, Nigeria. The sample comprised 80 science teachers obtained across 34 secondary schools using the convenience sampling technique. A researcher-designed questionnaire titled, "Science Teachers' Awareness and Perception of Analogies" with a reliability coefficient of 0.82, was used for gathering data. Frequency, percentages, and mean were used to describe the responses, while Analysis of Variance (ANOVA) was used to test the null hypotheses at a 5% level of significance. The findings revealed that the participating science teachers were highly aware of the nature of analogy and had a positively high perception of analogy use. There was no significant difference between science teachers' awareness and perception of analogy based on their teaching experience. The study concluded that analogies should not be used as the only teaching method even though students learn better with analogies. It was recommended that science teachers take the time to critically assess textbook-recommended analogies to ascertain their relevance to the learners' immediate experiences.

Keywords: Analogy; misconception; Nigeria; teaching method; science teachers

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Abstrak

Analogi ialah alat yang berguna untuk mengajar konsep saintifik yang sukar dan membetulkan salah tanggapan pelajar. Walau bagaimanapun, apabila guru tidak memahami analogi dengan betul, ianya akan disalahguna dan seterusnya membawa kepada salah tanggapan. Kajian ini menilai tahap kesedaran dan persepsi guru sains terhadap analogi dalam bilik darjah sekolah menengah di Ilorin, Nigeria. Sampel terdiri daripada 80 guru sains dari 34 sekolah menengah menggunakan teknik persampelan mudah. Soal selidik yang direka oleh penyelidik bertajuk, "Kesedaran dan Persepsi Guru Sains Terhadap Analogi" dengan pekali kebolehpercayaan 0.82, telah digunakan untuk mengumpul data. Kekerapan, peratusan dan min digunakan untuk menerangkan respons, manakala Analisis Varians (ANOVA) digunakan untuk menguji hipotesis nol pada tahap keertian 5%. Dapatan kajian menunjukkan bahawa guru sains yang mengambil bahagian amat menyedari sifat analogi dan mempunyai persepsi yang tinggi terhadap penggunaan analogi. Tidak terdapat perbezaan yang signifikan antara kesedaran guru sains dan persepsi analogi berdasarkan pengalaman mengajar mereka. Kajian tersebut merumuskan bahawa analogi tidak boleh digunakan sebagai satu-satunya kaedah penyampaian pengajaran walaupun pelajar belajar dengan lebih baik dengan menggunakan analogi. Guru sains disyorkan supaya meluangkan masa untuk menilai secara kritis analogi yang disyorkan buku teks untuk memastikan kaitannya dengan pengalaman segera pelajar.

Kata kunci: Analogi; salah tanggapan; Nigeria; kaedah mengajar; guru sains

1.0 INTRODUCTION

Science is a broad field of study split into three primary fields: natural sciences, formal sciences, and social sciences. The Natural sciences investigate natural occurrences and can be grouped into two main categories: physical science and the life sciences, while the formal sciences are concerned with the study of established structures, such as those found in the areas of logic and mathematics, that employ a deductive rather than empirical approach. The study of how people behave in various cultural and social settings is the emphasis of social sciences (Wikipedia, 2022a). Physical science, a branch of natural sciences, includes the fundamental disciplines of chemistry, physics, biology, and mathematics. Physics and Chemistry are two main branches of physical science whose application cuts across many professions. Although they both study matter, they differ in their scope and approach (Wikipedia, 2022b).

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Science is the basis upon which most modern technical breakthroughs are constructed. Today, countries all over the globe are constantly looking to improve in terms of technology and scientific accomplishment given that the world is becoming more scientific and all aspects of life rely heavily on science. Nigeria is likewise not left behind in this struggle. (Onasanya & Omosewo, 2011). Its effect is seen in all areas of human existence, and it is inextricably related to the growth and development of a nation. Through science, man has been able to obtain his requirements simply or decrease them to the bare minimum. Chemistry, for instance, is a very important field whose study and applications have led to an understanding of many chemical processes we encounter daily. Numerous everyday happenings are a result of several simple or complex chemical processes. In the industries, the application of chemistry concepts and findings has led to a better and more economical approach towards production.

The relevance of science in a nation's development cannot be overemphasized. Hence, science students must have a good understanding of its content. The teaching and study of science disciplines are prioritized in the Nigerian educational system. According to the Federal Republic of Nigeria (2014), one of the actions that the government would do to completely fulfil the aims of education in Nigeria is to ensure that "special provisions and incentives shall be made for the study of sciences at each level of the education system." In light of this, it is evident that the teaching of science is tantamount towards the realization of Nigeria's educational goals and aspirations. Unfortunately, studies have revealed that pupils in Nigerian secondary schools are not particularly engaged in learning science (Esiobu, 2005; Okonkwo, 2000).

Teaching and learning science present numerous benefits. However, the process is often faced with numerous difficulties that potentially impede learning effectiveness. For instance, Chemistry topics are primarily abstract, and students often require adequate teaching approaches to offer representations of things that cannot be seen (Rahayu & Sutrisno, 2019). In an attempt to provide meaning to these abstract concepts, learners may use their imaginations to form conceptions about the concept. Therefore, it is not uncommon for students of chemistry and other science-related disciplines to hold various beliefs or conceptions that are not consistent with the intended meaning. These beliefs are termed "misconceptions". Misconception, according to Özmen (2004), is any idea that departs from the widely accepted scientific interpretation of the term. These misconceptions often affect students' learning of new scientific knowledge. Interestingly, misconceptions occur at all levels of learning (Johnstone and Kellett, 1980). Khalid (2003) discovered that students can have such strong misconceptions that even after learning the proper concepts in the classroom,

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they resist changing their prior notions. Instead, they use their preconceived notions to interpret the newly learned knowledge.

Students tend to hold various beliefs or conceptions that are not consistent with the intended meaning. These beliefs are termed “misconceptions”, and often make the targeted students fail to achieve what was intended by the educator. When students fail to absorb the knowledge as its whole, alternate conceptions may emerge, limiting their capacity to create further. These alternate conceptions, whether pre-existing or created during learning, impair students’ learning. Ballard (2011) pointed out that several students can often take these alternate notions outside of school. Khalid (2003), found that sometimes, students have such strong misconceptions that even after learning the correct concepts in the classroom, they resist modifying their pre-existing ideas. Instead, they try to interpret the newly acquired knowledge using their preconceptions. This implies that for successful learning to take place, a secondary school science teacher must take into account the learners’ possible preconceptions that may hinder meaningful learning. Consequently, the teacher must ensure that while planning the lesson, students’ previous knowledge is accounted for, since different students may hold different assumptions of the concept before its introduction in the classroom

By leveraging on students’ previous knowledge, an analogy is one of the most important instructional tools that can be used to address students’ misconceptions. An analogy is, to put it simply, the process of finding connections between two concepts. The foreign scientific notion is referred to as the "target," and the familiar concept is called the "analogue" (Glynn, 1991). Analogies can take the form of illustrations, tangible experiences, sketches, comparisons, similes, narratives, symbols, puzzles, origami, pantomimes, animated videos or any other creative method devised by a resourceful instructor to engage learners and help them comprehend a concept by actively participating in the learning process (Ballard, 2011). As an illustration, a comparison is used to clarify the composition of an atom i.e. the target is the grouping of planets revolving around the sun i.e. the analogue (Maharaj-Sharma & Sharma, 2015). According to Djudin and Grapragasem (2019), the implementation of pictorial analogies can enhance and reinforce learners’ proficiency in comprehending Direct Current lessons while also improving their capacity to retain the information. Ahmad et al., (2022) likewise showed that students understood each terminology in their chemistry course by using analogies and were able to re-explain terminologies in simple and understandable words, which is aligned with the Structure-Mapping Theory.

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Several studies have been conducted to examine science teachers' views about analogy use in science teaching, how these analogies are used, and the effectiveness of analogies in solving students' misconceptions. Fotou and Abraham (2020) demonstrated that analogies may be utilized to assess students' misunderstandings of a science topic or idea. In the research, students were permitted to construct analogies on their own that they might use to anticipate the outcomes of various scenarios. The assessment revealed that in many cases, they spontaneously generated by themselves analogies to familiarize themselves with the offered unusual scenarios and be able to formulate and then explain their forecast. The outcomes of this study imply that allowing students to construct their own analogies may be effective in recognizing and correcting students' errors.

Orgill, Bussey and Bodner (2015) examined the views of biochemistry instructors about analogy and its use in the classroom. 13 biochemistry instructors from four different colleges and universities in the Midwest were interviewed as part of the study's qualitative approach. As a final step in the study, the instructors' replies were organised under five theme-based assertion that was created. Each of these assertions defines how biochemistry instructors view analogies and how they are used in the classroom. Two major findings from the study revealed that; despite being aware of many potential advantages of using analogies in the classroom, biochemistry instructors appeared to be less aware of any potential drawbacks or difficulties that could arise from doing so; and their use of analogies in the classroom does not always align with how they believe analogies should be used.

According to a study by Jonane (2015), most analogies (70%) used by physics instructors may be found in the textbooks used in Latvian schools. For example, the analogy between the flow of automotive traffic and an electric current. Chemistry textbooks can serve as a rich and constant store of analogies that are considered suitable by the authors. This means that chemistry textbooks are an easily accessible source of analogies for chemistry instructors. Similarly, Akçay (2016) analyzed a total of fifteen science textbooks: four in biology, six in chemistry, and five in physics. 92 analogies in total were found across all the texts. The most analogies were in physics textbooks (a total of 56). A total of 23 analogies were found in chemistry textbooks, but just 13 analogies were discovered in all of the biology textbooks. The findings of these research studies suggest that textbooks are an undeniable source of analogies for science teachers. However, one implication of this is that since analogies are readily available in textbooks, teachers may use any of the prescribed analogies without having the right knowledge to decide if the particular analogy is the best fit for the explanation.

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When delivering a lesson with an analogy, the teacher is saddled with the responsibility of ensuring that the analogies used for teaching do not confuse the students, or lead to the construction of unintended learning outcomes. Thus, there is a concern that teachers may misuse an analogy if they are not familiar with it. In these cases, especially when the teacher fails to explain the relationship between the analogue and the target or if the analogue is unfamiliar to the learner, the teaching exercise may result in further misconception. Consequently, teachers' lack of knowledge of the nature of an analogy and how to effectively use it can significantly impact the learning outcome. During the interviews performed by Maharaj-Sharma & Sharma (2015), it became apparent that there was a lack of information regarding the effective use of analogy and/or its appropriateness among the teachers. Many of them mentioned examples from their classrooms during the interviews and implied that they were employing analogies. It was evident from the teachers' justifications for why they used these examples that they had difficulty telling an analogy from an example. This failure to distinguish between examples and analogies might be attributed to teachers' inadequate pedagogical grasp of what makes an analogy and the goals for which analogies can be used, as well as to their lack of experience using analogies in their learning.

If an analogy is not properly used, it can lead to further misconceptions about the topic being taught. Some teachers believe that analogies and examples are the same, and as such, they use these analogies carelessly without considering the limitations of the analogy. According to Brown & Salter (2010), one reason why teachers may find it difficult to use is that they lack confidence in the approach, don't know enough about analogies in general, or don't know which analogy to employ for a given situation. Thorough knowledge of pre-existing analogies with well-determined limits is therefore required for science teachers to effectively utilize analogies in teaching. Although teachers are aware that analogies can be used to facilitate learning, they may not be educated on the purpose for which an analogy is to be used. Numerous studies have been conducted on the effects of analogy use on students' learning both in chemistry, physics and other science subjects like; biochemistry, and biology (Çalık & Kaya, 2012; Djudin and Grapragasem (2019); Heywood, 2010; Kılıç & Umdu-Topsakal, 2011; Pedro & Edinson, 2021; Ören et.al, 2011). However, there have been very few studies in the context of Nigerian education tailored towards understanding what secondary school science teachers know about, or think of an analogy in the teaching of science. Hence, this study sought to fill this knowledge gap by investigating senior secondary science teachers' perception, and level of awareness of analogy use in Ilorin, Kwara state, Nigeria.

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1.1 Purpose of the Study

This study sought to assess the level of awareness of science teachers, and their perceptions about analogy use in senior secondary school classrooms. The following research questions were developed to guide the study: (Q1) What is the level of awareness of the concept of analogy among secondary school science teachers? (Q2) What are the perceptions of secondary school science teachers on the use of analogies? (Q3) Is there any difference between the awareness of analogies among the less experienced, moderately experienced, and highly experienced science teachers? (Q4) Is there any difference between the perception of analogies among the less experienced, moderately experienced, and highly experienced science teachers?

Two null hypotheses were generated from the research questions and were tested at a significance level of 0.05: **H_{01}:** There is no significant difference between the awareness of analogies among the highly experienced, moderately experienced, and less experienced secondary school science teachers **H_{02}:** There is no significant difference between the perception of analogies among the highly experienced, moderately experienced, and less experienced secondary school science teachers.

2.0 MATERIALS AND METHODS

2.1 Research Design

A quantitative descriptive research design was adopted in carrying out the study. This method involves the collection of data without manipulating the information from respondents. The study aimed to examine how the level of awareness of these science teachers and their perception of analogy use in classroom teaching, thus, there was no need for the researcher to manipulate the natural environment. In addition, to accomplish the aims of the study, the study adopted the survey approach where respondents were allowed to answer the items without any external influence from the researcher (Sanders 2018).

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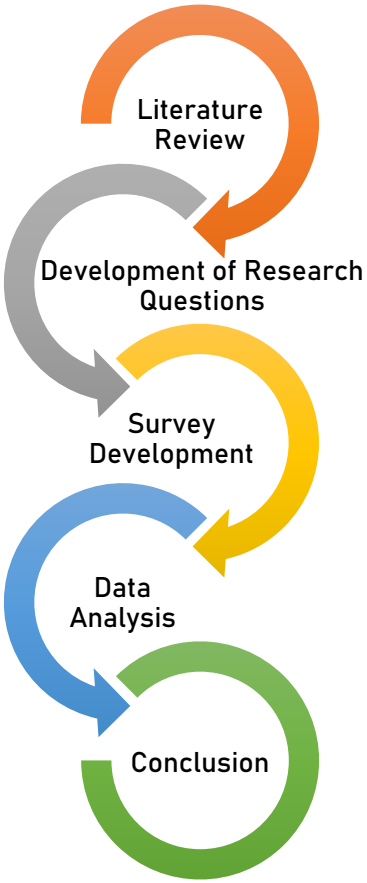

Figure 1. Research Methodology

2.2 Research Participants

The population for this study consists of all the senior secondary school science teachers in Ilorin, Kwara State. This is because the study focused on teachers in the three sub-regions of Ilorin – Ilorin South, Ilorin East and Ilorin West. A sample of 80 science teachers was obtained from thirty-four senior secondary schools across the three sub-regions in Ilorin through convenience sampling and was used for the study. The sampling technique was considered appropriate mainly because it is less time-consuming and less expensive, especially due to the rigid timeline and limited material resources available at the time this research was being conducted (Sekaran & Bougie, 2016). The science teachers were selected across the three levels of the secondary school (i.e., SSS 1–3) which allowed for a wider range of opinions and perspectives on the concept being investigated. A letter of introduction obtained from the Department of Science Education, University of Ilorin, Ilorin, Nigeria was presented to the appropriate authority of the sampled schools to seek approval before engaging with any of their teachers. The teachers were provided with a consent form to seek their consent to

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participate in the study to ensure that their participation in the study was voluntary. The researcher personally administered the questionnaire and waited for them to be filled and retrieved before leaving the school. The data collection exercise lasted for a month during which the researcher visited different schools at least thrice a week. All ethical issues such as non-disclosure of the personality of the respondents, non-exposure of the participants to any form or risks, and not compelling or intimidating the participants in any form were strictly adhered to.

2.3 Research Instruments

The instrument that was used in collecting data for this research was a researcher-designed questionnaire titled “Science Teachers’ Awareness and Perception of Analogies” (STAPA). The questionnaire consisted of a total of twenty-one (21) items divided into three (3) sections: A, B, and C. Section A collected information on the respondents’ demographic data. Section B elicited information on the science teachers’ awareness of analogies, while Section C elicited information on the science teachers’ perceptions of the use of analogies. Sections B and C were designed using a four-point Likert scale of SA – Strongly Agree, A – Agree, D – Disagree and SD – Strongly Disagree, with four different scores assigned in descending order i.e. 4, 3, 2, and 1 respectively. The face and content validity of the instrument was determined by two Senior lecturers in the field of Science Education. The reliability coefficient of the final version of the instrument was determined using Cronbach’s Alpha method and it was found to be 0.82.

3.0 RESULTS

The data gathered from administering questionnaires were subjected to descriptive and inferential statistical analyses using the SPSS version 25. The analyses were carried out based on the research questions and hypotheses raised in the study. The demographic data of the participants are presented in Table 1.

On the gender distribution of the respondents, Table 1 shows that 36 (45.0%) of the respondents are male, while 44 (55.0%) are females. On the academic qualification, only 1 (1.30%) of the respondents hold a PhD. degree and 24 (30.00%) hold an M.Sc./M.Ed./M.BA degree, while a larger share of the respondents 55 (68.80%) were B.Sc./B.Ed./HND holders. Furthermore, from the teaching experience, 31.3% of the respondents indicated that they had 0 – 5 years of experience in teaching science followed by 5 – 10 years of experience (46.3%), 10 – 20 years of experience (20.0%), and more than 20 years of experience (20.0%)

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Table 1. Demographic characteristics of the participants

Demographic Values	Frequency	Percentage (%)
Gender		
Male	36	45.0
Female	44	55.0
Total	80	100.0
Academic Qualification		
PhD.	1	1.3
M.Sc./M.Ed./M.BA	24	30.0
B.Sc./B.Ed./HND	55	68.8
Total	80	100.0
Teaching Experience		
0 - 5 years	25	31.3
5 - 10 years	37	46.3
10 - 20 years	16	20.0
20 years and above	2	2.5
Total	80	100.0

Research Question 1: Are science teachers aware of the concept of analogy in teaching secondary school chemistry?

A benchmark value of 2.5 was set due to the four point-Likert scale questionnaire and used to conclude whether the participants are aware of analogies or not, $\frac{4+3+2+1}{4}$. If the cumulated mean is above 2.50, it infers that the science teachers are highly aware of the concept of analogy. However, if the cumulated mean is below 2.50, it means that the respondents are less aware of the concept of analogy. The cumulated mean of the science teachers' awareness of analogy as a concept was found to be 3.28 which was higher than the predefined benchmark of 2.5 as shown in Table 2. This finding showed that the science teachers were highly aware of analogies; know what they mean and where they can be gotten from, and are aware of their typical use cases.

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Table 2. Mean response on science teachers' awareness of analogies

SN	Items	SD	Mean
1	Analogies compare things that cannot be seen with things that can be seen	0.65	3.26
2	All analogies are composed of an 'analogue' and a 'target'	0.60	3.27
3	Analogies are not the same as examples	0.76	3.11
4	The analogue in an analogy should be what learners are familiar with	0.69	3.33
5	Analogies can be constructed by learners while trying to learn a new concept	0.61	3.18
6	Analogies can be used to solve science students' misconceptions	0.59	3.34
7	Analogies can be gotten from textbooks	0.68	2.98
8	Analogies can be used as a technique to make learning science concepts easy	0.53	3.46
9	If analogies are not used carefully, they can cause further misconception	0.73	3.36
10	Analogies used must be easy to remember for the students	0.53	3.55
	Cumulated Mean		3.28

Research Question 2: What are the perceptions of secondary school science teachers on the use of analogies?

The data presented in Table 3 summarizes the science teachers' perception of the use of analogies. The results showed that the majority of the teachers (65.0%) agree that analogies should only be used when students find it difficult to grasp a concept. Almost all science teachers (>90.0%) believed that analogies contribute to the development of students' imagination and their understanding of abstract concepts. 78.8% of the science teachers also perceived that science students learn better with the help of an analogy. Most of the science teachers (71.3%) believed that the use of analogies is not suitable for all topics or concepts, while just over half of them (61.0%) agreed that analogies should not be used as the sole method of delivering a lesson.

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Table 3. Teachers' perception of the use of analogies

S/N	Items		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	Analogies should only be used when students find it difficult to grasp a concept	Count	28	24	26	2
		%	35.0	30.0	32.5	2.5
2.	I think that analogy contributes to the development of imagination	Count	28	48	4	0
		%	35.0	60.0	5.0	0
3.	I think that analogies contribute to the understanding of abstract concepts	Count	33	44	3	0
		%	41.3	55.0	3.8	0
4.	Analogies should be used as the sole method of delivering a science lesson	Count	6	25	38	11
		%	7.5	31.3	47.5	13.8
5.	I think that students learn better with analogies	Count	24	39	15	2
		%	30	48.8	18.8	2.5
6.	I think some science topics are not to be taught with an analogy	Count	15	42	23	0
		%	18.8	52.5	28.7	0

Research Question 3: Is there any difference between the awareness of analogies among the less experienced, moderately experienced, and highly experienced science teachers?

Table 4 indicates that the mean awareness score of the highly experienced (*M*= 3.5), moderately experienced (*M* = 3.25), and low experienced science teachers (*M* = 3.29) were not similar. This variation in mean values suggests that there is a difference in science teachers' awareness of analogy.

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Table 4. Mean awareness scores of science teachers based on their level of teaching experience

Teaching experience	*N*	Mean	SD
Less Experienced	62	3.29	0.38
Moderately experienced	16	3.25	0.37
Highly Experienced	2	3.50	0.57

H_{01}: There is no significant difference in the level of awareness of analogy among the highly experienced, moderately experienced, and less experienced secondary school science teachers.

To test this null hypothesis, a one-way ANOVA was performed to compare the difference in awareness of analogy among science teachers based on their teaching experience. The results of the analysis as shown in Table 8 revealed that there was no significant difference in awareness between at least two groups (F (2,77) = [0.40], p = [0.77]). Since the significant value of 0.77 is greater than 0.05, it implies that there is no significant difference between the level of awareness of analogy among less experienced, moderately experienced, and highly experienced science teachers. Therefore, the null hypothesis was not rejected.

Table 5. *The ANOVA analysis of the difference in awareness of analogies among science teachers based on teaching experience*

	Sum of Squares	df	Mean Square	*F*	Sig.	Decision
Between Groups	0.11	2	0.06	0.40	0.77	Not Rejected
Within Groups	10.95	77	0.1			
Total	11.06	79				

Research Question 4: Is there any difference between the perception of analogies among the less experienced, moderately experienced, and highly experienced science teachers?

Table 6 indicates that the mean awareness score of the highly experienced (*M*= 3.17), moderately experienced (*M* = 3.00), and low experienced science teachers (*M* = 2.98) was

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not similar. This variation in mean values suggests that there is a difference in science teachers' perception of analogy.

Table 6. Mean perception scores of science teachers based on their level of teaching experience

Teaching experience	*N*	Mean	SD
Less Experienced	62	2.98	0.40
Moderately experienced	16	3.00	0.38
Highly Experienced	2	3.17	0.71

H_{02}: There is no significant difference in the level of perception of analogy among the highly experienced, moderately experienced, and less experienced secondary school science teachers

To test this null hypothesis, a one-way ANOVA was performed to compare the difference in perception of analogy among science teachers based on their teaching experience. The results of the analysis as shown in Table 8 revealed that there was no significant difference in awareness between at least two groups (F (2,77) = [0.21], p = [0.81]). Since the significant value of 0.81 is greater than 0.05, it implies that there is no significant difference between the level of awareness of analogy among less experienced, moderately experienced, and highly experienced science teachers. Hence, the null hypothesis was not rejected.

Table 7. *The ANOVA analysis of the difference in perception of analogies among science teachers based on teaching experience*

	Sum of Squares	df	Mean Square	*F*	Sig.	Decision
Between Groups	0.07	2	0.03	0.21	0.81	Not Rejected
Within Groups	12.62	77	0.16			
Total	12.69	79				

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4.0 DISCUSSIONS

Findings from this study showed that secondary school science teachers have knowledge of, and are highly aware of the concept of analogy. They appeared to be generally aware of the nature and concept of analogy and its several advantages and disadvantages. This finding could be attributed to the fact that teachers in Nigeria generally always have to make the learning process relevant to the learner's everyday experience. This finding correlates with the findings of Maharaj-Sharma and Sharma (2015) which revealed that teachers were aware of some advantages and disadvantages of using analogies either from their own experiences or from reading about the use of analogies to teach science. This finding is also consistent with that of Orgill, Bussey, and Bodner (2015), who reported that biochemistry instructors are aware of many potential benefits of using analogies in their classrooms, though the instructors seemed less aware of potential disadvantages or challenges associated with analogy use.

The findings from this study indicated that the science teachers held several perceptions of their use of analogy. The science teachers expressed a positive perception towards the use of analogies for the teaching of difficult science concepts. The science teachers submitted that analogies contribute to the development of imagination and the understanding of abstract science concepts. The majority of them also stated that analogies should only be used when students find it difficult to grasp a concept. These findings align with those of Jonane (2015) and Maharaj-Sharma and Sharma (2015) where most of the respondents felt that analogies were tools to help with the learning of "difficult" and "abstract" concepts to promote visualization that can help students imagine and understand indirectly perceptible objects and processes.

Furthermore, the majority of the teachers surveyed in this study believed that analogies should not be used as the sole method of delivering a lesson. This suggests that other teaching methods will be useful in the case where an analogy breaks down or is unsuitable altogether, especially because teachers may fail to show students where the analogy breaks down or may become too comfortable with one analogy and adopt the one-analogy-teaches-all concept (Maharaj-Sharma & Sharma, 2015). The finding from this study also showed that most of the science teachers believed that some science topics should not be taught with analogies. This result is slightly in line with the findings of Orgill & Bordner (2004), who revealed that some of the interviewed chemistry students preferred that some concepts are not taught with analogies. The results of this study indicated that there was no significant difference between the level of awareness of analogy among the less experienced, moderately experienced, and highly experienced science teachers. This could be attributed to the

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ubiquitous nature of analogy in science teaching. These science teachers use analogies and are aware of their nature regardless of their teaching experience. This finding implies that years of teaching experience do not necessarily determine a science teacher's level of awareness of analogy.

Finally, the results of this study revealed that years of teaching experience do not significantly influence science teachers' perceptions of analogy use. These results suggest that teachers with fewer years of teaching experience may tend to use analogies in the same way as the more experienced ones do. The results can be partially attributed to the fact that these science teachers were not particularly trained in the use of analogies for science teaching and so they all perceive it to be an interesting tool for delivering science lessons.

5.0 CONCLUSION

This study investigated science teachers' level of awareness and perception of the use of analogies in science teaching. This research study critically assessed the awareness of chemistry teachers on the concept of analogy and also investigated the common practices of these teachers while using an analogy. The results indicated that secondary school science teachers are highly aware of the concept of analogy. This is beneficial since analogies are a powerful tool that can be used in the delivery of science lessons, considering that a lot of science concepts and processes are either abstract or not directly relatable. The science teachers were fully aware of the potential of these analogies to create misconceptions. It is required to properly explain the relationship between the analogue and the target.

In addition, the majority of the science teachers submitted that analogies should not be used as the only method of delivering a lesson even though they agreed that students learn better with analogies. Thus, implying that other teaching methods will undoubtedly prove useful in the case where an analogy breaks down or is unsuitable altogether. The findings from this study show that analogy should not be used as the first approach to teaching a science concept. Although many of the science teachers agreed that analogies are potent instruments that can be used to teach difficult science concepts, they, however, disagreed with the use of analogies in teaching some topics. This might be because teachers in Nigeria mostly decide on what materials and specific techniques to teach a particular topic.

Conclusively, science teachers have a satisfactory level of awareness about analogies and generally have a positive perception towards their use in the classroom. This level of awareness and perception did not show any difference based on their teaching experience.

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6.0 RECOMMENDATIONS

The following recommendations were advanced based on the findings of this study:

- Science teachers should take the time to critically assess textbook-recommended analogies to ascertain their relevance and usability within the context of the learners' immediate experiences.
- Students should be guided and encouraged to create their own when learning a new chemistry concept.

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