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ASSESSMENT OF SECONDARY SCHOOL STUDENTS' DIFFICULTIES IN TRANSLATING WORD PROBLEMS INTO ALGEBRAIC EQUATIONS

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Abstract: *The purpose of this study was to assess the difficulties secondary school students encounter in translating algebraic word problems into algebraic equations. This study was conducted at Nsukka Local Government Area, Enugu State, Nigeria. A survey research approach was employed in this study. Two research questions were answered and one hypothesis was tested in this study. The sample was 140 participants, selected using stratified proportionate random sampling approach. The data gathering tool was an essay test constructed by the researcher and entitled 'Algebraic Word Problem Test (AWPT)'. The AWPT was validated by experts after which the inter-rater reliability was determined using Kendall's correlation of concordance (W) which yielded reliability index of 0.81. The findings indicated that students did not encounter difficult in representing unknown variables with letters. However, students had difficulties in: (i) generating linear algebraic terms, (ii) creating linear algebraic expressions, (iii) equating two algebraic expressions to obtained the require equations, (iv) in generating the two distinct simultaneous equations as required by the questions, (v) creating quadratic terms, (vi) generating quadratic algebraic expressions, and (vii) creating and writing the final quadratic equation. Gender had no influence on difficulties encountered by students in translating word problems to equations. Recommendations were made in light of the findings.*

Key words: *mathematics; algebra; assessment; secondary school education.*

Introduction

Students' ability to solve algebraic word problems is one of the essential mathematical skills needed in applying Mathematics in solving real-life problems. It is key factor for instilling problem-solving skills among learners (Teoh et al., 2024). However, students often see word problems

as uphill tasks. Consequently, it is often reported that student fail woefully in questions involving translating word problems to algebraic equations (The West African Examination Council [WAEC], 2016-2021). Worrisomely, the specific areas of the students' difficulties in translating word problems to algebraic equations are yet to be properly identified; thereby making effective interventions by Mathematics teachers challenging. It worthies to mention, that, identification of a problem is key phase in solving it. There is scarcity of knowledge on whether the difficulties secondary school students in Nigeria encounter in translating word problems to algebraic equations revolve around simple linear equations, simultaneous equations, quadratic equations, or even polynomial equations. Hence, this current study is poised to fill this knowledge gap by assessing the difficulties secondary school students' encounter in translating algebraic word problems into algebraic equations which is one vital and often tested content areas of secondary school Mathematics.

Mathematics involves series of activities designed to enable individuals and nations solve problems (Ogbu & Ugwu, 2023). Hence Mathematics could be described as an activity-based subject with problem solving orientation. Mathematics could serve as a tool for communication and a mean to solve computational challenges in various areas of lives (Ekwueme, 2013). According to Iyoke (2015), the applications of Mathematics knowledge is an integral part of the daily activities of individual which can easily be seen in business transaction, architectural designs, arts work, decision making processes, engineering work, and even sports. Fundamentally, Mathematics makes use of axioms, numbers, symbols, and logic to derive solutions to mathematical tasks. Hence, Mathematics could be defined as the study and use of axioms, theory of numbers, letter, symbols, shapes and dimensions of shapes, quantities and changes in the quantities, and logics in solving mathematical related problems. It is an indispensable tool for development of science and technology. It is the subject that enables students to acquire wider areas of skills, including skills in computation and logical thinking (Abdul-Rauf & Akanmu, 2019). Because. Mathematics knowledge is applied in virtually all spheres of human endeavours, any nation that aspires to attain scientific, technological, and economic independence, is expected to lay solid foundation in science and Mathematics.

Mathematics is designed to facilitate the solving of complex computational problems in concrete or abstract sense which needed for transformation of nations. The current rapid advancement in technologies among nations in recent times, undoubtedly, owes a lot to improvement in scientific and mathematical knowledge. For instance, Mathematics is needed to make accurate and precise prediction of

events; hence the reason Mathematics cannot be separated from science and research. In Agriculture, basic mathematical knowledge is also required to enable farmers determine, for example, the right compositions of materials for fertilizers, feeds, pesticides and herbicides that would yield the maximum results. In transportations, knowledge of Mathematics could help pilots, sailors, and drivers to accurately determine how long an embarked or prospective journey could take. The construction and development most modern means of transportation (such as cars, ships, and airplanes) and equipment are guided by laws and principles developed using mathematical ideas (Gimba |& Agwagah, 2012). Of course, the importance and roles of Mathematics in the society is obvious and seems to have been recognized by education stakeholders.

The importance of Mathematical knowledge cannot be over stressed as such knowledge could be applied in many areas of human endeavors. For instance, a student who wishes to further a career in Engineering, Pharmacy, Physical Sciences, Social Sciences, Education, Banking, Finance, and even some medical related courses, such student is expected to have good knowledge of Mathematics. This major admission requirement of many tertiary institutions in Nigeria which stipulates a minimum of credit grade in Mathematics in senior secondary school certificate examinations conducted by examination bodies such as the National Examination Council (NECO) and the West African Examination Council (WAEC) is strong pointer to the need of Mathematics for the society. Mathematics is a problem-solving based subject that was initially designed by primitive man to keep accurate record of the increasing number farm produce beyond the use of pebbles, counters, or the making of stroke of lines on the stones and walls. Another interesting way to appreciate the importance of Mathematics is to examine the stipulated aims of teaching Mathematics at secondary school level in Nigeria, which include providing learners with the desired computational skills and inculcating in the learners the desire to apply Mathematics in solving everyday problems. Essentially, it implies that Mathematics is recognized as problem solving discipline. Mathematics is an essential tool needed to guide every day informal and formal decisions and business transactions. It also serves as agent of creativity and technologies as evidence in the second aforementioned objective of teaching Mathematics in secondary schools in Nigeria.

Rapid change in technologies owes a lot to adoption of scientific and mathematical knowledge as mathematical ideas are applied in production and modification of many technological equipment and devices. This is evidence, for example, in the calibration of many measurement devices that are based on the principle of Mathematics. These devices are used in many manufacturing industries to facilitate

industrial services. Interestingly, companies could maximize their profit and minimize loss through the application of Mathematics. Engineers, for example, need substantial knowledge of geometry, quantum mechanics, analysis, and calculus to build bridges, buildings, and other architectural works (Gimba & Agwagah, 2012). Mathematics is important because it is very much needed to educate pupils and students in technological related disciplines which would enable graduates to become problem solvers (Igbojinwaekwu, 2020). It is expected that the objectives of teaching Mathematics at secondary school level should be attained to great extent given the importance of mathematical and unrelenting efforts to ensure effective teaching and learning of the subject.

It is worth recognizing some efforts towards effective teaching and learning of Mathematics. Students who have exceptional knowledge of Mathematics are often reward; a vicarious attempt to get low Mathematics students motivated to learn Mathematics. For example, in Nigeria, Mathematical Association of Nigeria (MAN) and National Association of Science Teachers (NAST) have continued, on annually basis, to reward the best performing students selected through competition Mathematics examinations. Mathematics teachers are also being retrained through workshops and seminars organized by educational stakeholders on the best approaches for effective teaching of Mathematics. The WAEC Chief Examiners Reports have usually outlined the areas of students' weaknesses in Mathematics with a view to instigate necessary interventions. In the same vein, some employers of labours have continued to demand for candidate with basic mathematical knowledge, suggesting that students are expected to demonstrate sound knowledge of Mathematics.

However, notwithstanding the roles and the importance Mathematics and the efforts to ensure effective teaching of the subject, students' achievement in Mathematics seems not to match the developmental expectation of Nigeria in terms of mathematical knowledge. Students' achievement in Mathematics in this paper is operationalized as the grades or scores students obtained either in the internal or external Mathematics examinations. Internal examination is used in this context to donate the examinations conducted by individual classroom or subject teachers while external examinations are set and administered by external bodies such as NECO and WAEC. Furthermore, academic achievement entails performance indicators that describe the degree to which an individual has attained a given educational target that were outlined by the teachers before instructional activities commenced (Ogbu, et al., 2024). It is the overall manifestation of possessed competence, skills, and knowledge in the subject (Pandey, 2017). Hence, a student with higher competence, skills, and mathematical knowledge

are expected to achieve more in Mathematics as compare to students with low skills, and poor knowledge of Mathematics. In other words, students with low Mathematics ability are likely to be associated with poor achievement in the subject.

Plethora of evidences indicate reoccurring students' poor achievement in Mathematics. For instance, in Nigeria, secondary school students' achievement in Mathematics in WASSCE was noted to be unsatisfactory (Ntibi & Edoho, 2017). The WAEC Chief Examiners' Report (2016-2021) indicated that students encountered a lot of difficulties in Mathematics, especially in the area of solving word problems. Ogbu and Anyaegbu (2021) in a content analysis of the WAEC Chief Examiners' Reports on students' weakness in Mathematics for the year 2009 to 2019 revealed that the most frequently occurring weakness of students in Mathematics is generally in algebra and word problems in particular. Of course, multiple factors may account for this students' poor achievement in Mathematics. For instance, poor teaching methods, school related factor, students' related factors, and the nature of Mathematics itself is could cause students' poor achievement in the subject.

Mathematics, at secondary school, has different branches which include algebra, geometry, number and numeration, probability and statistics, and Trigonometry. Algebra represents about 30% of the content of secondary school mathematic curriculum in Nigeria. It is pointed out the Trend in International Mathematics and Science Study (TIMSS) which the common benchmark for enhancing students' knowledge of Mathematics contains 30% algebra for eight grade Mathematics (Teoh et al., 2024). The content of TIMSS is designed in such a way that students' mastery of algebra will enhance their performance not only in TIMSS but in Mathematics generally. More importantly, the mastery of foundational concepts of algebra before enrolling in university is crucial, hence the teaching and learning of algebra in schools need to be scrutinized to determine reason for students' inability to fully comprehend and used mathematical language correctly (Teoh, et al., 2024). Mathematics is often and erroneously described as an abstract subject; comprising inexplicable non concrete concepts. It is worth to emphasize that most of the concepts of Mathematics could be applied in solving problems in real time by translating real life situation into mathematical models. Hence, the perception of the subject as being abstract by its nature is unwarranted once the students understand the link between mathematical equations and word problems.

Word problems may be described as the link between Mathematics and the solution to real life problems. When individuals assert that Mathematics is applied in solving problems, it implies that the problems are transformed into Mathematics expression where manipulations are performed to arrive at the solution to the problems. Notwithstanding the

roles of the knowledge of words problems in modeling and solving real life problems, secondary school students have challenges in dealing with Mathematical word problems. Word problems are long recognized as the most dreaded, feared, and disliked part of Mathematics (Bullock, 2015; Ogbu & Anyaegbu, 2021). Algebra often makes use of numbers, shapes, letters, and symbols to represent ideas. When these numbers, shapes, letters, and symbols are represented using words for the purpose of finding solution to problems, it is called word problems.

Several studies have explored the challenges students encounter in algebra (Wahyuni et al., 2020), however, studies on the best way to learn algebra is vital as students' performance in algebra has continued to decline (Teoh, et al., 2024). Students' unparalleled dislike and anxiety for word problem is a growing concern for Mathematics teachers (Murray, 2012). Experts have noted that students have great deal of aversion in solving word problems which results in the students' inability in solving and obtaining good grades in Mathematics tasks involving word problems (Rembert, Mack, & Gilbert, 2019). Specifically, the chief examiner for WAEC has continuously lamented on the students' inability to solve word problems in WASSCE. For instance, WAEC Chief Examiners' Report for the year (WAEC, 2017, 2018, 2019, 2020, 2021), noted that most students could not attempt word problem tasks. Secondary school students' mastery of secondary school algebraic content is below expectation (Teoh et al., 2024). More so, in rare instances, most of the few students who attempted these tasks did not produce appropriate algebraic expression for the word problem tasks (Taley, 2022). The inability of the students to transform worded tasks into algebraic expression restrained them from providing accurate solutions, Taley further observed. Students do not possess the needed mathematical language to obtain good performance in word problem (Teoh et al., 2024). Sugiarti and Retnawati, (2019) categorized students' difficult in algebra into concept related difficulties and principle related difficulties. Adu, et. al. (2015) also noted that though approximately 60% of the students attempted most of the word problem question, only 2% percent produced correct answers, which underscored students' inability to comprehend and transform word problems into equations. Hence, there is the need to pinpoint the specific areas of students' difficulties in transforming word problems to algebraic expressions to direct proper and effective actions necessary to overcome these challenges.

Measures have been taken to ascertain students' challenges with regards to solving of word problems. For example, Adu, et. al. (2015) explored students' errors in solving word problems in linear equations using ten questions on word problem that were given to the student. The authors further noted that about 75% to 84% of the students examined committed

various errors, including comprehension and transformation errors. Identifying students' error in solving word problems as comprehension and transformational errors may not give Mathematics teachers clear direction on how to reduce students' difficulties in solving word problems. Comprehension and transformation errors seem to be generic in that one could not precisely point out one area where students do not comprehend. It has also been suggested that one of the ways to overcome the challenges of students in dealing with word problems is to adequately address the issues of student's poor knowledge of Mathematics lexicons and terms (Adu, Assuah, & Asiedu-Addo, 2015; Moleko & Mosimege, 2020). In addition, how these terms and lexicons are related to mathematical operators are of great importance in dealing with word problems. There is gap in the knowledge on the exact difficulties students possess in translating word problems to simultaneous and quadratic equations. For instance, neither the WAEC Chief Examiner's Reports nor previous researchers have pinpointed student's difficulties in translating word problems to simultaneous and quadratic equation. Hence the need for further studies because of the important of word problems in real life situations.

While it is important for students to understand the meaning of Mathematical terms, teachers may be in better position to guide the students if the teachers have knowledge of students' difficulties in not just on mathematical lexicons but also in other areas. For instance, do the students have difficulties in representing unknown using letters or symbols in translating words problems to linear, simultaneous, and quadratic equations? Could the students have difficulties in generating algebraic terms involving linear, simultaneous, and quadratic equations? Do the students have difficulties in crating algebraic expression, and obtain the final require algebraic equation while translating words problems into linear, simultaneous, and quadratic equation? This knowledge would enable Mathematics teachers effectively teach word problems to students regardless of the students' gender.

Gender is the biological condition that indicates whether an individual is male or female. It is societal coined concept that attributes roles, responsibility, and cultural expectations to male and female members of the society (Akande & Ajisebiyawo, 2018). Society has covertly assigned some roles predominately to a particular gender. In terms of academic related outcomes, such as students' achievement, or difficulties in learning, there seems to be no established direction with respect to male and female learners. A meta-analysis study has revealed that, in Mathematics tasks that involves word problems, male students outperformed their female counterparts (Anghel et al., 2019). However, some studies show that female had better academic achievement in Mathematics than male student (MTteucci & Mignani, 2021). More so,

the role of gender on learning outcome may even depend on the level of students' education. For example, it is noted that gender is an influential factor on students learning of Mathematics whereby at senior classes, the gender gaps favour male students but favour female students at junior classes (Breda & Napp, 2019). However, it was surprising that at primary school level, male and female pupils did not show any significant difference in their achievement in Mathematics (Third International Mathematics and Science Study [TIMSS], 2018). In recent times, it noted that despite the increase in the number of female students in STEM related fields, Mathematics remains males dominated subject (Andersen & Smith, 2023). The controversial effect of gender on learning outcome seems to be an old one that would keep calling for more evidence. Unfortunately, while there is still no consensus on the influence of gender on students' learning outcome, there is even little or no study that have examined the roles of gender on students' difficulties in dealing with word problems. Since evidence has shown that word problems is the most difficult areas for secondary school Mathematics students, understanding the role of gender in this important area seems not only imperative but could be said to be timely. Hence, this study seeks to find out if gender actually has an influence on secondary school students' challenges in translating word problems to algebraic equations. Evidences have shown that most frequently occurring difficult areas in the secondary education Mathematics is in the algebraic word problems. The consequence of students' persistent poor achievement in Mathematics is that the growing demand for technological independence of Nigeria may not be fully achieved. Hence, there is a need for urgent solution to address students' poor achievement in Mathematics. While some studies have attempted to solve this problem by ambiguously identifying and classifying student errors in solving words problems, these studies couldn't provide specific information enough to guide teacher for effective interventions. This could even be the reason students still struggle to learn word problems. Worrisomely, most of the researchers who analyzed student' difficulties in solving word problems failed to explore the influence of gender on students' difficulties in solving word problems given the age long controversial role of gender in students' learning outcomes. Of course, filling this knowledge gap may give teachers and other stakeholders focus on addressing students' weaknesses in algebra. For this reason, the problem of this study, therefore is: what are the difficulties senior secondary school students encounters in translating algebraic word problems to algebraic equation and what could be the influence of gender on the difficulties encountered by senior secondary school student in translating algebraic word problems to algebraic equations?

Purpose of the Study

The overall aim of this study was to assess senior secondary school students' difficulties in translating algebraic word problems to algebraic equations. Specifically, the study seeks to determine:

1. The difficulties secondary school students have in translating algebraic word problems to algebraic equations.
2. the influence of gender on the difficulties secondary school students has in translating algebraic word problems to algebraic equations.

Research Questions

The following research questions were formulated for the study:

1. what are the difficulties secondary school students have in translating algebraic word problems to algebraic equations?
2. What the influence of gender on the difficulties secondary school students has in translating algebraic word problems to algebraic equations?

Hypotheses

The following hypotheses tested at 0.05 level of significance guided the study;

H_{01}: There is no significant influence of gender on the difficulties secondary school students have in translating algebraic word problems to algebraic equations.

Materials and Methods

Research Design

This study followed a survey approach. The study was conducted at Nsukka Local Government Area in Enugu State, Nigeria. Nsukka LGA is one of the three Local Government areas in Nsukka Education Zone. Nsukka LGA is also one of the 17 LGAs in Enugu State, Nigeria. Nsukka Local Government Area is located in the South-Eastern Nigeria. The residents of this area are predominantly the Igbo tribe. The occupation of the residents includes farming, trading, civil and public servants, and artisans. Large number of the residents are students. The prominent educational institution in the area is the University of Nigeria. The population of the study consisted of 2388 SS2 Mathematics students from the 32 public secondary schools in Nsukka Local Government Area Enugu State (PPSMB, 2023). The sample for the study was 140 SS2 Mathematics comprising of 58 male students and 82 female students. Proportionate stratified random sampling was adopted in drawing the participants for this study.

Tools for Data Collection

The instrument applied for data collection was entitled 'Algebraic Word Problems Test (AWPT)' constructed by the researcher. The AWPT was made up of two sections: Section A which elicited personal information

(eg. Gender) and Section B which contains three essay questions on word problems. Out of the three questions, the first one was on word problems leading to simple linear equations, the second was on word problems leasing to simultaneous equation and the third was on word problem leading to quadratic equations. A scoring rubric was developed to identify students' difficulties in translating the word problems to algebraic equation (See Appendix A for the question with the corresponding rubrics). The instructions for the questions only required students to translate the word problems into algebraic equations and not to solve them. Hence, the scoring rubric did not go beyond generating the equation, although some students attempted solving the equations. The students were given adequate time 30 minutes and were asked to generate algebraic equation for the word problems. The difficult students had in translating word problems to algebraic equation were categorized using the scoring rubric developed by the researcher. The instrument was submitted for validation using three experts (two in Education Mathematics Unit and one in Pure and Applied Mathematics) from the University of Nigeria, Nsukka. The experts were further requested to make any comment or/and suggestion that could improve the quality of the instrument and the study generally. The corrections and modifications were affected in the final version of the instrument. The AWPT was subjected to trial testing. The trial testing was carried out by administering the AWPT on 20 students from one school outside the study area. The answer scripts obtained from the students were subjected for inter-rater reliability using Kedall's Coefficient of Concordance (W). Three Mathematics teachers were given the scoring rubric developed by the researcher and were asked to rank the 20 students' scripts in terms of their difficulties in translating algebraic word problems to algebraic equation. The resulted yielded reliability index of $W=0.81$. This implied that the instrument was reliable as the reliability index was above 0.70 considered by Nworgu (2015) as an indication of reliable instrument.

The researchers first obtained permission from the principals of the schools and then briefed the teachers on the purpose of the study. Having intimated the teachers, the researchers adopted on-the-sport administration and collection of the questionnaire in order to ensure high return rate. The researchers with the help of the mathematics teachers administered the AWPT to all the SS2 students in the sampled secondary schools and their responses collected immediately. Research question one (1) was answered using frequency and percentage. While Research question two (2) was answered using mean and standard deviation, the hypothesis was tested using t-test at 0.05 level of significant. Students are said to experience difficult in a given step (difficult area) in translating word problems to algebraic equation when the percentage of student that have difficulties in that step (difficult area) is 50% and

above, otherwise the difficult is said not to be difficult for the students. The 50% was the benchmark for identification a particular content area as difficulty.

Results

Research Question One: what are the difficulties secondary school students have in translating algebraic word problems to algebraic equations?

S/N	Areas of Difficulties	N	%	Remarks
1	Inability to represent unknown variables with letters	10	14.29	ND
2	Inability to generate linear algebraic terms.	38	54.29	D
3	Difficulties in creating algebraic expressions	36	51.43	D
4	Inability to equate two algebraic terms or expressions as required by the question.	46	65.71	D
5	Inability to represent two unknown variables with two distinct letters when translating algebraic word problems to simultaneous equation with two unknowns	10	14.29	ND
6	Inability to generate the two distinct equations for algebraic simultaneous	64	91.43	D

	equations			
7	Inability to create quadratic terms (such as 1.80/x)	66	94.29	D
8	Inability to generate quadratic algebraic expressions.	59	84.29	D
9	Inability to write the required final quadratic equation	66	94.29	D
	Grand Percentage		62.70	D

Key: N=Number of students, %= percentage of students having difficulties, D=Difficulty, ND=Not Difficulty

Table I: Frequency and Percentage of Difficulties Students encounter in Translating algebraic word problems to Algebraic Equations

Table 1 shows percentage of students who had difficulties in the nine difficult areas ranged from 14.29% to 94.29%. The percentage of students' who had difficulty in representing unknown variables with letters (such as, x, y, n, a, etc) in translating algebraic word problems to simple linear equations was 14.29%. Similarly, the percentage of students who had difficulty in representing unknown variables with two distinct letters when translating algebraic word problems to simultaneous equation with two unknowns was also 14.29%. These percentage values are below 50.00% benchmark stated for the indication of students' difficulty areas in Translating algebraic word problems to algebraic equations. It implies that students had no difficulties in the use of letter to represent unknowns in both single linear and simultaneous equations in two unknowns. However, the percentage of students' difficulties in the remaining six difficulty areas ranged from 51.43% to 94.29%. These percentage values were above the 50.00 benchmark which implies that these are some the difficulty areas the students' had in translating algebraic word problems to algebraic equation.

Research Question Two: what is the influence of gender on secondary school students' difficulties in translating algebraic word problems to algebraic equations?

Gender	Mean	SD	Remarks
Male	38.14	10.58	Females encountered more difficult
Female	39.44	11.36	

Table 2: Mean and Standard Deviation for Comparing Difficult by Gender

Data in the Table 2 shows that male students had mean difficulty score (*M=38.14, SD=10.58*) in translating algebraic word problems to algebraic equation. On the other hand, the female students had (*M=39.44, SD=11.36*) in translating algebraic word problems to algebraic equations. The higher standard deviation value for the female group indicated that their raw scores had more variation from their mean scores as compared to their male counterparts with standard deviation value of 10.58. The female students had more difficulties than their male counterparts in Translating algebraic word problems to algebraic equations. A t-test was performed to ascertain whether the mean difference was a mere chance occurrence or genuine difference.

Hypothesis One: There is no significant influence of gender on the difficulties secondary school students have in translating algebraic word problems to algebraic equations.

Gender	N	Mean	SD	t	df	P	Decision
Male	58	38.14	10.58	0.69	138	0.49	Not Sig
Female	82	39.44	11.36				

Table 3: A t-test for Significance Influence of Gender

An independent sample t-test was further performed to compare the difficult scores for male and female students in translating algebraic word problems to algebraic equations as shown in Table 3. There was no significant difference in the difficulties encountered by male students *(M* = 38.14*, SD* = 10.58*)* and female students in translating algebraic word problems to algebraic equations *(M* = 39.44*, SD*=11.36*; t (138)* = 0.69*, p* = 0.49*>0.05).* The null hypothesis was therefore, rejected at 0.05 level of significance, which means that gender does not play any role on

the difficulties students encounter in translating algebraic word problems to algebraic equations.

Discussion

This study examined the difficulties students encounter in translating algebraic word problems to algebraic equations. This study is important considering the persistent poor performance of students in algebra generally and word problems in particular. The findings of the study showed that students' difficulties in translating word problems to algebraic equations include inability to generate linear algebraic terms, difficulties in creating algebraic expressions such as 5x+2, 3y+5, 7-2y/3, etc., inability to equate two algebraic terms or expressions as required by the question, inability to generate the two distinct equations for algebraic simultaneous equations, inability to create quadratic terms (such as 3x2, 5y2, etc.), inability to generate quadratic algebraic expressions (such as 3x2 +7, etc.), and Inability to write the required final quadratic equation. These findings are in consonance with Aforklenu and Bukari (2023) who noted that students' poor knowledge of Mathematics lexicons and terminologies negatively affect students' ability to solving Mathematics word problems. The study also corroborated Teoh et al. (2024) that students' have challenges learning algebra. The reason for this finding could be that students have not fully mastered the terminology associated with Mathematics. Students need to understand the meaning of terminologies such as: and, product, sum, is, result, difference, ago, 'in x years' time', factor, interchange, varies directly or inversely, add, costs, among others in other to effectively use them to form mathematical terms and operation which would give rise to the required algebraic equations. Interestingly, the English meanings of these terms that are expected to enable students translate word problems into mathematical equation are the same even when they are used in Mathematics context. This implies that when they are lacking, in terms of poor knowledge of the terms, they are likely to perform below expectation in algebraic task that involve the terms. Although, high proficiency in English language may not directly translate to high ability algebra (Suhr et al., 2024). High language proficiency is a powerful tool in understanding of algebraic word problems (Sandilos, et al., 2020). This implies that for effective teaching of word problems to take place, Mathematics teachers are expected to ensure that the students acquire sufficiency knowledge of terms that are often used in in word problems. Of course, there are many strategies teachers could adopt to facilitate students' mastery of terms used in algebraic word problems. First, they could provide the students with a comprehensive list of the commonly use English terms and their meanings. Secondly, they could show the students how some of the simple terms are used. For example, the six

and five (6+5), the sum of X and Y (X+Y), two times Y (2Y), two times Y is four (2Y=4), the students should be made to relate the terms in the word problem with the mathematical symbols and operations in the equations. More importantly, the teachers should know that while the students can easily use letters to represent an object as demand from the tasks, most students could not solve beyond this step. As a matter of fact, the students' difficulties mostly are in translating word problems to simultaneous and quadratic equations. This implies that the terms involved in simultaneous and quadratic equation should be properly explained to the students by building on their knowledge of simple linear equations.

The finding revealed that there was no significant difference in the difficulties encountered by male students and female students in Translating algebraic word problems to algebraic equations. These findings were not surprising, giving that, in recent times, both male and female students are encouraged to pursue science related disciplines. This finding aligned with Ajai and Imoko (2015) who reported that gender had no role on students' learning of Mathematics as both male and female students demonstrated similar abilities to collaborate and compete in solving Mathematics tasks. The findings are in agreement with Ogbu (2018) that gender had no significant role on teachers' mastery of Mathematics contents. Lack of significant difference in the difficulties encountered by both male and female students may be as a result of the teaching methods used by the teachers in teaching students' Mathematics which gave no particular group of student advantages over the others. In addition, it seems that gone were those days when mathematics was perceived as discipline made for the male folks. Large number of mathematics teachers are female and this could serve as motivation to female students that they could do as well as their male counters do even better. The implication of this findings is that no special attention should be given to a particular gender in the efforts to enhance their word problems solving ability. In other words, the teachers should see the students a group of students with a common difficult in translating algebraic word problems to mathematical equation. Hence, gender friendly approach is expected to be incorporated into teaching and learning of algebra in schools.

Conclusion

The students' difficulties in translating algebraic word problems to mathematical equations have been explored. Out of nine difficult areas outlined, students had difficulties in seven areas which revolved around Inability to generate linear algebraic terms, difficulties in creating algebraic expressions such as 5x+2, 3y+5, 7-2y/3, etc., inability to equate two algebraic terms or expressions as required by the question,

inability to generate the two distinct equations for algebraic simultaneous equations, inability to create quadratic terms (such as 3x2, 5y2, etc.), inability to generate quadratic algebraic expressions (such as 3x2 +7, etc.), and Inability to write the required final quadratic equation. While using of letters to represent an object was not difficult for the students, students' difficulties in other steps in translating word problems to algebraic equations were obvious. Hence, a comprehensive seminar and workshop on word problems should be organized by government from time to time for teachers on how to impact the knowledge of word problem translations to the students. Teachers are expected to use the expert knowledge to teach the students how to translate word problems to algebraic equations. Teachers should encourage the students to work hard so as to clear all difficulties they do encounter while translating algebraic word problems to algebraic equation. More so, the need for students to change their negative impression about word problems and try to see their major difficult areas so as to consciously put more time in learning them cannot be overstated. Mathematics text book authors should try to give more examples on students' major difficult areas while the government should allow only qualified Mathematics teachers to teach the students. Curriculum planners should plan the curriculum in such a way that more time will be allocated to students' difficult areas in Mathematics such as word problems. Parents should try to help their wards by providing Mathematics tutor for them who will help explain some of these words problem concepts to them to enable them translate to Mathematical equations.

Female students, although had more difficulties in translating algebraic word problems to algebraic equations. There was no significant influence of gender on the difficulties secondary school students encounter in translating algebraic word problems to algebraic equations, implying that teachers need not pay more attention to a particular gender in the attempt to enhance students' difficulties in word problems. Therefore, the focus of researcher should be on how to apply gender friendly strategies in tackling students' difficulties in translating word problems into mathematics equations.

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Appendix A
Rubric FOR Identification of Students' Difficulties in translating Word Problems to Algebraic Equations

Question One **Word problems involving linear equation**		
Questions	**Nature of Difficulties which could be Identified**	**Criteria for Identification of Difficulties**
1. A boy is one-fifth of his father's age. In three years' time, the sum of the boy and his father's age will be 72 years. Translate the word problem into algebraic equation	a. Inability to represent unknown variables (eg age) with letter such as x. b. Inability to generate linear algebraic terms. a. Difficulties in creating algebraic expressions such as 3(x+5). b. Inability to equate two algebraic terms or expressions as required by the question.	a. No letter was used at all. b. Two different letters were used when one letter should be used. c. No evidence of obtaining (x+5) d. No evidence of 3(x+5) obtained e. No evidence of equating 3(x+5) to 36 thus:3(x+5)=36
2. In a two digit number. The units digit is thrice the tens digit. If 36 is added to the number, the digits interchange their place. Find the number.	ai. Inability to represent two unknown variables with two distinct letters (eg x and y) when translating algebraic word problems to simultaneous equation with two unknowns. aii. Inability to generate the two distinct equations for algebraic simultaneous equations. aiii. Inability to generate the two	ai. Using the same latter to represent the digit in unit and tens aii. Not using letters at all to represent the digits. aiii. No evidence of obtaining 10y + x, and 10x + y aiv. In ability to obtain the equations x = 3y and 10y + x + 36 = 10x + y or their equivalents

	distinct equations for algebraic simultaneous equations	
3. Sunny bought some biscuits for 1.80 naira. If the biscuits had been 10 kobo a packet cheaper, he would have bought three more for his money. Obtain the equation representing the question.	3i. Inability to create quadratic terms 3ii. Inability to generate quadratic algebraic expressions (such as $3x^2+7$, etc.) 3iii. Inability to write the required final quadratic equation	a. No letter was used to represent the number of packs bought. b. Not representing the cost of each pack by 1.80/x kobo c. Not representing cheaper by 10 kobo by (180/x-10) kobo d. Not representing 3 more packs by (x+3) packets e. No evidence of the final equation 180/x-10=180/(x+3)

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