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Transformational Leadership Style

ICT Integration in Teaching and Learning

} Highlights {

EFL Distance Learning & Foreign Language

The Moderating Role of Teacher Self-Efficacy

Discovering Thoughts, Inventing Future

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By Esther Gacicio, Christopher Gakuu & Harriet J. Kidombo

University of Nairobi

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THEMODERATINGROLEOFTEACHERSELFEFFICACYINTECHNOLOGYONTHERELATIONSHIPBETWEENTRANSFORMATIONALLEADERSHIPSTYLEANDICTINTEGRATIONINTEACHINGANDLEARNING

Strictly as per the compliance and regulations of:

The Moderating Role of Teacher Self-Efficacy in Technology on the Relationship between Transformational Leadership Style and ICT Integration in Teaching and Learning

Esther Gacicio [α], Christopher Gakuu [σ] & Harriet J. Kidombo [ρ]

Abstract- In spite of the trainings mounted by the government and other stakeholders in Education to capacity build the teachers in using technology the uptake has been low. Previous studies report that the integration of Information, Communication and Technology (ICT) into the curriculum remains problematic in the school context. Some of the problems encountered in the process of integrating ICT into the curriculum are school leaders' perceptions of ICT. It is against this backdrop that the present study sought to investigate how transformational leadership style predicts ICT integration in teaching and learning in public primary schools in Nairobi County and the moderating role of teachers' self-efficacy on technology and school environment respectively. The target population for this study comprised of 6150 teachers drawn from public primary schools in Nairobi County. The study was conducted in a sample of the public primary schools in the eleven sub-counties of Nairobi County namely; Embakasi, Makadara, Kamukunji, Starehe, Njiru, Kasarani, Westlands, Langata, Kibra, Mathare and Dagoretti. Simple random sampling from the target was employed in the study. Teachers responded to a structured questionnaire while the head teachers had an in-depth interview. An observation checklist was also used to assess resources used by the teachers for ICT integration. Both descriptive and inferential analysis were employed. Findings indicate that teacher self-efficacy in technology exhibits a significant moderating effect of the relationship between transformational leadership style and ICT integration (F (2, 282) = 58.721, p-value < 0.001). The study recommends that school administrations as well as teacher management under the Teachers Service Commission develops and executes programs to reinforce teachers' efficacy in the adoption, use and innovation in technology.

Keywords: teacher self-efficacy, transformational leadership style, ICT integration in teaching and learning.

I. Introduction

The demand for a well-educated workforce has driven many countries to reengineer their education systems. An education system has to be suited to the demands of the technological age so that a competitive edge can be maintained. Accordingly, the digital age has not simply changed the nature of resources and information; it has transformed several basic social and economic enterprises. Contemporary society-the settings where we live, work, and learn-has likewise changed dramatically. Both the amount of information and access to it has grown exponentially; a significant potential for using varied resources in numerous ways for instruction and learning has emerged (Hill, 2011).

The effective use of the wide range of facilities offered by ICT opens up unprecedented opportunities for invigorating learning and teaching in our schools and improving pupils' attainment in coursework across the whole curriculum. Indeed, the thinking on the nature of the curriculum itself is likely to be challenged as the use of ICT becomes more effective and widespread. The reformed curriculum that Kenya is experiencing at the moment is edged on the nurturing every child's potential. Central to the competencies that it addresses is the digital literacy that is entrenched in every learning area (Basic Curriculum Framework, 2016). Besides, the government's initiative of deploying digital devices to all standard one pupils in Primary schools in Kenya is another indicator of how fast ICT is invigorating teaching and learning process in Kenya.

Both the school leadership and teachers are at the centre of this teaching and learning process. School leadership plays a key role in improving school's outcomes by influencing the motivation and capacities of teachers as well as the school environment and environment (Bush, 2015). The head teacher must employ inclusive kind of leadership where they will involve other people as a team. This team gets a deliberate opportunity to contribute to the vision, culture and climate of the school and thus the head teacher has a duty to create the opportunities to make this happen and teachers partly determine the leadership styles of the head teacher (Mutula, 2016). As a leader, the head teacher has the power to influence job satisfaction among the teachers under them. Leadership styles or traits are the characteristic way in which a leader uses power, makes decision, and interacts with others. The transformational headteachers has been particularly found to favor innovative teaching and learning practices ((Kouzes, 2009; Bush, 2015; Kunwar, 2011; Farah, 2011).

Like headteachers, teachers are also pertinent in the successful integration of ICT into teaching and learning. With the advent of technology in teaching and learning, it has become imperative that the teachers embrace the use of ICT to boost their efficacy. With the dynamism in technology, it is possible that teachers face difficulties in adopting technology in their work. Previous studies have identified several reasons for this

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underutilization of technology including but not limited to lack of resources, lack of training, philosophical beliefs about technology, and lack of time to experiment with technology tools (Compeau & Higgins, 1995; Kellenberger & Hendricks, 2013; Littrell, et al., 2015; Teo, 2009; Wang, Ertmer, & Newby, 2014). Further, many researchers attribute underutilized technology to teachers' lack of self-efficacy in incorporating such resources into their classrooms (Kellenberger, & Hendricks, 2013). Against this background, we set out to investigate the association among the transformational leadership style, teacher self-efficacy in technology and ICT integration in teaching and learning.

a) *Transformational Leadership Style and ICT Integration in Teaching and Learning*

Literature reveals that in its current form, the full range leadership has shown leaders as having five transformational leadership attributes, three transactional leadership attributes, and one non transactional laissez-faire leadership. Transformational leadership is a model of leadership where the leaders inspire members to go beyond their task requirements. Burns (1978) defined a transforming leader as one who: '(1) raises the followers' level of consciousness about the importance and value of designated outcomes and ways of reaching them; (2) gets the followers to transcend their own self-interest for the sake of the team; (3) raises the followers' level of need on Maslow's (1954) hierarchy of needs, from lower-level concerns for safety and security to higher level needs for achievement and self-actualization' (Bass, 2008). A transformational leader on the other hand is capable of delivering performance beyond expectations (Bass, 1985) by (1) raising followers level of awareness of the importance of achieving valued outcomes and the strategies for reaching them, (2) encouraging followers to transcend their self-interest for the sake of the team, organization, or a larger cause and (3) developing associates' needs to higher levels in such areas as achievement, autonomy, and affiliation, which can be both work related or outside work related.

In the school context, transformational leadership (Kouzes, 2009) refers to leadership skills in those head teachers who can pioneer the school to a new level at the hinge of school development. Of all leadership styles, transformational leadership is found to have the strongest positive impact on school environment. This is because the head teacher's motive is to empower the teachers as partners and both the head teacher and teachers are guided by a shared vision. Staff members depend on one another and work together as a team. While technology infrastructure is important, ICT leadership is even more necessary for effective ICT implementation. Head teachers are aware of the fact that creating a positive and supportive climate is one of the important aspects of their

responsibilities. Moreover, they believe that the climate among and between teachers is one of the factors with which to measure school success (National Association of Secondary School Head teachers (NASSP) 2001: 51-52). Therefore, it can be suggested that head teachers should embrace a transformational style of leadership. It is assumed that this style of leadership would be effective in creating a goal-oriented atmosphere in the school.

b) *Teachers Self Efficacy in Technology*

Holden and Rada (2011) suggested that by increasing teachers' technology self-efficacy, they might directly increase their acceptance of technology and also indirectly increase their usage of technology. In which case therefore there will be more teachers enrolled in online courses since they will be confident in using ICTs. Furthermore, Brown, Holcomb and Lima (2010) asserted that technology self-efficacy has come to play a crucial role in the preparation and implementation of educators who can successfully use educational technology to enhance learner learning. How would teachers increase technology efficacy in order to adopt ICT in Teaching and learning? In her study, Farah (2011), gathered that professional development opportunities are critical to teachers adopting use of technology. This entails more targeted and specialized teacher training on instructional technology and increased knowledge of and access to instructional technology tools and resources. Further increased teacher collaboration with a focus on instructional technology and creating opportunities for teacher observations and demonstrations would enhance adoption of technology. In my opinion, teachers prefer to work together as teams. They gain a lot in sharing their experiences as well as challenges that they face as they execute their duties. This aspect of sharing is backed Farah's (2011) research.

Through increased teacher collaboration with a focus on instructional technology, teachers would have the opportunity to share, discuss, and explore ways to integrate instructional technology in their instructional practice. This agrees with Duncan's (2010) view where he identified the need to connect teachers and leverage technology to enable us to build the capacity of teachers. He also discussed the benefit of online learning communities which would create opportunities for teachers to collaborate with peers, as well as reach out to experts all over the world. Elimika course is one such platform offered by the Kenya Institute of Curriculum development (KICD) where teachers can interact.

c) *ICT Integration in Teaching and Learning*

Kenya has realized the importance of embracing technology in learning and has made tremendous steps towards integrating it in education. The government of Kenya is devoted to the utilization of

ICT which includes digital information technologies, and other resources to enhance access to learning for all Kenyans as indicated in its strategic plan (GOK, 2016). The government has developed a National policy that led to the development of National ICT strategy for education and training (2016). This strategy outlines the implementation of use of ICT in teaching and learning process. It further reinforces the government desire to use ICT to facilitate education.

Consequently, there has been continuous deployment of ICT infrastructure to schools and learning institutions. Some of the initiatives along this line include the NEPAD e-schools (2015); the e-schools initiative; the Multi-media lab project (TELEVIC); the ESP-ICT Computer for schools project (2010 -2012); the Accelerating 21st Century Education (ACE) project (2010-2012); Tafakari Project in TTCs; the Badiliko Project (British Council) and the Holistic Model project (2011-2012). The most recent of these initiatives is the Digital Literacy program (DLP) where learning devices have been deployed in all the primary schools in Kenya for the standard one pupils. This deployment is coordinated by ICT authority and is one of the flagship projects of the Government of Kenya.

Further, to provide coordination and harmonization of initiatives in education, the State Department of Education established ICT4E unit and Team. This has provided continued guidance on public-private partnerships to mobilize resources for ICT in education. Besides, the government through Kenya Institute of Curriculum development has developed digital content for Primary and Secondary Schools for use by the learners in the ICT integration in Education. Accordingly, there is a wide range of ICT initiatives and projects ongoing in Kenya focused on e-infrastructure with the aim of boosting the adoption of ICT in public primary schools not only in Nairobi County, but across the country. Key among these include the Digital Learning Programme (DLP) initiated by the Government of Kenya in 2013. The programme targets learners in all public primary schools and is aimed at integrating the use of digital technologies in learning. Under the programme, 75,000 public primary school teachers have been trained as at October 2018 in readiness for the project implementation (GoK, 2019).

However, given the milestones achieved so far in ICT integration in education in Kenya, and also the efforts put in place to ensure that technology is in use in the Kenyan schools, teachers have been slow in adopting use of ICTs in teaching and learning indicated by low uptake levels (MOE, 2012). The British Educational Communications and Technology Agency (2014) reported that only few teachers succeed in integrating ICT into subject teaching in a fruitful and constructive way that can promote learners' conceptual understandings and can stimulate higher-level thinking and reasoning. The report further states that in most of the cases, teachers just use technology to do what they have always done, although in fact they often claim to have changed their teaching practice. Further, a number of teachers report that they do not feel comfortable with the ICT integration in subject teaching, since their role was predetermined and designed by educational authorities and teachers feel that they face a lack of professional autonomy (Olson, 2010). Although the government has provided a national roadmap ICT policy, financial plan for ICT use in schools that requires its relevant extraction and implementation by key school leaders including the deployment of digital devices in all the Primary schools in Kenya through DLP. Despite these road maps developed by the government to implement ICT-based curriculum and instruction in schools, the situation in many schools in Kenya is that many of these schools are not effectively implementing ICT in curriculum and management as intended.

Previous studies (Keiyoro, 2011; Manduku et al., 2012; Ling, 2013) report that the ICT integration into the curriculum remains problematic in the school context. Some of the problems encountered in the process of integrating ICT into the curriculum are school leaders' perceptions of ICT and teacher competency. Further, extant studies with respect to ICT integration in teaching and learning have been narrow in their conceptualization, focusing on among others, factors influencing effective use of ICT in teaching and learning (Keiyoro, 2011); Adoption and use of ICT in enhancing management of public secondary schools (Manduku et al., 2012); Constrains in the use of ICT in teaching and learning (Gikonyo, 2012); and the relationship between head teachers' access to ICT and school performance (Mutula, 2016).

It is against this backdrop that the present study sought to establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools; to establish the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools; and to examine the moderating influence of teacher self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools.

II. Literature Review

a) ICT Integration in Teaching and Learning

For technology to be seamlessly integrated in teaching and learning, it is important that teachers are well versed with technology to the extent that they have confidence to use it in the classroom. Holden and Rada (2011) suggested that by increasing teachers' technology self-efficacy, they might directly increase their acceptance of technology and also indirectly increase their usage of technology. Furthermore, Brown,

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Holcomb and Lima (2010) asserted that—technology self-efficacy has come to play a crucial role in the preparation and implementation of educators who can successfully use educational technology to enhance learner learning. How would teachers increase technology efficacy in order to adopt ICT in Teaching and learning? Exposure to technology as well as interest in using it would help boost the teachers' self-efficacy in technology. Constant use of the same would give them the confidence they require in its usage. In her study, Farah (2011), gathered that professional development opportunities, more targeted and specialized teacher training on instructional technology and increased knowledge of and access to instructional technology tools and resources are key to teachers adopting use of technology. She further noted that increased teacher collaboration with a focus on instructional technology and creating opportunities for teacher observations and demonstrations.

Through increased teacher collaboration with a focus on instructional technology, teachers would have the opportunity to share, discuss, and explore ways to integrate instructional technology in their instructional practice. This agrees with Duncan's (2010) view where he identified the need to connect teachers and leverage technology to enable us to build the capacity of teachers. He also discussed the benefit of online learning communities which would create opportunities for teachers to collaborate with peers, as well as reach out to experts all over the world. Because teachers are in the trenches teaching learners, they can easily relate to other teachers and provide significant support to their colleagues to help promote effective uses of instructional technology. These ideas are consistent with one of the goals presented in Georgia's technology plan, which states the need to increase teachers' proficiency to use technology effectively in order to enhance learner learning (Georgia Department of Education, 2013).

Different categories have been used by researchers and educators to classify factors that influence teacher use of ICT in teaching. Sherrr and Gibson (2012) claims that technological, individual, organizational and institutional factors should be considered when examining ICT adoption and integration. Rogers identified five technological characteristics or attributes that influence the decision to adopt an innovation namely Relative Advantage, Compatibility, Simplicity, Triability and Observability (Rogers, 2013). Stockdill and Morehouse (2012) also identified user characteristics, content characteristics, technological considerations, and organizational capacity as factors influencing ICT adoption and integration into teaching. Balanskat, Blamire & Kefalla (2012) identified the factors as teacher-level, school-level and system-level. Neyland (2011), identified factors such as institutional support, as well as micro factors

such as teacher capability influencing the use of online learning in high schools in Sidney.

A study done by Lau and Sim, (2008) in Malaysia on "exploring the extent of ICT adoption among secondary school teachers in Malaysia" showed that despite the apparent benefits of the use of ICT for educational purpose, the potential of learning is deprived as many teachers are still not fully ICT literate and do not use it in their teaching. Studies on teacher's readiness for ICT suggest that there is still a long way to go before schools in developing countries are able to take full advantage of the opportunities provided by 21st century technology (So and Paula, 2016). Gobbo and Girardi (2011), Ritz (2012), and Sang et al (2013) all indicate that teachers' ICT literacy levels influenced how learners used ICT in schools.

b) Transformational Leadership Style and ICT integration

Success of any institution is pegged on the leadership. Continuous success and prosperity of any institution is directed by the ever-changing situations that impact on leadership. School leaders should take cognizance of this aspect. In the world that we live in today, school leaders' roles have changed from practicing teachers with added responsibilities to full-time professional managers of human, financial and other resources accountable for their results (Bolam, McMahon, Pocklington & Weindling 2010). This has meant that more and more tasks have been added to the job description: instructional leadership, staff evaluation, budget management, performance assessment, accountability, and community relations, to name some of the most prominent ones. In light of the foregoing, this section reviews the concept of transformational leadership style, hailed as the most effective in school management in general and ICT integration in particular (Bush, 2015; Kunwar, 2011; Farah, 2011).

Transformational leaders are proactive, raise awareness levels of followers and help the followers to achieve high performance outcomes. This has been affirmed by Bass, 1990. Transformational leaders pay particular attention to each individual's needs for achievement and growth. Hamidifar (2009) found that employees are more satisfied with transformational leadership than any other style. He also revealed that this type of leadership was not being exercised by the managers. The study concluded that transformational leadership led to better satisfied employees. Nguni, Sleegers, and Denessen (2016) also studied the effects of transformational leadership on teachers' job satisfaction, organizational commitment, and organizational citizenship in schools in Tanzania. They observed that the leadership style was distinguished by the different ways' leaders motivate their followers and appeal to the emotions and values of their followers. The

teachers rated their head teachers particularly high on the transformational leadership traits of charismatic leadership, individualized consideration, and intellectual stimulation.

A study by Nthuni (2012) on leadership style factors that influence motivation of pre-school teachers in public pre-schools in Embu North District, revealed that there was need to adopt a transformational leadership style in order to enhance motivation of pre-school teachers in public pre-schools and improve their working environment by involving them in decision making and in policy formulation in their schools. Kibue (2008) study on transformational leadership style on public secondary schools in Kirinyaga County revealed that majority of head teachers and teachers did not understand nor use the transformational leadership style in schools. This style is still a new concept to many. The researcher concluded that there was need for teachers to be trained and properly inducted on leadership in order to properly manage both human and material resources. Against this backdrop, we hypothesized that transformational leadership style does not have a significant influence on the ICT integration in teaching and learning (H_{01}).

c) Teacher Efficacy in Technology and ICT Integration

With the advent of technology in teaching and learning, it is imperative that the teachers embrace the use of ICT to boost their efficacy. It is evident that teachers have not embraced technology. Previous studies have identified several reasons for this underutilized of technology including but not limited to lack of resources, lack of training, philosophical beliefs about technology, and lack of time to experiment with technology tools (Compeau & Higgins, 1995; Kellenberger & Hendricks, 2013; Littrell, et al., 2015; Teo, 2009; Wang, Ertmer, & Newby, 2014). Further, many researchers attribute underutilized technology to teachers' lack of self-efficacy in incorporating such resources into their classrooms (Kellenberger, & Hendricks, 2013). Previous studies have identified several factors that may contribute in teachers' decisions to integrate technology into their classrooms. Self-efficacy is one of those factors (Compeau & Higgins, 1995; Kellenberger & Hendricks; Littrell, et al., 2015; Teo, 2009; Wang, Ertmer, & Newby, 2014). Therefore, teachers' efficacy in digital technology becomes very crucial in the ICT integration in Teaching and learning.

In a qualitative multiple case-study research on teachers' competence and confidence level regarding the use of ICT in teaching practiced conducted in five European countries, Peralta and Costa (2014) found that technical competence influenced Italian teacher's use of ICT in teaching. However, the teachers cited pedagogical and didactic competences as significant factors if effective and efficient educational interventions are likely to be implemented. In Syria, for example, teachers' lack of technological competences has been cited as the main barrier (Albirini, 2014). In Australian research, Newhouse (2012) found that many teachers lacked the knowledge and skills to use computers and were not enthusiastic about the changes and integration of supplementary learning associated with bringing computers into their teaching practices.

A study by Ayere et al, (2010) on E-learning in secondary schools in Kenya reported that a number of teachers in secondary schools had not received any training in ICT use during their formative years at teacher training institutions before joining the profession. 55% of the sampled teachers stated that they did not receive any ICT training at all. However, 51% of the teachers had taken self-initiative to undertake ICT training during the last three years they had been employed. A report by the Ministry of Higher education, Science and Technology (GOK, 2010) on secondary school teachers' adoption and use of ICT indicated that the number of teachers skilled in ICT in secondary schools was low. The study revealed that out of the number available, few had ICT training effective in adoption and use of the technology in the classroom. Out of 232 teachers in the sample, majority (57%) were reported to have trained at certificate level on basic computer skills, 73% were reported to have acquired ICT training through in-service courses and 43% were trained by private computer college.

Similarly, a study by Mingaine (2013) that carried out in Meru County involved a sample of 315 respondents and investigated the skill challenges in ICT integration in public secondary schools. The study which employed a descriptive survey design found that, there is limited supply of qualified ICT teachers and that majority of secondary school teachers in Meru County were not competent to facilitate use of ICT in schools. It also concluded that the level of training of majority of the teachers is far from being satisfactory due to lack of exposure during formative training in initial teacher training institutions. A study by Ayere et al (2010) compared e-learning in NEPAD and non-NEPAD schools that were offering computer studies and found that teachers in NEPAD schools integrated ICT in the learning in all subjects, whereas little or no integration took place in the non-NEPAD schools. This finding could be explained by the fact that more teachers from NEPAD schools were computer literate (60%) as compared to their non-NEPAD counterparts (31%). At the same time, NEPAD schools had more ICT graduate teachers (53%) than the non-NEPAD schools (33%) (Ayere et al 2010). These figures cannot be taken to be representative of the situation in the entire country, though, because the study included just a few selected schools all of which were already utilizing computers. There is a need to establish the situation in other parts of the country.

Teachers' motivation towards their efficacy is hedged on their self-worth which is directly linked to their perception on who they are. The theory on Self-worth asserts that a person's ability to achieve is directly linked to their perceptions of themselves. Martin Covington, the pioneer in the psychology field of self-worth and self-efficacy, states that most people will go to extraordinary lengths to "protect their sense of worth or self-value," even if it infringes on the ultimate outcome of their achievement (Covington, 1984, p. 4). Recent work on teacher motivation within the framework of expectancy-value theory (Richardson & Watt, 2006; Watt & Richardson, 2007) provides evidence for links between teachers' motivation and their engagement, commitment and persistence in teaching and their inclination to become involved in professional development. There is considerable agreement that teachers' motivation and scepticism about affecting learners is associated with enthusiasm, job commitment, and instructional behaviour (Tschannen-Moran & Woolfolk Hoy, 2001). Furthermore, research has identified a link between teacher efficacy and learner efficacy and achievement as well (Feldhaufer et al., 1988; Ross &Cousins, 1993).

A growing number of studies have been conducted on teachers' confidence in their use of computers, either for personal work or in their teaching practice. Several studies (Lynch, 2013; Macmillan, Timmons and Liu, 2011; Sandholtz, Ringstaff and Dwyer, 2012) reported that teachers were reluctant to reveal their level of computer knowledge to learners and were unwilling to use computers in regular teaching practice until they felt comfortable and competent in using the technology. Teachers with more computer experience had greater confidence in their ability to use computers effectively (Galloway, 2013; Nash and Moroz, 2015).

Against this backdrop, we hypothesized that state that teacher self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning (H_{02}); and that teacher self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning (H_{03}). Accordingly, the hypothesized relationships are conceptualized and as illustrated in Appendix I.

III. Methodology

This study was approached from a pragmatism point of view, which was deemed best in underpinning the present study as it allowed for flexibility in approach including the collection of different data types, use of various data collection methods as well as data analysis techniques. The philosophy is further justified as the study involves ICT which is dynamic, involvements of different persons with divergent views and with varied leadership styles.

The study also adopted a mix of cross-sectional survey, correlational and mixed methods design. The study used a cross-sectional survey design since the object of the study was to document the situation as it is at the present time. The survey involved field visits to sampled schools so as to get first hand observation data and views from respondents. The study also employed a correlational study design which is a quantitative method of research in which there are two or more quantitative variables from the same group of participants, and one is trying to determine if there is a relationship (or covariation) between the two variables (that is, a similarity in pattern of scores between the two variables, not a difference between their means). Qualitative methods, particularly content analysis was also employed in the study as interview schedules were used that provided qualitative data hence mixed methods design.

The target population for this study comprised of public primary schools' teachers drawn from Nairobi County. Nairobi City County was selected as a suitable site for the study because it is a cosmopolitan area with pupils and teachers drawn from different social cultural backgrounds. The study targeted teachers from the 205 public primary schools in Nairobi County (NCEO, 2016). Respondents were drawn from the population of 205 head teachers and 6150 teachers in Nairobi county. Only head teachers and teachers were reached owing to the nature of the study objectives which only required their input. While head teachers were crucial in examining the head teachers' leadership roles in the implementation of ICT in primary school administration, teacher responses were required to determine the moderating role of teacher self-efficacy on the ICT integration in teaching and learning.

The study was conducted in a sample of the public primary schools in the eleven sub-counties of Nairobi County namely; Embakasi, Makadara, Kamukunji, Starehe, Njiru, Kasarani, Westlands, Langata, Mathare, Kibra and Dagoretti. The sample population was 205 head teachers from 205 Public Primary Schools in Nairobi County with 6150 teachers. Owing to the anticipated large number of respondents that included 6150 teachers and 205 head teachers, the study employed a combination of two formulae. For teachers the study used the Fisher et al. (1983) formula for determining sample sizes in large populations; while for head teachers, the study referred to Mugenda and Mugenda (2003) who proposes a 30% proportion in extremely small population sizes and 10% for larger populations. The 10% proportion will be used in the present study giving a sample of 21 head teachers. The Fisher et al. (1983) formula is as shown below:

$$n = \frac{N}{1 + (N * e^2)}$$

Where;

N= population size

e= Tolerance at desired level of confidence, take 0.05 at 95% confidence level

n= sample size.

For teachers, the sample size will be arrived at as follows:

n=6150/(1+(6150*0.05*0.05))

n=375.57

As such, the study was to reach a total of 376 teachers

A combination of cluster sampling and random sampling procedures was employed in the study. Whereas the sub counties formed the clusters random sampling was used to reach the head teachers from 21 primary schools in Nairobi County. The 11 sub-counties formed the cluster from where the sample size (376) of teachers were proportionately drawn.

The instruments used for data collection were structured questionnaires for teachers while the head teachers were taken through an in-depth interview using an interview guide. An observation checklist was further used to assess resources used by the teacher for ICT integration in teaching and learning. Different sets of questionnaires were developed for the teachers.

Both linear and moderation regression analyses were performed to assess the strength and direction of the relationships between the specified variables as well as the statistical significance. To this end, various statistics were extracted and interpreted with respect to the various models. Linear multiple regression analysis was employed in testing null hypothesis 1 (H_{01}) as illustrated in equation I and hypothesis 2 (H_{02}) as illustrated in equation II. Moderation regression was on the other hand employed in testing null hypotheses 3 (H_{03}) as illustrated in equation III.

$Y = \alpha + \beta X + \varepsilon \ (H_{01})$………………………………………………………… I

Whereby:

Y = ICT integration

α is the y-intercept or model coefficient;

β are the coefficients of the independent variables;

X = Transformational leadership style

ε is the error term established from heteroskedasticity test;

$Y = \alpha + \beta M + \varepsilon \ (H_{02})$………………………………………………………II

Whereby:

Y = ICT integration

α is the y-intercept or model coefficient;

β are the coefficients of the independent variables;

M = Teacher efficacy

ε is the error term established from heteroskedasticity test;

$Y = \alpha + \beta_1 \ (X*M) + \varepsilon(H_{03})$…..III

Whereby:

Y = ICT integration

α is the y-intercept or model coefficient;

β_1 are the coefficients of the independent variables;

X = Transformational leadership style

M = Teacher efficacy (Moderator)

ε = the error term established from heteroscedasticity test;

IV. Results

a) *Transformational Leadership Style and ICT Integration: Model Summary*

The statistical model $Y = \alpha + \beta_1 X_1 + \varepsilon$ where: Y = ICT Integration, α =constant, β_1 = Coefficient of X_1, X_1 = Transformational leadership, ε = Error term was used to establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools. Accordingly, H_{01} stating that transformational leadership style does not

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have a significant influence on the ICT integration in teaching and learning was tested.

From Appendix II, there was correlation between transformational leadership and ICT integration indicated by R which was 0.207. The value of R Square = 0.043 meaning that transformational leadership style explains the variance of ICT integration by 4.3% the variance of ICT integration. From the ANOVA results in Appendix II, the model was found to be statistically significant ($F_{(1,293)}$ = 13.124, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that transformation leadership is a good predictor of ICT integration.

Given the statistical model $Y = \alpha + \beta_1 X_1 + \varepsilon$, the beta coefficients of transformational leadership in Table show that β_1 = 0.207, t = 3.623, p-value < 0.001 indicating that a unit improvement in the transformational leadership style contributes to a 0.207 improvement in ICT integration. This further affirms that transformational leadership style is significant predictor of ICT Integration in teaching and learning. The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{01} is accepted. The results indicate a p-value < 0.001. This is also supported by a t-statistic of 3.623 which is larger than the critical t-statistic of 1.96. There was, therefore, sufficient evidence to reject the null hypothesis, H_{01}, that transformational leadership style does not have a significant influence on the ICT integration in teaching and learning. The study therefore concluded that transformational leadership style has a significant influence on the ICT integration in teaching and learning.

The finding is in agreement with Nguni, Sleegers, and Denessen (2016) who studied the effects of transformational leadership on teachers' job satisfaction, organizational commitment, and organizational citizenship in schools in Tanzania. They observed that the leadership style was distinguished by the different ways' leaders motivate their followers and appeal to the emotions and values of their followers. The finding is also consistent with Nthuni (2012) in whose study on leadership style factors that influence motivation of pre-school teachers in public pre-schools in Embu North District, revealed that there was need to adopt a transformational leadership style in order to enhance motivation of pre-school teachers in public pre-schools and improve their working environment by involving them in decision making and in policy formulation in their schools.

b) Teacher Self-Efficacy in Technology and ICT Integration

The statistical model $Y = \alpha + \beta_3 X_3 + \varepsilon$ where: Y = ICT Integration, α = constant, β_3 = Coefficient of X_3, X_3 = Transformational leadership, ε =Error term was used to explore the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools. Accordingly, $H_{03,}$ stating that teacher self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning was tested.

As seen in Appendix III, the value of R Square = 0.285 meaning 28.5 per cent of the variation in ICT integration can be explained by teacher self-efficacy in technology. The correlation is very high. Teacher self-efficacy in technology influence ICT Integration in teaching and learning in Nairobi Primary schools. ICT Integration in teaching and learning is a function of teachers' self-efficacy in technology. From the ANOVA results in Appendix II, the model was found to be statistically significant ($F_{(1,284)}$ = 112.69, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that teacher self-efficacy in technology is a good predictor of ICT integration.

Given the statistical model $Y = \alpha + \beta_3 X_3 + \varepsilon$, the beta coefficients of transformational leadership in Table show that β_3 = 0.534, t = 10.616, p-value < 0.001 indicating that a unit improvement in the teacher self-efficacy in technology contributes to a 0.534 improvement in ICT integration. $H_{03,}$ Teachers self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning, was tested using the results in Appendix III. The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{03} is accepted. The results indicate a p-value < 0.001. This is also supported by a t-statistic of 10.616 which is larger than the critical t-statistic of 1.96. There was, therefore, sufficient evidence to reject the null hypothesis, H_{02}, that teachers' self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning. The study therefore concluded that teachers' self-efficacy in technology does have a significant influence on ICT integration in teaching and learning.

This consistent with Ayere et al (2010) whose study compared e-learning in NEPAD and non-NEPAD schools that were offering computer studies and found that teachers in NEPAD schools integrated ICT in the learning in all subjects, whereas little or no integration took place in the non-NEPAD schools. The finding was explained by the fact that more teachers from NEPAD schools were computer literate (60%) as compared to their non-NEPAD counterparts (31%).

c) Moderating Effect of Teacher Self-Efficacy

The statistical model $Y = \alpha + \beta_1 X_1 * X_3 + \varepsilon$ where: Y = ICT Integration, α =constant, β_1 = Coefficient of X_1, X_1 = Transformational leadership, X_3 = Teacher Self-Efficacy in Technology, ε = Error term was used to examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in

teaching and learning in public primary schools. The model was also used to test H_{03}, which states that teacher self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning. Both the transformational leadership style and teacher self-efficacy in technology were confirmed to be significant predictors of ICT integration. This was the first important step before testing the moderating effect (Aiken & West, 1991).

As shown in Appendix III, the model without the interaction term, teacher self-efficacy in technology, is significant with $F (1, 283) = 14.311$, p-value < 0.001. The model with the interaction term is also significant with $F (2, 282) = 58.721$, p-value < 0.001. From Appendix IV, we note that R Square change without the interaction term $= 0.048$, p-value < 0.001 while with the interaction term R Square change $= 0.294$, p-value < 0.001. This indicates a significant moderation effect between transformation leadership style and teacher self-efficacy in technology. Transformational leadership style alone contributes 4.8 per cent on the state of ICT integration. When the moderating variable, teacher self-efficacy in technology, is introduced the contribution rises more than six-fold to 29.4 per cent. H_{03}, teacher self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning, was tested using the results in Appendix III.

The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{04} is accepted. The results indicate a significant increase in the R Square change from 0.048 to 0.294 at p-value < 0.001. This is also supported by the significant F-statistic with $F (1, 283) = 14.311$, p-value < 0.001 without the interacting term and significant $F (2, 282) = 58.721$, p-value < 0.001 with the interacting term. The null hypothesis, H_{04}, teachers' self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning was rejected. The study concluded that teachers' self-efficacy in technology does have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning.

V. Conclusions and Recommendations

The study concludes that transformational leadership style significantly and positively the ICT integration in teaching and learning. This can be attributed to the supportive, accommodative and change-oriented role played by head teachers across a majority of the schools reached, that inspires and motivates teachers to develop themselves part of which including improving their grasp of the concept of ICT and its implication for and application in teaching and learning. Head teachers were observed to practice the transformational leadership style largely to a moderate extent. This is exhibited in a majority of the head teachers' ability to make people they interact with feel proud, good and have complete faith in him or her. Head teachers were also found to help others find meaning in their work, expresses with a few simple words what we could and should do and help teachers develop themselves.

The study also concludes that teacher self-efficacy in technology has a significant influence on ICT integration in teaching and learning. As expected, the more conversance, confidence and motivation a teacher exhibits in the use of ICT in teaching and learning, the more inclined they are to integrating ICT in their teaching and learning profession. A majority of the respondent teachers reached were found to exhibit only moderate levels of self-efficacy in using technology in their teaching profession. This was manifested in the teachers' moderate competences in selecting and using various media to support teaching and learning, in the evaluation of software to support teaching and learning, ability to integrate technology across the curriculum as well as the moderate capability to determine why, when, and how to use technology in education.

The study further concludes that teacher self-efficacy in technology has a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning. This can be attributed to the ability of a well-versed teacher in the application of ICT in teaching, to leverage the supportive and accommodative role of the head teacher to harness the available ICT infrastructure and integrate the same in their teaching profession, as compared to a teacher with low self-efficacy in technology.

It is recommended based on the study findings and conclusions that school administrations take a keen review of the leadership style given that transformational leadership style is seen to have a significant influence on ICT integration in primary schools. The study recommends that head teachers adopt the transformational leadership style and offer support, motivation and encouragement to their teacher geared towards enabling teachers train and develop their teaching practice especially towards horning their skills in their application of ICT in teaching.

It was further established that teachers' self-efficacy in technology has a significant influence on ICT integration in teaching and learning. As such, teacher self-efficacy in technology emerges as a very core plank in ICT integration when juxtaposed with the school environment and transformational leadership. It is therefore recommended that school administrations as

well as teacher management under the Teachers Service Commission develops and executes programs to reinforce teachers' efficacy in the adoption, use and innovation in technology. The study further asserts based on the findings that the onus is squarely on teachers to develop their teaching careers and practice through leveraging such avenues as training programmes and seminars with a view to improve their knowledge, confidence, experience and therefore self-efficacy in the use of ICT and its integration in their teaching practice.

It is further recommended that the policy governing teacher training, establishment, improvement, support and maintenance of school environments be reinforced with a view to impart digital skills in trainee teachers, invest in the right infrastructure and reinforce the right school environment. It is also recommended that the Ministry of Education and the related co-actors take measures to improve the school environment, especially in setting up the right infrastructure, and operative policy environment given that the school environment is seen to exert a significant influence on ICT integration.

Policy makers and regulators are also urged, as informed by the study findings to formulate polices and regulations that ensure that as technological innovations progress and advance rapidly, their application in the education sector in general and in teaching and learning in particular is leveraged to the utmost benefit and safety of the consumers of these innovative products and services, which includes learners and teachers.

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Appendices

Appendix I: Conceptual Framework

Transformational Leadership Style
- Idealized influence attributed
- Idealized influence behaviour
- Inspirational motivation
- Intellectual stimulation
- Individual consideration

H_1

H_3

ICT Integration in learning
- Knowledge of instructional technology
- Access to instructional materials through ICT
- Existence of teacher-to-teacher collaboration in the learning process
- Learner centred approach in learning process
- Use of E-pedagogies
- Teachers' innovations in teaching using ICT

Independent Variable

Teacher Efficacy in ICT
- Teachers Confidence
- Enhanced teachers Competencies
- Teacher motivation
- Change in teachers Attitude

H_2

Moderating Variable

Dependent Variable

Appendix II: Transformational Leadership Style and ICT Integration

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.207[a]	.043	.040	.78554	.043	13.124	1	293	.000

a. *Predictors: (Constant), Transformational Leadership Style*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.098	1	8.098	13.124	.000[b]
	Residual	180.800	293	.617		
	Total	188.898	294			

a. *Dependent Variable: ICT Integration*

b. *Predictors: (Constant), Transformational Leadership Style*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.941	.185		10.476	.000
	Transformational Leadership Style	.192	.053	.207	3.623	.000

a. *Dependent Variable: ICT Integration*

Appendix III: Teacher Self-Efficacy in Technology and ICT Integration

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.534[a]	.285	.282	.68248	.285	112.690	1	283	.000

a. Predictors: (Constant), Teacher Self-Efficacy in Technology

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.488	1	52.488	112.690	.000[b]
	Residual	131.815	283	.466		
	Total	184.303	284			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), Teacher Self-Efficacy in Technology

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.974	.158		6.152	.000
	Teacher Self-Efficacy in Technology	.539	.051	.534	10.616	.000

a. Dependent Variable: ICT Integration

Appendix IV: Moderating Effect of Teacher Self-Efficacy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.871	1	8.871	14.311	.000[b]
	Residual	175.432	283	.620		
	Total	184.303	284			
2	Regression	54.188	2	27.094	58.721	.000[c]
	Residual	130.115	282	.461		
	Total	184.303	284			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), Transformational Leadership Style
c. Predictors: (Constant), Transformational Leadership Style, Teacher Self-Efficacy in Technology

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.219[a]	.048	.045	.78734	.048	14.311	1	283	.000
2	.542[b]	.294	.289	.67927	.246	98.214	1	282	.000

a. Predictors: (Constant), Transformational Leadership Style
b. Predictors: (Constant), Transformational Leadership Style, Teacher Self-Efficacy in Technology

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EFL Distance Learning and Foreign Language Anxiety Management: Exploring FL Anxiety within Distance Learning

By Kadiri Hasnae & Bousfiha Adiba

University of Sidi Mohamed Ben Abdellah

Abstract- Foreign Language anxiety is a specific type of anxiety that accompanies the process of foreign language learning that can change according to a variety of variables such as the teacher- students relationship, language attitudes and learning environment. The purpose of this study was to examine the potential relation between students' foreign language anxiety levels and learning environments (traditional or distance learning) in a university setting (Faculty of arts and letters Fes Sais, Morocco). Students showed higher levels of anxiety within the distance learning setting compared to traditional education. A survey using a 5 point Likert scale was employed. Semi-structured interviews were also adapted. The results indicated a significant increase in Communication apprehension, test anxiety and fear of negative evaluation in distance learning compared to face to face setting. The factors behind this have been questioned and analyzed. The current study concludes with the current study's limitations as well as suggestions for further future research.

Keywords: foreign language anxiety- distance learning-anxiety – traditional education- covid-19.

GJHSS-G Classification: FOR Code: 200399

EFLDISTANCELEARNINGANDFOREIGNLANGUAGEANXIETYMANAGEMENTEXPLORINGFLANXIETYWITHINDISTANCELEARNING

Strictly as per the compliance and regulations of:

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Kadiri Hasnae [α] & Bousfiha Adiba [σ]

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Keywords: foreign language anxiety- distance learning-anxiety – traditional education- covid-19.

I. Introduction

Teacher-student relationship is a vital part of the teaching-learning process that have been a topic of deep interest with the rise of communicative language teaching approaches to learning in the mid 60's. An effective teacher is usually described as one that manages to hold strong emotional as well as intellectual ties with their students, therefore engendering a secure, accepting and safe environment that acts as a motivational element resulting in a stress and anxiety-free learning atmosphere. Many teachers spend considerable time and effort thinking about ways to refine their methods of transfer at the expanse of the emotional and relational aspect of the teaching- learning process, which are often neglected and overlooked. In this respect, Marzono states that 'an effective teacher-student relationship may be the keystone that allows the other aspects to work well' (2003).

Though not as familiar as it is nowadays an unusual form of teaching and learning that calls for a very peculiar teacher-student relationship saw the light in the mid 19th century. Distance learning emerged in what is called 'correspondence courses'. The earliest example was created by British teacher Isaac Pitman in mid 19th century, who taught a system of shorthand by mailing transcribed texts into shorthand and getting transcriptions from his students in return for correction. Distance learning kept evolving slowly until it witnessed a qualitative leap with the emergence of the World Wide Web.

With the emergence of the World Wide Web distance learning gained interest as it had been much more reliable and faster than ever to the extent that it was claimed by many to have the potential to fully replace face to face education. Nevertheless, distance learning is still a subject of conflicting attitudes, some advocate distance online teaching, as it offers interaction, flexibility and low cost and it can be at times a freeing and motivational experience that gives more space for shy and introvert students as well as students with other special needs. This view is generally referred to as the *'no significant differences'* that holds that "online learning can be as good as or even better than in-person classroom learning" (Greenhow, 2020). While on the other part, others regard it as a deficient version of traditional education that cannot be an efficient alternative. As it is deemed inefficient and of limited efficiency to be only employed in advanced stages of learning as it requires a considerable amount of autonomy, engagement and maturity from the part of students, a range of characteristics that are absent when it comes to beginner and child learners. Children instruction and language teaching requires more than any other school subject interpersonal relationships to guarantee interaction and motivation that eventually result in some students falling in what is called the 'online penalty' causing harm to those who need the most help (Dynarski qtd. in Greenhow, 2020). In this regard, Greenhow explains "average students would do worse in an online course than in a face to face class, but researchers in different contexts have found the online penalty to be more severe among students with low prior achievement, students from ethnic and racial minorities, and students with other markers of low socioeconomic status" (2020) .

This worldwide pandemic of Covid-19 opened the way to the reconsideration of old methods as well as

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a necessary adaptation with the current event. This transition was an inescapable necessity as well as a challenge especially for institutions that used to rely solely on proximate teaching. Since the overwhelming majority of educators in Morocco lack training on online language design and have been put without prior notice under the imperative of teaching in the virtual space. Foreign language Anxiety among other variables is one of the most challenging facets of distance learning in Corona times, as it operates within a different student-teacher relationship pattern that can have diverse repercussions on different aspects of the teaching & learning process, as Gibbs & al explain:

'Anxiety causes students to consistently underperform. Anxiety in distance learners stems mainly from their life experiences, and expectations/ assumptions they make as a result. The distance learners tend to fear failure, yet conversely can have high, even unrealistic expectations of themselves. They may have had negative experiences of educations in the past, and assume that distance learning education may provide the same disempowering learning environment as that experiences by many school.'(Gibbs & al, 1989)

The research questions considered in the present study are the following:

1. Do classroom and distance foreign language learners show different anxiety profiles?
2. How are the three dimensions of foreign language anxiety (communication apprehension, fear of negative evaluation and test anxiety) affected within the two modes of learning?
3. How can the results be interpreted?

II. Review of the Literature

This brief review of the literature is meant to provide a general overview of the proposed research and locate briefly the issue under study within the existing literature.

a) A General Defintion of Anxiety

As individuals, we have all experienced anxiety at some point of our lives. This feeling would generally accompany us while waiting for the outcome of specific situations such as waiting for the success of a medical operation, the result of a medical test or academic examination; it can be defined as a feeling of discomfort or fear that leads individuals to anticipate possible difficulties even before they have occurred. Oxford dictionary stresses the same idea by defining anxiety as ''a feeling of worry, nervousness, or unease about something with an uncertain outcome''. We all experience different degrees of anxiety in our everyday life and this feeling can affect enormously students in the sense that they are daily confronted with various sources of stress: classroom, exams, homework, underdeveloped skills, job markets' requirements and sometimes teachers are all considered stressors for

students. Because of the various changes, frightening uncertainty, poor time management and fear of failure, students are subjects to fatal pressure which often affect their academic achievement.

b) Defining Foreign Language Anxiety

Foreign Language anxiety is a specific type of anxiety that accompanies the process of foreign language learning. Anxiety as part of affect factors in teaching and learning became a topic of considerable attention with the rise of humanistic approaches to teaching and learning in the late 80's. The Longman applied linguistics dictionary defines it as 'subjective feelings of apprehension and fear associated with language learning and use. (Anxiety, Longman Dictionary of Language Teaching and Applied Linguistics).

The importance of affective factors gained interest with the emergence of the affective filter hypothesis that argues that the learning process is not only a matter of a series of objective factors but it rather relies notably on affective factors. Therefore, an awareness of the affective variables is vital for effective teaching. According to Krashen, affect includes four important variables that are as follow: - Motivation, Anxiety, Attitude and Self confidence. These variables can either contribute positively or negatively to the learning process. Krashen argues that language input is not sufficient for a full language acquisition since affective factors act as filter that blocks students from fully and effectively putting the input into effective use. In this regard, Krashen explains:

"Studies have shown that several affective variables are related to success in language acquisition – anxiety (low anxiety is correlated with more success in language acquisition), self-esteem (more self-esteem is related to success in language acquisition), and motivation, with 'integrative motivation,' (a desire to belong to a certain group) related to long-term success in language acquisition (until membership is achieved), and 'instrumental motivation' (to accomplish a task) related to shorter term success (until the task is done)." – (Krashen, 2008).

Consequently, foreign language anxiety along with other affective factors can act as a barrier that impedes students' language acquisition. Gardner and McIntyre explained that Foreign language anxiety starts as 'an undifferentiated, negative affective response to some experience in language class' that 'with repeated occurrences becomes reliably associated with the language class and differentiated from other contexts' (Gardner & Mcintyre, 1991). While Horwitz & al defined it as "a distinct complex of self-perceptions, beliefs, feelings and behaviours related to classroom learning arising from the uniqueness of the language learning process" (1986), he also adds that there are three dimensions to foreign language anxiety that any foreign language teacher need to pay appropriate attention to

and are as follow: *1- Communication apprehension, 2- Fear of negative evaluation and 3- Test anxiety (Ibid).*

One of the main stressors of students is the classroom, as it is the place where students confront many sources of anxiety, namely the relationships that they experience either with their peers or teachers. Student- teacher relationship is considered the more frequent source of stress in the sense that it is what determines students' experience in the classroom. In this regard, Gregerson and Mcintyre stress the importance of the teacher in this equation stressing the fact that FL anxiety can originate from the learner or the teacher or more likely from the incompatibility of the styles of both (2014). Goodenow and Grady (1993) argue that students' general perception of student-teacher relationship quality is a predictor of global self-worth, school engagement. Thus, students feel more confident when their relationship with their teachers is positive. While Fredriksen & Rhodes *(2004)* maintain that students ''relationships with their teachers can be a crucially important influence, affecting students' connection to school, motivation, academic performance, and psycho- social well-being'' including an anxiety free atmosphere. They also add that 'students who reported more positive bonds with their teachers obtained higher scores on self- and teacher-reported social and emotional adjustment outcomes''. Thus, students feel more secure and have a higher self-esteem. In brief, positive student-teacher relationship plays an important role in students having healthy, successful and fun experience in school.

A large body of research has shown that affective variables have a strong influence on students FL general achievement. Mcintyre and Gardner claimed that "anxiety is one the best predictors of success", while Gregerson and Mcintyre maintained that anxiety decreases chances for fluency development, as learners are less willing to produce output.

It is worth mentioning that research has shown a general consensus of the debilitating effect of FLA and demonstrated its negative repercussions as a variable that can block learners from functioning correctly (Aida, 1994; Horwitz et al, 1986; Philips, 1992; Zhang, 2001; Bell & McCallum, 2012).

c) The Potential Relationship Between Fl Anxiety and Disntance Learning

As has been mentioned priorly the dynamics of the teacher student relationship is a vital factor in predicting students' levels of anxiety and consequently the prediction of the general success of the teaching learning process. The nature of the teacher student relationship hugely depends on the modes of communication which vary according to the learning environments, that can either rely on direct face to face communication or rather depend on what the virtual space offers (online virtual learning), which can take

different forms: Sharing of syllabus documents, video conferences, interactive platforms such as: *Zoom, Microsoft Teams, Google Meet, Moodle, Whatsapp groups, Facebook lives and groups….*

To date, a limited body of research sought to uncover potential correlations between FLA and learning environments (Traditional vs. Distance education). Some studies have implied that the adoption of distance learning may influence negatively students' levels of anxiety in comparison to proximate learning (Bollinger, 2017). While other research found no significant correlation between the learning environment and levels of anxiety (Pichette, 2009).

According to these findings, it can be said that a general inconsistency of findings governs this issue since an unanimity of results is far from being obtained. A potential explanation for this could be found in the inherent nature of the FLA as well as the learning environment variables that can 'be related in a complex way to a number of demographic, cognitive, affective, and instructional factors, including learners' cultural background, learners' personal characteristics and learning experiences, classroom activities, to name a few' (Bollinger, 2017).

III. RESEARCH METHODOLOGY

a) Participants

The given investigation was conducted on the basis of "The English Department of the faculty of letters and humanities- Sais" (Fes- Morocco) during the academic year 2020-2021. It involved 108 students of the 2nd and 3rd year. First year students were excluded because unlike the other levels they have not experienced both modes of education and have only been subject to distance learning and therefore are not fit for our study. Therefore, for the purposes of this study the population chosen has experienced both face to face education and distance learning during their academic experience. It is worth mentioning that distance learning has been adopted for the first time in Morocco on the 14th of March, 2020 so as to meet the quarantine requirements due to the outburst of Corona virus. Surveys were administered online due to sanitary constraints. The total number of respondents was 108 and convenience sampling was used. Females were slightly overrepresented (57.4%) compared to male participants (42.59%). It is noteworthy that distance learning was conducted online and mainly through 'Moodle' platform.

b) Instruments

The purpose of this causal comparative study was to examine if there was a statistically significant difference in students' foreign language anxiety levels (dependent variables) based on and their learning environment (independent variable) at the English department of Sais faculty. To fulfill this aim the first

independent variable, foreign language anxiety, was measured using an adapted version of the Foreign Language Classroom Anxiety Scale (FLCAS) developed by Horwitz et al. (1986) as well as the Foreign Language Virtual Classroom Anxiety Scale developed by (Kaisar and Chowdhury, 2020). The researchers' adapted version included 22 items in total, and was made up of two sections each consisting of 11 items. The first section aimed at uncovering students' general level of anxiety within face to face education, while the second sought to do the same but within the distance learning setting. Besides aiming at uncovering students' general levels of anxiety within the two modes of learning the survey also aimed at evaluating the three dimensions of foreign language anxiety (Communication apprehension, Fear of negative evaluation and Test anxiety).

The independent variable of foreign language anxiety has three levels: low, moderate, and high. The survey comprises 5-point Likert scale. Points from 1 (strongly disagree) to 5 (strongly agree) have been awarded for each answer, this scale has been found to fulfill the aims of the current study. In the present paper, the survey was administered using Google forms platform and the responses were analyzed using SPSS software. So as to gather qualitative data semi structured interviews with 6 students were conducted through 'Zoom' and 'Whatsapp' calls. Demographic data was collected about students: gender and age.

c) Results

i. Overview of Anxiety Profiles

As it is the case with all Likert scaling, a value was assigned to each of the five responses varying from 1 to 5, whereby 1 stands for strongly disagree and 5 for strongly agree. This way the researcher was able to yield a score for each respondent, which would then describe their anxiety profiles (high, moderate, low). Since each section of the questionnaire consisted of 11 items, the following score values would reveal the following:

$11 \times 1 = 11 \implies$ Low anxiety.

$11 \times 3 = 33 \implies$ Moderate anxiety.

$11 \times 5 = 55 \implies$ High anxiety.

Accordingly, the scores for any respondent would fall between 11 and 55. If the score happens to be above 33 it would reveal that the respondent has a high anxiety level. A score below 33 would mean that the student is subject to low anxiety, while a score of 33 would be suggestive of a moderate anxiety profile. The findings were illustrated as table number 1 suggests.

Table 1: Respondents Anxiety Profiles (Face to face and Distance learning).

	Proximate Learning		Distance Learning.	
	Number of students	Percentage%	Number of students	Percentage %
Total number	108	100%	108	100%
Low anxiety group.	54	50%	7	6.48%
Moderate anxiety group.	42	38.88%	18	16.66%
High anxiety group.	12	11.11%	83	76.85%

As the data in table one demonstrate, the majority of respondents (50%) are subject to low anxiety within proximate learning, while a significant increase is observed within the distance learning setting where the overwhelming majority of students' tend to fall within the high anxiety group . In this regard one interviewee mentioned: *"I never felt that anxious before, I was always okay and love [sic] the challenge that I find in my learning, but now I find myself stuck and always think [sic] about what I can do".* For another interviewee: *"I tend to worry a lot when exams are near, but now I feel totally lost and blocked, I don't know from where to start".*

The comparative analysis of the results of the scores of both sections of the survey (face to face and distance) reflected considerable changes in the degree of foreign language anxiety under the influence of the teaching setting. The results suggest that considerable foreign language anxiety is experienced by a majority of learners in response to the distance learning setting conditions. According to these findings one can conclude that FLA environment acts as a factor that triggers students' general foreign language anxiety.

The following is an in-depth analysis of the status of the three main dimensions of Foreign language anxiety both within face to face and distance learning.

ii. *Communication Apprehension*

Table 2: Survey of Communication Apprehension (Face to Face and Distance learning).

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Item no1: It frightens me when I don't get what the teacher is saying in my face to face language classroom.	13	12%	30	27.8%	36	33.3%	19	17.6%	10	9.3%
Item no2: It frightens me when I don't get what the teacher is saying in my distance learning classroom.	1	0.9%	15	13.9%	30	27.8%	47	43.5%	15	13.9%
Item no.3: I feel isolated while being a distance learning student.	0	0%	8	7.4%	23	21.3%	41	38%	36	33.33%
Item no.4: I feel isolated during my face to face education.	26	24.1%	29	26.9%	42	38.9%	9	8.3%	2	1.9%
Item no.5: I don't feel much involved during real-life classes	12	11.1%	27	25%	62	57.4%	7	6.5%	0	0%
Item no.6: I feel much involved during distance learning classes	1	0.9%	3	2.8%	23	21.3%	50	46.3%	31	28.7%
Item no.7: A real classroom setting makes me feel more suffocated than distance learning setting.	35	32.4%	45	41.7%	24	22.2%	4	3.7%	0	0%
Item no.8: The distance learning setting makes me feel more suffocated than a real classroom.	4	3.7%	0	0%	33	30.6	50	46.3%	21	19.4%

As shown in table number two, items. No 1,2,3,4,5,6,7 and 8 have been used to obtain a sound grasp of students' general status of communication apprehension and it indicated a noticeable increase on this matter when it comes to the distance learning setting.

Participants report a notable feeling of suffocation and unease within the distance learning setting, an unease that is almost nonexistent within the traditional education setting. Since a majority of *32,4%* disagreed with this item *'A real classroom setting makes me feel more suffocated than distance learning setting.'* While *46,3%* agreed with this one *'The distance learning setting makes me feel more suffocated than a real classroom.'* In this regard, one interviewee mentioned *'I am not okay with this way of teaching, I don't feel motivated, I feel like am drowning in information I don't know from where to start'* while another interviewee stated *'I am not used to the virtual space at all, I lose interest very fast but in class I used to focus and be more organized'.*

As far as students' involvement in the teaching and learning process is concerned, students report a rather neutral position when it comes to face to face education and a negative one when it concerns distance education. *38%* agreed with the following statement *'I feel isolated while being a distance learning student',* while *33%* strongly agreed with it. On the other hand *"38.9%"* kept a neutral stance to this statement *'I feel isolated while being a distance learning student.'* Students comments also reflect this anxiety as one interviewee reported: *'I have lost the feeling of belonging to the my class'* or as another stated *'I feel very far away from school, it made me lost confidence in myself'.* These findings are further supported with the findings that item 5 and 6 reveal. Since almost half of the population under study *46.3%* agreed that they didn't feel much involved during their distance learning classes.

Almost half of the participants reported having concerns about the quality of communication as a whole within distance learning. *43.5% of the respondents agreed to feeling frightened* of not getting what the teacher is saying in my distance learning classroom. It can be said that the distance learning conditions represent an inhibitory factor that leads students to anticipate the failure of the communication flow. One interviewee explains *"Moodle doesn't not give us a chance for communication, the teacher sends documents and practice but I always feel like I don't get what I am supposed to know and develop".* It seems that communication apprehension is due to the one way communication pattern that governs the teaching and learning process.

iii. *Fear of Negative Evaluation*

Table 3: Survey of Fear of Negative Evaluation (Face to Face and Distance Learning)

	Strognly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Item no.9: I worry about making mistakes in my face to face language classroom.	7	6.5%	20	18.5%	46	42.6%	29	26.9	6	5.6%
Item no.10: I don't worry about making mistakes in my distance learning course.	7	6.5%	41	38%	54	50%	6	5.6%	0	0%
Item no .11: I feel anxious thinking that my teacher does not see my seriousness during face to face education	13	12%	30	27.8%	53	49.1%	12	11.1%	0	0%
Item no.12: I feel anxious thinking that the teacher does not my non-verbal response and seriousness during the virtual class.	5	4.6%	0	0%	30	27.8%	43	39.8%	30	27.8%

As shown in table number three, the analysis has revealed that students' responses reflect a prevailing state of neutrality when it comes to the fear of making mistakes both within face to face and distance learning. Since the majority of students chose a neutral position to both of these statements *'I worry about making mistakes in my face to face language classroom.'(42,6%)* and also to this one *'I don't worry about making mistakes in my distance learning course.'* In order to interpret fairly this neutrality, the interviews have revealed that holding such a view is to be attributed to the immense lack of communication. In this regard, one interviewee stated: *'How can I be afraid to make a mistake, if I don't have the opportunity to do so'.* Therefore, it seems that distance learning creates a rigid space that doesn't allow for interactivity and communication.

As far as item no.12 is concerned, a general fear of negative evaluation is observed amongst the majority of students within the distance learning setting while a general state of neutrality prevails within face to face education. *49.1%* of respondents adopted a neutral stance to this statement *'I feel anxious thinking that my teacher does not see my seriousness during face to face education',* while *39.8%* agreed with the following statement *"I feel anxious thinking that the teacher does not see my non-verbal response and seriousness during the virtual class".* The data is consistent with the interviewees' testimonies. One interviewee mentioned: *'I don't even know how my teacher looks like, I know it's not important but I don't feel okay with this way',* another interviewee mentioned: *"the idea of not being able to ask my teacher or participate in the classroom scares me".*

This general tendency could be explained by the lack of physical contact especially eye contact and also to the remoteness from the campus's atmosphere. This had led students to develop fear, as one interviewee mentioned: *'I feel like my efforts are not seen or acknowledged, I feel like am a stranger to my faculty and teachers, I haven't even seen some of them'.* Therefore, it can be said that distance learning develops a sensation of alienation and isolation that aggravates students' general and foreign language anxiety as it fails to meet student's interactive and communicative needs.

iv. *Test Anxiety*

Table 4: Survey of Test Anxiety (Face to Face and Distance education).

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Item no.13: I am not usually at ease when am being tested in language courses I've taken in regular classes.	20	18.5%	23	21.3%	50	46.3%	15	13.9%	0	0%
Item no.14: I am not usually at ease when am being tested in language courses I've taken in distance learning classes.	0	0%	9	8.3%	44	36.1%	39	40.7%	16	14.8%
Item no.15: I keep thinking that the other students are doing better than me in face to face courses.	8	7.4%	26	24.1%	42	38.9%	27	25%	5	4.6%
Item no.16: I keep thinking that the other students are doing better than me in distance learning courses.	0	0%	24	22.2%	25	23.1%	40	37.0%	19	17.6%

Item no.17: I worry a lot about getting left behind in my face to face classroom	7	6.5%	32	29.6%	53	49.1%	11	10.2%	5	4.6%
Item no.18 : I worry a lot about getting left behind in my distance learning courses	6	5.6%	0	0%	39	36.1%	42	38.9%	21	19.4%

There has also been observed a considerable increase in students' test anxiety between face to face and distance learning setting. A vast majority (46.3%) endorsed a neutral position to testing within this statement *"I am not usually at ease when am being tested in language courses I've taken in regular classes"* ,while the majority (40,7%)chose to agree with the following statement *"I am not usually at ease when am being tested in language courses I've taken in distance learning classes."* In this regard one interviewee mentioned: *'before, taking exams used to be fun, but now I go and m very scared, I feel like I don't know anything'* this general feeling of unease is to explained by a general feeling of isolation as well as loss of self confidence that accompanies distance learning as item no.15 and 16 demonstrate. This general feeling of lagging behind has been repeatedly verbalized by interviewees, as one respondent stated: *'I feel like I don't belong to my class, that they are succeeding and developing and that I am still in my place which make me worry a lot'.* Another respondent explained: *'not being able to communicate with my classmates and exchange experience makes me worry and fear the exam a lot, I hate this pressure'.*

The special international circumstances that led to the adoption of distance learning, that is Covid- 19, are by themselves circumstances that can highly trigger general anxiety. And with the absence of well thought of distance learning plan that guarantees communication and interactivity, the distance learning environment turns into a factor that.

IV. Discussion and Recommendations

Generally respondents showed a great deal of unease when it comes to the distance learning setting. The data analyzed indicates that students exhibit a general vulnerability to anxiety within distance learning which is attributable to a range of factors. To put it in other terms, Students become an easy prey to anxiety when being taught online. Apprehension and the suspension of communication flow seems to affect negatively students linguistic, intellectual and communicative development, since the students reported in more than one instance feeling isolated and not being involved. Students also reported getting overwhelmed by the material they have to cover during the semester. This is mainly due to the fact that the students have become more than any other time passive receivers of knowledge. As far as test anxiety is concerned a high increase of worry and negative

attitudes prevail when it concerns distance learning, students tend to adopt a doubtful state of their competences as well as their linguistic and intellectual abilities. In the same context, a rather contradictory view of fear of evaluation was noticed. Since students expressed the lack of communication opportunities within distance learning yet they expressed their fear of being negatively judged by their teachers.

Such negative findings make one question the nature of the communication channel employed as it can provide a great amount of clarification to the whole issue. A review of the possibilities that the 'Moodle' platform adopted can offer, revealed that there is a possibility of sharing documents, videos, power point presentation, formulate interactive quizzes, chat windows. Nevertheless, the majority of students' reported only receiving PDF documents and e-mails from their teachers, while only in few cases more interactive approaches were developed. Therefore, we can conclude that it would be presumptuous to assume that the increase in anxiety has been the direct and sole result of distance learning as a method of teaching, but rather a result of the conditions within which this mode of teaching took place. These negative responses are mainly the product of student's restricted access, limited participation and absence of feedback. This perceived deficiency of distance learning, leads us to question what qualifies as online or distance learning as a whole. In this context Fojtik stresses the importance of technical, methodical and didactic preparedness to the success of distance modes, as he mentions:

"It is necessary to provide an extensive preparation for the distance and combined forms. Students must already have all study materials, assignment of correspondence tasks, technically prepared control systems, means of communication, and so on. However, thisrequires a lot of work both technically and methodically and didactically." ((Fojtík, 2018)

Bearing in mind the features of distance education, policy makers must pay keen attention to the status of communication patterns and classroom dynamics within distance learning. Because of the sudden flow of events both on the national and international events weren't prepared to deal with such nascent events. Both teachers and students lacked the right training and readiness to change abruptly their methods to fit the digital space. Moreover, providing student counseling hotline could lessen students' anxiety as it will provide considerable support and motivation to students.

V. Concusion

In our case and under our conditions distance learning seems to have weakened learners' intellectual as well as affective ties with their professors. This can have major negative repercussions on students' linguistic and intellectual development as well as overall academic experience. To conclude, the findings of this study add to the limited number of research dealing with anxiety and distance learning. It can contribute in helping teachers, educators and decision makers to take pedagogical decisions that would guarantee the effective development of foreign language departments throughout the kingdom as well as distance learning trainings for teachers and students. So as to benefit fully from the potential that technology offers and adapt smoothly in times of crisis. Distance learning education presents a rich and unexplored field, which is why different variable of the teaching and learning process must be reexamined within this context. Further research could adopt more exhaustive instruments and add other variables to the research such as achievement and motivation.

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Performance of Learners with Visual Impairment in Summative Evaluation in Special Schools in Kenya

By Serah Wanja Njue

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Abstract- Vision is the most crucial sense among the five senses. Almost 80 percent of all learning is achieved through the visual channel. Good vision is therefore paramount for learners to reach their academic potential. Lack of it can negatively affect how a learner performs in examinations. Available studies have looked at the performance of learners with visual impairment in specific subjects. The aim of the study was therefore to explore the general performance of learners with visual impairment in summative evaluation in special schools in Kenya. A survey design with qualitative research method was adopted. Examination results from four special schools for learners with visual impairment were analyzed and in addition, a questionnaire was used to solicit more information from teachers who taught the classes under study. Descriptive statistics were used to analyze data and findings were presented in tables and percentages. Findings indicated that; learners with visual impairment generally performed poorly in examinations. Mathematics and sciences were the worst done at secondary school level where as Kiswahili and Social studies were the two worst performed at primary school level.

Keywords: visual impairment, summative evaluation, braille, KICD, KCPE, KCSE, KNEC, NACOSTI.

GJHSS-G Classification: FOR Code: 930199

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I. Introduction

Education is accepted all over the world as the core of national development and a major factor in the utilization of human resources to the fullest. Education is important in that it does not only help people to improve their lives but also makes them self-independent, in addition to acting as a platform to prove the equity by defeating all barriers, including those imposed by disability. Education is the best investment for the people because well educated people have more opportunities to get a job which gives them satisfaction. Egunyomi (2006) observed that Education is universally recognized as the main key to sustainable development and helps in improving human welfare. Through education, individuals, including those with disability, gain strength of mind and opportunity to be independent, so education is not a preserve of individuals without disabilities alone. Thus, education would enable a person with disability to transform from life of complete isolation and social neglect to emerge as self-supporting, economically independent and useful member of the society.

All learning takes place through the five sensory channels. Among the sense organs, the eye is considered a very important sensory organ which accounts for a large fraction of total information available. Vision and learning are very closely related. Experts agree that about 80% of what children learn in school is information presented through vision. Therefore, good vision is paramount for learners to reach their full academic potential. Loss of vision is likely to impact negatively on a student's educational achievement. Owing to this, intervention becomes very handy to ensure that learners with loss of vision are not disadvantaged in their education. Early intervention is the first step towards making it possible for children with visual impairment to have equal opportunities with their sighted peers. Failure to give early intervention services to these children may lead to their developmental vulnerabilities in motor, cognitive, language, social and also attention domains including the risk of developmental setback. One of the intervention strategies is availing the relevant communication medium to these students which in this case is Braille. Braille is a tactile system of reading and writing used by persons with visual impairment. Braille entails use of raised dots as shown in figure 1. The dots are used to form different combinations which represent words and other signs which are read through touch by persons with visual impairment or through sight by those with vision.

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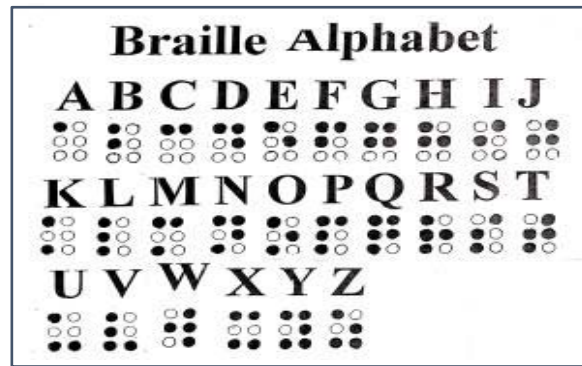e-mail: serawanjah@gmail.com

Figure 1: English Braille Alphabets

It is through Braille that learners with visual impairment interact with their academic work including sitting for their examinations. Most children with visual impairment require extra support in order for them to succeed in school. This is in an attempt to establish a level ground with their peers who have vision. Despite the overwhelming evidence about the importance of early intervention for learners with visual impairment, such services are not available in African countries; instead, children with visual impairment are admitted to school with no additional support or service. This is likely to cause some limitations in their learning and yet they are later subjected to the same examinations with their sighted counterparts.

In Botswana, a study by Habulezi and Kefilwe (2017) found that students with visual impairment in senior secondary schools performed dismally in science subjects. Out of the 8 students with visual impairment who sat the examination in the year 2014, in the school under study, only 2 (25%) passed. The remaining 6 (75%) failed. In the following year, 2015, 11 students with visual impairment sat the examination and out of the 11, only 1 (9%) passed. The remaining (91%) failed. In the year 2016, out of the 9 students with visual impairment who sat the examination, none passed in science subjects. All the 9 (100%) failed.

In the Kenyan context, a study by Bisi (2013) indicated that performance of students with visual impairment in Kiswahili in the three colleges that offer Primary Teacher Education and admit students with visual impairment (Asumbi, Machakos and Mosoriot Teachers colleges) was very low. Out of the 17 students with visual impairment who sat the PTE Examination in the three colleges in 2009, 7 (41%) failed, in 2010, 13 (44%) out of the 26 students failed and in 2011, 13 (44%) students out of the 29 who sat Kiswahili that year failed (KNEC, 2012). No study is available to show the performance of these students in the other subjects offered in the Primary Teacher Education or their general performance at primary and secondary school levels of education and yet their mode of learning and sitting examinations is quite different from that of their sighted peers.

Summative evaluations in education in this case are assessments that are used to evaluate students' learning at the conclusion of a defined instructional period. Students' learning is compared against some benchmark or standard with an aim of assessing what they have learned. The evaluation focuses on the outcome of a programme. These evaluations are generally evaluative rather than diagnostic (Abbott, 2014). Saima and Qadir (2011) further observed that examinations are useful as they measure a student's progress towards predetermined objectives. Learners are subjected to evaluation through examinations at various stages of their learning.

In Kenya, learners are subjected to summative evaluation after eight years of primary education and four years secondary education and also at tertiary level. The Kenya National Examination Council (KNEC) is the main examining body in Kenya. KNEC controls examinations, ensuring their validity and reliability, and also ensuring conformity to Kenya's goals and changes in Government policy relating to the curriculum and examinations (KNEC, 2013). The two main examinations controlled by KNEC are the Kenya Certificate of Primary Education (KCPE) and the Kenya Certificate of Secondary Education (KCSE).

The Kenya National Examination Council is mandated to prepare the examination papers for candidates who are blind in Braille. In order for learners with special needs in education to benefit from the education system in Kenya, KNEC has found various ways and means in which assessment for these learners can be made more adaptable to their needs through differentiation, adaptation and modification of its examination and examination management. The examinations are norm referenced. The Kenya National Examination Council develops or adapts examinations using the adapted curriculum by the Kenya Institute of Curriculum Development (KICD). Where such curriculum does not exist, the learners are left to fit within the regular curriculum. Candidates with visual impairments take the regular examinations but in Braille for those who are blind and large print for those with low vision. Differentiation is made in adaptations which are made in

certain questions that require sight e.g., in Mathematics, Biology, Geography and Home science. Certification requirements are also waivered for candidates who are blind by exempting them from taking a second science subject which is a requirement for other candidates. On time allocation, an extra thirty minutes is given in all subjects.

In Kenya Certificate of Secondary Education Examination, map reading and diagrams used in Geography use symbols with texture which is felt by touch to enable the learners with visual impairment arrive at correct interpretation (KNEC, 2013). The council has a grading system that it uses in measuring the performance in KCPE and KCSE examinations by candidates. In KCSE, the grading is as follows (grades are from A –E in a strength scale of 12 down to 1 point respectively). A (80% and above), A-(75 -79), B+(70-74), B (65-69), B-(60-64), C+(55-59), C (50-54), C-(45-49), D+(40-44), D (35-39), D-(30-34) and E (0-29). The grading applies both for the subjects' performance and the learners' mean grade (KNEC, 2013). Examinations offered by KNEC are terminal, summative and their main purpose is for selection, placement and certification.

II. Performance of Learners with Visual Impairment in Mathematics and Science Subjects

Fraser and Maguvhe (2008) observed that conceptual development and abstract thinking for learners with visual impairment may be delayed due to the absence of graphical stimulus or imageries. Therefore, since greater parts of science representations are visual, learners with visual impairment frequently face educational challenges. This is likely to be due to the fact that some teachers lack appropriate teaching and learning strategies for learners with visual impairment. Kapperman and Sticken (2004) observed that many people with visual impairment encounter challenges in performing mathematical operations in real- life situations mostly due to the visual nature of mathematics. In addition, delay in development of concepts which are needed in understanding mathematics and also lack of the required knowledge by teachers to be able to teach learners with visual impairment contributed to poor performance in mathematics. According to Clamp (2003), learners with visual impairment are usually slower in acquiring knowledge in mathematics than their sighted colleagues. This could be due to lack of visual stimulation in natural mathematics and also the limiting effects of visual impairment on cognitive function, in addition to the underdevelopment of specific mathematical concepts.

In support of this, Kalra, Lauwers, Dewey, Stepleton & Dias, (2009) and Maguvhe (2005) observed that science and mathematics education was less accessible to learners with visual impairment as compared to those with vision. They attributed this to the fact that many concepts in science and mathematics were presented graphically and there were also a number of concepts which could not be explored through touch thus disadvantaging the learners who used touch. Habulezi, Kefilwe, Batsalelwang and Malatsi, (2017) carried out a study on factors influencing the poor academic performance of learners with visual impairment in Science subjects in a senior secondary school in Botswana. The study embraced qualitative research design and used purposeful sampling. They sampled 14 learners and 5 teachers for the study and used interviews, observation and document analysis for data collection. They explored results of students with visual impairment in science from the year 2010 through 2016. They found that the performance of learners with visual impairment in science subjects was far below average. Not a single year recorded 50% pass. The best performance was recorded in 2010 and 2013 where percentage pass was at 33%. The other years ranged from 25% down to 0% pass recorded in the year 2016 where all the 9 students who sat the examination failed in science as presented in table 1.

Table 1: Performance of learners who used Braille in Science Subjects

Year	No of learners who sat Examination	No passed	No failed	Pass %	Fail %
2016	9	0	9	0	100
2015	11	1	10	9	91
2014	8	2	6	25	75
2013	6	2	4	33	67
2012	5	1	4	17	83
2011	4	1	3	25	75
2010	3	1	2	33	67

Source: Special Education Dept, 2017 in Habulezi, Kefilwe & Malatsi (2017)

Habulezi et al. concluded that performance of learners with visual impairment in science was influenced by deficient pedagogical practices, insufficient teaching and learning materials and also shortage of specialized teachers of science. In partial support of these findings, (Beck-Winchatz & Riccobona, 2008; Moreland, 2015) noted that majority of teachers face difficulties when teaching learners with visual

impairment because they have little experience. In addition, these teachers usually have rigid views regarding the abilities of the learners.

These teachers give their students the impression that science subjects are inaccessible due to their absence of vision Maguvhe (2013), while the actual problem is that teachers themselves lacked adequate direct experience in teaching learners with visual impairment (Sahin & Yorek, 2009). Some teachers doubt whether their learners have the capacity to do well in science. However, Kumar, Ramasamy, and Stefanich (2001) asserted that learners with visual impairment have the same cognitive ability just like their sighted counterparts. In order for them to perform on the same level, learners with visual impairment only need appropriate accommodations. In addition, there is availability of necessary technologies that can be utilized to support learners with visual impairment in their science and mathematics education (Sahin & Yorek, 2009). On pedagogical practices, Mwakyeja (2013) also noted that when teachers fail to use teaching methods properly and lack the skills and abilities to work with learners with visual impairment, the learners are disadvantaged as they face numerous challenges in acquisition of education. It was further observed that teachers of learners with visual impairment were not well trained in the use of Braille materials and also in the preparation of tactile diagrams and maps. There also seemed to be a large gap between teachers' perspectives on what learners with visual impairment could do and the availability of resources to support them achieve their full potential.

Still on the teaching of science and mathematics, Maguvhe (2013) carried out a study aimed at exploring the role of the teacher in promoting the participation of learners with visual impairment in mathematics and science subjects in South Africa. He embraced a case – focused – study of an individual respondent who had unique characteristics of interest to the researcher. The individual was a technician with visual impairment who drew from his own experiences. A semi structured face – to – face interview was used for data collection. The participant felt that teachers were the primary resource in teaching mathematics and science subjects and therefore they should be well equipped with knowledge, skills, attitudes and values to make them inspire and stimulate learners' interest in sciences. Sahin and Yorek (2009) felt that learners with visual impairment regarded science as a challenging subject due to its abstract concepts and yet the subject depended mostly on visual instruction. The researchers over emphasized the fact that learners with visual impairment needed to rely on their other senses such as touch and auditory in their learning process. Maguvhe (2013) further noted that teachers lacked motivation and mentorship in mathematics and science in addition to deficiency in methodologies and abilities to use tools in order to empower their learners. Generally, teachers

lacked the necessary skills in special education to support learners in realizing their potential in mathematics and science.

Under normal circumstance, science and mathematics education is easily accessed by learners with sight while those with visual impairment experience a myriad of challenges in accessing the subjects owing to the fact that most of the concepts are presented in graphics. In addition, there are many concepts which are difficult to explore by touch and are therefore presented through visual observation (Kalra et al., 2009). Sahim and Yorek (2009) observed that in situations where resources have been modified for learners with visual impairment, and the relevant information put across in formats that these learners are able to access, then they perform competitively with their sighted peers. They therefore concluded that learners with visual impairment performed minimally in science due to lack of appropriate access to technologies as opposed to their psychological incapacity. However, Maguvhe (2013) was of a different opinion where he asserted that teachers lacked the proper training to enable them teach learners with visual impairment. This finding is supported by Sahin and Yorek (2009) who asserted that many teachers lack experience in teaching learners with visual impairment in addition to scarcity of resources. Further, Catholic Education Office Canberra (2011) observed that most teachers lack confidence in understanding assessment procedures of learners with visual impairment.

Malik, Ngban and Ibu (2009) described mathematics as a subject that affects all facets of human life in many ways. However, that notwithstanding, students' performance in mathematics has not ameliorated significantly despite its importance, not even with the introduction and use of technology. In developing countries, the situation might be quite different. For instance, in Nigeria, mathematics has not shown any significant improvement even after the government confirming its importance and making it a core and compulsory subject both at junior and senior secondary levels (Federal Republic of Nigeria, 2004). In developed countries, unlike the developing, schooling resources which may include reduced class sizes, higher teacher salaries, modern equipment and other structures are associated with better student outcomes. On several accounts, mathematics teachers have been judged as the central determinant in the way students perform in mathematics. According to Idowu (2015) teachers are very crucial to the good performance of their students since they are expected to possess the required knowledge important for teaching. In addition, teachers ought to have the ability to impart the knowledge in a way that it results to learning. Soer (2009) added that teachers of mathematics should be in position of communicating the required knowledge in unambiguous, informative and accurate manner to their

students. Unfortunately, this is not being done by the teachers for mathematics according to Okafor and Anaduaka (2013) who argued that most teachers are not ready to do anything extra in their teaching.

Olalekan (2016) conducted a study in Nigeria on performance of high school students in mathematics. The study embraced use of descriptive survey with a designed questionnaire for data collection. A sample of 287 students was randomly selected from two rural secondary schools and subjected to the questionnaire. The findings indicated that overpopulated schools with large classes, unqualified teachers and undesirable spending by the government were the main factors contributing to the poor performance. Partly supporting these findings was Avong (2013) whose study concluded that lack of qualified mathematics teachers was the single most cause of poor performance in mathematics.

In their study Osunde and Izerbigie (2006) cited teachers' attitude as another aspect contributing to students' poor performance in mathematics. Overcrowded schools with large classes of student - teacher ratio of up to 100:1 is likely to compromise the teaching and learning of mathematics (Umameh, 2011). Sahin and Yorek (2009) in their Turkey study further asserted that it was difficult for teachers who are not specialists to impart the subject matter effectively to learners with visual impairment; it was difficult to achieve maximum participation. Fraser and Maguvhe (2008) argued that learners with visual impairment found it difficult to pursue mathematics and science due to the unavailability of resources in addition to teachers who had problems in imparting the subject matter to their students. So, it is paramount for teachers to have enough knowledge on how their students learn mathematics and the best ways of teaching it (Ruth, Linda, Alethea, Nikole, and Stelios, (2009).

A study by Miheso (2012) in Nairobi County, Kenya examined factors affecting mathematics performance among secondary school students. The study involved a sample of 570 form two students from ten randomly selected secondary schools. Through use of questionnaires, checklists, achievement tests and interviews, the study found that variation in performance in mathematics was significantly influenced by the type of teaching method embraced. There seemed to exist a direct relationship between the learning environment and poor performance. Text book-student ratio was also another factor that affected performance. However, there was no significant difference in performance when the ratio of text books to learners was 1:2 and below. A ratio of 1:3 and beyond seemed to have a negative impact on performance (Miheso, 2012). Another study by Mwangi (2014) on pedagogical challenges which faced teachers of learners with visual impairment at Thika Primary School for the blind established that learners with visual impairment performed minimally in

mathematics in Kenya. The study used descriptive survey design to collect data from both the teachers and the learners. In this study, teachers agreed that mathematics topics were the most difficult to teach to learners with visual impairment. Topics such as measurement, geometry, multiplication and division were identified as the most challenging. On time, about 74% of the teachers felt that the time allocated for both teaching and assessment of learners with visual impairment was not adequate. The study further established that learners with visual impairment were slow in acquiring computational skills and some had challenges in using resources such as the abacus in mathematical computations (Mwangi, 2014).

III. Performance of Learners with Visual Impairment in Languages

The sense of vision is very important in providing information on non-verbal communication in addition to providing meaning to language. The role played by language in learning is very crucial. Being handicapped in the language of instruction for any learner would most probably mean no learning takes place since there won't be any communication between the teacher and the learner (Malekela, 2003). To help learners with visual impairment to improve on their use of language, it is important that they are provided with many hands - on experiences with real objects together with auditory labels paired with descriptions and a rich literacy environment (Carmen, 2019). Kapoli (2001) asserted that learning materials help the learner to make exploration of the language used in day-to-day life which is related to their interests and needs. Still on the issue of teaching/learning materials, Nyamubi (2003) postulated that materials make learning more gratifying to the learner by stimulating their imagination and making learning more real. Tangible foundation for abstract thought is extended by learning materials giving more meaning to word responses.

The early years are typically the time when language develops greatly since this is the time when children begin connecting verbal labels and identifying objects. Unfortunately, for children with visual impairment, this opportunity of casually observing and making connections with gestures and materials in their environment is not there. This can only be achieved if the learner with visual impairment is intentionally taught through direct experiences accompanied with language. If this is not done, language development in learners with visual impairment will be undoubtedly delayed. Carmen (2019) cited a number of language problems likely to be found among learners with visual impairment. These are, verbalism; this is where a learner talks about people, objects and events without understanding the concepts at all. This is mostly due to the fact that they have heard people talking about the

topics but had no experiences related to the topics themselves. Unless learners with visual impairment are provided with various hands – on experiences then they will definitely experience difficulties understanding the concepts and will have no foundation to build upon. Ramakrishnan (2013) asserted that excessive dependence on verbal learning impacts negatively on both academic learning and also personality development. Ramakrishnan further noted that the absence of vision not only influences but also delays the process of language acquisition. Without vision, the child with visual impairment relies more on auditory and tactual exploration unlike a child with vision who integrates all the senses including vision. Another problem is echolalia; this is where a learner with visual impairment learns to talk by copying words, phrases or sentences from others without attaching any meaning to them (Carmen, 2019). If such problems are not addressed in the early years, it is likely that their effects will be felt later in life and this might determine how such a learner performs in language examinations.

The language of instruction in the upper primary and in other post primary institutions of learning in Kenya is English. It is the expectation of everybody that by the time students are through with secondary education, they will have acquired and also developed both spoken and written skills of the language to enable them cope with its demands at higher educational levels and also in the world of work. However, despite the important role that is played by English language, empirical studies have indicated that learners have not been performing well in English language examinations. One such study was carried out by Mosha (2014) in Zanzibar. The study aimed at investigating the factors affecting students' performance in English language subject in secondary schools in Zanzibar. It adopted both qualitative and quantitative approaches and used questionnaires, interviews, classroom observation and documentary review for data collection. The population for the study was made up of both students and their English teachers. The results indicated that students were inspired to learn English language because they recognized its importance in local and international communication and also for employment prospects.

However, even with such motivation, students continued performing poorly in the language as indicated in the findings. For instance, in the year 2001, 197 students out of a total of 296 (67%) failed in the subject. In the following year, 2002, the situation was not very different because out of 292 students who sat the English examination, 181 (62%) failed. In the year 2003, 68% of the students failed, and in 2004, the situation got worse with up to 72% failure. The worst was the year 2005 where 78% of the students failed. The trend indicates that the situation was worsening as students continued performing poorer (Mosha, 2014). The findings pointed to a number of factors that continued

affecting the performance of the high school students in English language. First, there was a deficit of English teachers and the teaching and learning resources were scarce (Mosha, 2014). The study further found that students were taught by teachers who were not qualified, some other teachers were trained but still they were not competent. In some instance, such teachers resulted to skipping some difficult topics in the syllabus.

Other contributing factors to the poor performance of English according to Mosha (2014) included large class sizes and unfavourable teaching and learning environments. Mosha's findings partly corroborated with those of Msanjila (2005) whose study in Tanzanian secondary schools found that learners' poor performance in English examinations was because of the inappropriate methods used by the teachers, inadequate text books and the fact that some teachers were unqualified. Therefore, this would mean that qualities of teachers are among the factors that lead to student' poor performance (Harmer, 2003; Mosha, 2004). In their study Fakeye and Ogusinji (2009) posited that proficiency in English language impacted very significantly on the students' overall academic performance. Moreover, there was a positive notable relationship between proficiency in English language and the general academic achievement. Despite its great impact on the students' general performance, research has indicated that most students perform poorly in it (Nyamubi, 2003; Yohana, 2012).

Students' success in school to a large extent relies on their proficiency in the language of instruction (Fakeye & Ogunsiji, 2009). Harb and El-Shaarawi (2006) postulated that competence in English is a pre-requisite factor that has some positive effect on the student's performance. Moreover, a study by Nara, Eunjin, and Reubenson (2015) found that use of language as a medium of instruction limited the students' academic performance. These researchers used an ex-post facto, non-experimental approach to examine the impact of proficiency in English language on academic performance of international students in a university in the United States of America. The population of the study was university students in their junior and senior year of college. The study found that students who were excellently proficient in English had the highest mean GPA of 3.57. Further, the group of students who had indicated that English was their second language scored the lowest mean GPA of 2.68. The conclusion of the study was that self-perceived English proficiency correlated with the students' academic performance. Thus, it was crucial to offer support services to the international students most of which was to be in form of English language courses (Andrande, 2006).

A similar study was carried out by Olanipekun, Garuba, Mohammed and Ohiemi (2014) in Nigeria. The aim of their study was to investigate the influence of English language on students' performance in

vocational education, majoring on Agriculture, Science and Economics and it adopted a descriptive survey method. The population was derived from graduating students. The results of the study indicated that competency in English considerably determines the students' academic performance. This showed that good mastery of English language is paramount in students' performance in intelligence tests (Olanipekun et al., 2014). Lack of proficiency in English could be among the factors likely to lower the students' performance. Students who experienced difficulties in communication skills in English were likely to underperform not only in English language, but also in other areas of study. In Olanipekun et al. (2014) study, it was evident that students' academic performance in vocational education was influenced by English language. Therefore, the importance of English language as the medium of instruction can never be over emphasized.

Among the languages examined in the Kenyan Education system are Kiswahili and English, in the lower grades and foreign languages like German and French in high school. Kiswahili and English are compulsory in both Kenya Certificate of Primary Education (KCPE) and the Kenya Certificate of Secondary Education (KCSE) examinations. Kiswahili is looked at as a key subject in career development (Bisi, 2013). It affects the career choices of students, for example for one to join primary teachers' training colleges one has to score a minimum of grade C in either Kiswahili or English. Okombo (2002) asserted that governments' policies on schooling, national language and mass media of communication all in a way affect the people's career prospects and also their cultural life. That is to say, whatever is done in the classroom has some consequences in life after school. According to Maina (2003) children are introduced to Kiswahili early enough and they learn it with ease. Once they are exposed to the language early, they learn it with no problem and they become bilingual. However, in Kipipiri division of Nyandarua county Maina (2003) found that learners consistently performed poorly in Kiswahili. The researcher looked at the performance of secondary school students in Kiswahili in their KCSE examination for five consistent years starting in 1998 through 2002. The study used descriptive survey and targeted form four students and their Kiswahili teachers.

The study revealed that performance in Kiswahili during the five years under study was quite low. Most schools under study recorded a mean score of C's- over the years under study. In 1998 and 2001, the mean grade was C-, in 1999 and 2000 the mean grade was D+ and the best performed year was 2002 where the mean grade was a steady C (Maina, 2003). The findings indicated that learners lacked resources and in some cases the resources available were inadequate. Areas highlighted as the most challenging to learners thus contributing to poor performance were,

poetry, Kiswahili grammar, composition, vocabulary and literature in Kiswahili. The finding supported Kinyanjui (2006) who stated that poetry in Kiswahili was found to be the most difficult part of literature to understand and quite a number of students do not like studying it. Some students felt that 'mashairi' (Poetry) was a foreign aspect of literature and had no direct relationship to their day-to-day lives. Cole and Chan (2000) further argued that most teachers held negative attitude towards Kiswahili and unfortunately this attitude is passed on to their learners.

According to Curran and Rosen (2006) attitude affects achievement. This would then mean that once students have negative attitude towards Kiswahili, their preparation in it would be poor, thus, yielding poor results. This being the case then, teachers are supposed to be good mediators and portray a positive attitude towards the subject so that students can have similar attitude and achieve their full potential. Learners with visual impairment would need more support of modified school practices and services to assist them develop their full potential and perform as well as their sighted counterparts. As AFB (2007) asserts, instruction for learners with visual impairment should be provided by teachers who are well qualified and prepared to impart knowledge and skills in the best way possible. If this is not done, then it is highly likely that performance of learners with visual impairment in Kiswahili will continue being poor. Unfortunately, no study has been done to establish performance of learners with visual impairment in humanities like history and geography.

IV. Research Methodology

The study adopted a qualitative study design to explore performance of learners with visual impairment in summative evaluation. Four special schools for learners with visual impairment in Kenya were used for the study. Results for the Kenya certificate of secondary education and Kenya certificate of primary education for the year 2017 were analysed. Further, results for the year 2013 through 2016 were also explored. To supplement data collected through document analysis, a questionnaire was used to collect more data from the teachers. The questionnaire sought to find out whether there were topics that teachers felt were challenging to teach learners with visual impairment. It also focussed on soliciting information on challenges emanating from the whole examination process.

Consent to carry out the study was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) through graduate school, Kenyatta University. The four schools under study were visited and after getting permission from the head teachers, the questionnaires were administered to the teachers who taught class eight and form four. Results for the years under study were also acquired.

V. Data Analysis

The collected data was edited, coded, categorized and classified according to its origin. The classified data was then put in tabular form. The examination results were analysed and presented through frequencies and percentage distributions. The tabulation helped to give a comprehensive picture of what the data looked like. Explanations were also given in relation to reviewed literature.

VI. Findings and Discussions

a) *Student's performance in 2017 KCPE in the schools*

In their KCPE performance, the learners' mean marks obtained in English, Kiswahili, Mathematics,

Science and Social Studies were established in the two schools (St. Francis and Kibos Primary schools for learners with visual impairment). Performance in Thika High school and St. Lucy's secondary schools for learners with visual impairment in KCSE was equally evaluated.

Table 2: Learners' performance in the subjects in 2017 KCPE (Mean scores)

	Primary schools (KCPE)	
	School 1	School 2
English	31.00	35.67
Kiswahili	33.50	30.50
Math	35.33	32.50
Science	34.67	29.92
S/Studies	33.00	29.58

Source: KNEC, 2018

Analysis of the learners' mean performance in KCPE per subject in the two primary schools indicated that the learners performed minimally in all the subjects. It can be observed that not a single subject attained the average mean score of 50 and above. The highest mean score achieved in subjects was 35.67 in English in school 2 and 35.33 in Mathematics in school 1, a deviation of 14.33 and 14.67. The two lowest mean scores were 31.00 and 29.58 from the two schools respectively. Total mean scores posted for the five subjects from the two schools were 167.5 from school 1 and 158.17 from school 2. This indicates that the performance in the two schools was indeed low. Results for the years preceding 2017, that is 2013 through 2016 indicated some improvement in the performance as observed in Figure 2. However, the improvement was not very significant though because it was only school 1 which managed an above average mean score in the year 2016. Both schools posted below average scores for the other three years 2013, 2014 and 2015.
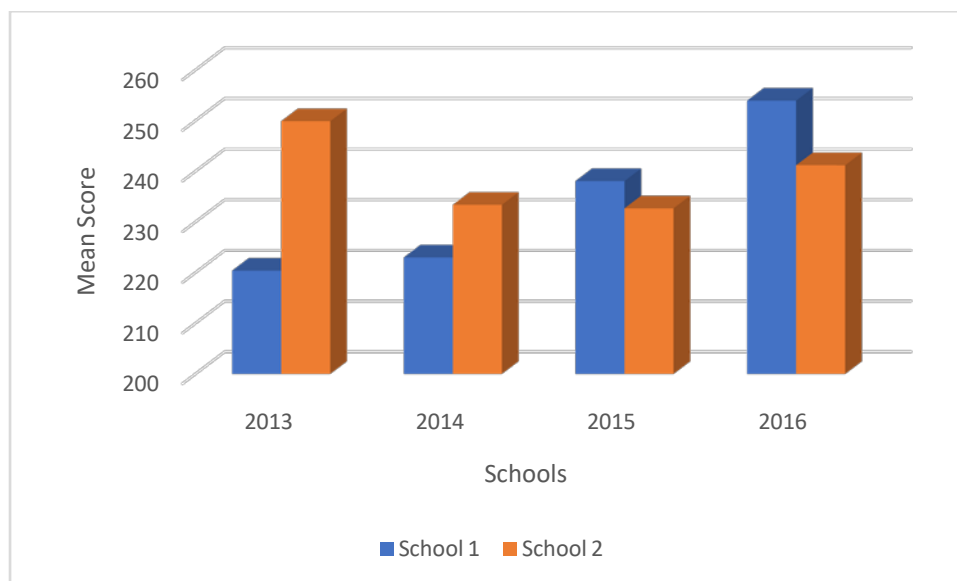

Figure 2: Performance of learners in KCPE in the same schools for the years 2013 - 2016

b) *Students' performance in 2017 KCSE in the two secondary schools*

Performance in the two high schools in the individual subjects were analyzed using a descriptive analysis of the mode (highest occurrence) based on the number of the learners.

Table 3: Learners' performance in 2017 KCSE in High school 1

SUBJECT	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	F
ENG	0	0	1	0	1	4	2	6	4	16	10	0	0
KIS	0	0	2	1	2	2	6	7	4	11	8	1	0
MATHS	0	0	0	1	0	0	0	0	0	4	6	33	0
BIO	0	0	0	0	1	0	1	0	1	7	16	16	2
HIST	2	2	2	4	4	2	6	5	2	8	5	2	0
C.R. E	0	2	4	6	6	1	3	5	1	13	3	0	0
GEO	0	0	0	3	2	3	1	2	2	4	3	0	0
H/SCI	0	0	0	4	3	6	3	4	0	6	2	0	0
AGR	0	0	0	0	0	0	1	2	2	3	3	0	0
FRENCH	0	0	0	0	0	0	0	0	1	0	0	0	0
MUSIC	0	0	0	0	1	1	1	0	0	3	1	0	0
B/ST	0	0	0	0	1	0	0	1	0	3	1	1	0

Table 4: Learners' performance in 2017 KCSE in High school 2

Subject	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	F
ENG	0	0	0	0	0	0	1	1	0	2	2	3	0
KIS	0	0	0	0	0	0	0	1	2	2	3	1	0
MATHS	0	0	0	0	0	0	0	0	0	0	0	9	0
BIO	0	0	0	0	0	0	0	0	0	0	5	4	0
HIST	0	0	0	0	0	1	1	4	0	1	1	1	0
C.R. E	0	0	0	0	0	1	1	2	0	3	1	1	0
GEO	-	-	-	-	-	-	-	-	-	-	-	-	-
H/SCI	0	0	2	0	0	1	0	1	1	3	1	0	0
AGR	0	0	0	0	0	0	0	0	0	0	1	2	0
FRENCH	-	-	-	-	-	-	-	-	-	-	-	-	-
MUSIC	0	0	0	0	0	0	0	0	0	0	1	1	0
B/ST	0	0	0	0	0	0	0	0	0	0	4	0	0

Source: KNEC (2018)

The tables indicate that the performance across subjects was rather low. Home science had the highest grade of C+. Performance in English, Kiswahili, CRE, History, Agriculture and Business Studies was the same where the mode posted by all the six subjects was a D while Biology had a D-. Mathematics had the lowest mode which was Grade E. The tables also indicate that the best grades posted by individual students were in history and CRE. Majority of the students in high school I managed to score Grade C and above in history where two students scored grade A and a further 2 scored grade A-. Two students managed a B+ and another 4 students got grade B. 4 students scored a B-, 2 got a C+ and 6 got grade C. Interestingly, the situation was completely different in high school 2 where the best score in the same subject was a C+ posted by one student only and another 1student posting grade C, all the other students in this school scored grade C- and below in history. In C.R.E two students in school 1 managed to score grade A-. Another 4 scored a B+, six scored B and the same number got a B-. One had a C+ and another 3 posted a C. Just like in history, the situation was different in high school 2 where the best score was a C+ posted by a single student and another one scored grade C. All the other seven in this school scored C- and below. In English, 8 students managed to

score grade C and above in school 1 while in school 2 only one student scored grade C. All the others had grade C- and below.

Kiswahili was not very different since 13 students scored grade C and above in school 1 and just like in English, school 2 had a single student scoring grade C while all the others scored grade C- and below. French was done by a single student in school 1 who scored a D+.

Mathematics was the worst performed subject where in school 1 a single student managed to score grade B and all the others scored grade D- and below,

with the majority scoring grade E. Interestingly all the students in school 2 scored grade E in mathematics.

c) *KCSE points obtained in the two schools in respective subjects*

In KCSE grading A – E (points A =12, A- =11, B+ =10, B =9, B- =8, C+ =7, C =6, C- =5, D+ =4, D = 3, D- =2 and E = 1), the points obtained in each of the subjects were added up to establish which of the subjects learners with visual impairment scored the highest points in the two high schools in that year.

Table 5: High School total points obtained in the subjects

| Subject | School 1 | | | School 2 | | | |
	Total	No of learners	Ave.	Total	No of learners	Av.	Av. Points
ENG	172	44	3.91	24	9	2.67	98
KIS	196	44	4.45	26	9	2.89	111
MATHS	66	44	1.50	9	9	1.00	37.5
BIO	87	44	1.98	14	9	1.56	50.5
HIST	253	44	5.75	39	9	4.33	146
C.R.E	263	44	5.98	35	9	3.89	149
GEO	106	20	5.3	-	-	-	106
H/SCI	162	28	5.79	47	9	5.22	104.5
AGR	39	11	3.55	4	3	1.33	21.5
FRENCH	4	1	4.00	-	-	-	4
MUSIC	32	7	4.57	3	2	1.50	17.5
B/ST	25	7	3.57	8	4	2.00	16.5

In the first school, the best performance was therefore recorded in C.R.E where the school had a total of 263 points. Similarly, in the second school; the best performance was in C.R.E where the learners scored a total of 149 points. Using descriptive statistics, mean performance, the learners performed well in C.R.E (mean points 149). Considering the number of learners who attempted the various subjects, in school 1, the

best subject, C.R.E scored a mean point of 5.98 while in school 2 the best performance was in Home science which had a mean of 5.22 points. In both the schools 1 and 2, the lowest points were recorded in Mathematics (1.50 and 1.00 respectively, and an average of 1.25).

The average performance of the two schools was therefore established as shown in table 6.

Table 6: Average points for the two high schools obtained in the subjects

Subject	Eng	Kis	Math	Bio	Hist.	C.R. E	Geo.	H/Sci	Agri	Fren	Mus	B/St
Ave. Points	3.29	3.67	1.25	1.77	5.04	4.94	5.30	5.51	2.44	4.00	3.04	2.79

The table indicates that the mean for the two schools for the particular year was 3.528. Home science was the best performed (mean point 5.51) followed by geography (mean point 5.30). On the other hand, mathematics was the worst performed subject with mean point of 1.25, followed by biology (mean point 1.7). The performance in all the schools was generally below average.

The teachers were asked to explain whether there were some topics that proved difficult to teach those learners with visual impairment. Most of them agreed that they faced a number of challenges in teaching a number of concepts particularly in math and sciences.

Poor performance by learners with visual impairments in mathematics has been confirmed by a number of researchers. The worst scenario in the current study was the results posted by school 2 in 2017 KNEC examination where all the learners scored grade E. Grade E in the KNEC examination is considered the lowest grade a learner can score in a subject or in their overall performance. This finding supports Schleppenbach (1997) who reported that mathematics was a field considered inaccessible to learners with visual impairment because of the presentation of its concepts and information. Schleppenbach (1997) further noted that only a few educators are prepared adequately to teach mathematics to learners with visual impairment, thus the poor performance.

The fact that mathematics is usually taught using the 'chalk and talk' method which basically focuses on what the teacher is saying and the examples worked out on the board, makes it quite a challenge to learners who are not able to see and follow the demonstrations, and the subsequent development of the concepts on the board. This finding on poor performance in mathematics by learners with visual impairment also supports Cliffe (2009) who reported that taking in a lot of information, and trying to conceptualize huge amounts of spoken mathematics without reference to what is being developed on the board or written notes could place high demands on memory. Such a situation could be made worse by the ambiguity of spoken words particularly when teachers of mathematics use gestures and phrases like 'this equation' or 'this plus this' which the learner with visual impairment cannot see (Rowlett & Rowlett, 2012; Cliffe, 2009).

The issue of time could also be a contributing factor to poor performance in mathematics. Time was reported as an issue by majority of the teachers in the current study who observed that mathematics papers should be given more time since the current time was not adequate, even with the additional thirty minutes. They attributed this to the many activities and long processes that candidates with visual impairment involved themselves in before arriving at the answers. This included reading the questions, arranging the calculation tools (cubes and cubarithms) and getting back to the Braille writer to arrange the process on paper. This finding supports Gross (1995) who noted that computation by learners with visual impairment usually took a lot of time as compared to the way learners who use sight work out the same mathematical questions.

Lack of proper accommodations could also be another reason why learners with visual impairment in the current study posted a minimal performance in mathematics. It was reported that diagrams adapted by KNEC were quite difficult to interpret. The teachers also noted that mathematics papers were full of diagrams and learners with visual impairment took a lot of time trying to read and interpret the diagrams tactually. However, the finding on minimal performance in mathematics contrasted with Lynn (2012) who found a consistent high percent of learners with visual impairment getting high scores in mathematics across grade levels and years in her study. This good mathematics performance by learners with visual impairment as confirmed by Lynn (2012) countered a theory and misconception by Ferrel, Buertel, Sebald and Pearson (2006) and Kapperman and Sticken (2004) that performance in mathematics by learners with visual impairment had always been poor as a result of the visual-spatial and abstract nature of mathematics concepts and teachers who were not well prepared to teach advanced concepts.

However, an interesting point to note was the difference in the performance of mathematics in the two primary schools as compared to the performance of the secondary schools. In primary school 1, mathematics had a mean of 35.33 and it was the best done among the five subjects. In primary school 2, mathematics was the second best done with a mean of 32.5. This was a complete opposite of the findings from the secondary schools where mathematics was the worst done. Findings on better results in mathematics at primary school level supported a number of researchers (Chapman & Stone, 1988; Corrigan, 1977) The explanation these researchers gave was that mathematics during the primary years was practical and related to everyday activities but as concepts become established the nature of work in numeracy becomes more representational, possibly because learners rely on their memories and have little or no reinforcement from visual promptings, thus learners with visual impairment excel in mental arithmetic. Another explanation that could support better results for mathematics at the lower classes was indicated by Aldrich and Sheppard (2001) who found that many young learners were keen on tactile graphics as they found them quite interesting and derived lots of fun from them, on the other hand, older learners found them more difficult maybe due to the content under study, sometimes calculations can be too long or too complicated to be handled mentally.

The second worst done subject in the two secondary schools was biology. This could be attributed to similar factors that affect performance in mathematics. Such are time factor and also the way the examinations were adapted for learners with visual impairment. Sahin and Yorek (2009) observed that learners with visual impairment merely needed proper accommodations to enable them to perform as well as their sighted peers in science. More researchers, (Gardner, Stewart, Francioni & Smith, 2002) agreed that Science, Technology, Engineering and Mathematics (STEM) subjects are known for the huge number of visual resources used which included diagrams, graphs and charts. It is a long-held belief that, technical subjects can be quite challenging to learners with visual impairment. Concepts in STEM subjects could be difficult for grasping by learners with visual impairment because they rely quite heavily on visual representation as in diagrams, graphs and charts (Agarwal, Jeeawoody & Yamane, 2014).

Another factor which might have contributed to low performance in biology could be challenges in teaching some of the topics as indicated by the teachers. Jones, Minogue, Oppewal, Cook, Michelle, Broadwell and Bethany (2006) advanced a similar idea that in Science Education, learners with visual impairment reported challenges in learning about topics that they are not able to experience directly. McCarthy

(2005) concurs with these researchers that there was evidence that learners with disabilities were often not given the same opportunities to experience science like their non-disabled counterparts, furthermore McCarthy (2005) reported that teachers in special needs education often lacked knowledge about the science curriculum, content involved in science, together with the science pedagogy.

Performance in KCSE for the years 2013 - 2016 were also explored and the results presented in Figure 3.
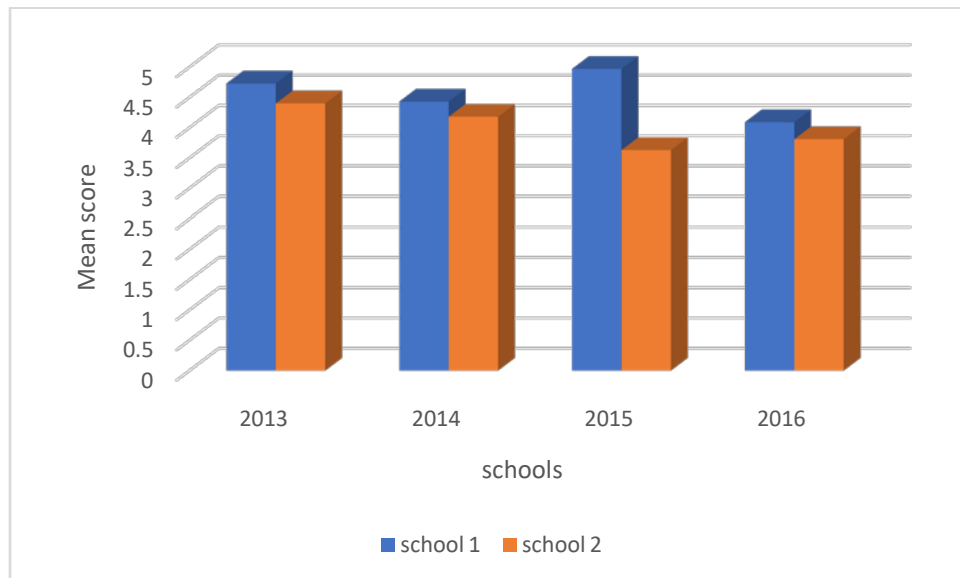
Figure 3: Performance of learners in KCSE in the same schools for the years 2013 – 2016

The average score for the four years was 4.404 with school 1 scoring 4.554 whereas school 2's mean score was 4.255, a deviation of 0.299. Therefore, the difference in performance between the two schools was not very significant and the general performance was rather low just as it was found out in the analyzed 2017 results. It is possible that the numerous factors raised by the three categories of respondents indeed impacted negatively on the performance of learners with visual impairment.

d) Challenges faced by learners with visual impairment during examinations

The teachers were asked to identify some challenges emanating from the whole examination process that their learners usually complained about. They came up with nine different issues as indicated in Table 7.

Table 7: Teachers' responses on challenges faced by learners with visual impairments during examinations

Impediments	Frequency (N = 16)	Percent	Rating (1- 9)
Poor adaptation of questions and diagrams	12	75.0	9
Inadequate time	11	68.75	8
Inadequate facilities	11	68.75	8
New Braille signs in examinations	10	62.50	7
Breaking down of machines	10	62.50	7
New materials in examinations	8	50.0	6
Long passage in languages	5	31.25	5
Panic and anxiety	3	18.75	4
Unfriendly supervisors & invigilators	2	12.50	1

Note: 1-least impediment, 9 – biggest impediment

Majority of the teachers, 12 (75.0%) reported that their learners complained of questions and diagrams that were poorly adapted. Diagrams that are not well adapted are likely to cause confusion and even mislead the learners leading to wrong responses.

Examination adaptation for learners with visual impairment was also highlighted as quite a challenging area in a study by Graeme et.al. (2009) where data gathered from ten countries indicated that the challenges were experienced in all the countries. Allman

(2009) observed that test bias should be eliminated from examinations for learners with visual impairment by paying attention to item construct. It is important that in adaptation of examinations, individual learners' needs are considered as opposed to blanket adaptation. This was observed by Schmidt and Cagran (2008) who concluded that student's age, type of class setting ought to be considered in determining the kind of adaptation for learners with visual impairment. Eleven more teachers (68.75%) reported that the learners usually said that the time allocated for the examination was inadequate for most subjects.

Studies done on time modification found that extra time was available in all the countries under study, but contrary to the Kenyan situation, some countries like Netherlands and Czech Republic considered giving learners with visual impairment 100% extra time. Ireland and France reported a 33% extra time, (Ghulam et al., 2014), though lower than the Netherlands and Czech Republic, this was still higher than what the Kenyan learners are added. In Kenya learners are added thirty minutes both at primary and secondary school. This translates to 16% extra time in a 3 hours paper and a 25% addition in a two hours paper. This was the lowest extra time added compared to all the countries reviewed.

The thirty minutes added is also uniform in all the subjects and yet the teachers reported that some subject would need more time than others. Still in agreement with the need to add learners with visual impairment more time during examinations, the AFB (2016) observed that extended time during examinations was very essential since some learners may be slow in writing and also because some tools that these learners used may pose some challenges. This finding supports Mitchell (2008) who found out that sometimes tools used to assess learners with visual impairment were rigid and not adapted.

The same percentage (68.75%) further observed that facilities were inadequate. Braille machines that learners used to write examinations were just enough. In some extreme cases, the learners had to wait for the machines to be repaired as reported by 10 (62.50%) of the teachers. This is in case they broke down during examination period. Such inconveniences are likely to cause untold anxiety to the learners which might in turn affect their performance. It is advisable for schools to have some spare machines to ensure that learners do not get stressed in case they break down during examination time. A further 10 (62.50%) reported that learners pointed out that they usually came across new Braille signs that they had not earlier learnt. A further eight teachers (50.0%) reported that learners complained of strange materials that KNEC usually used in its adaptation of the examination. New materials during examination can easily bring confusion and anxiety to the candidates.

A few teachers; 5 (31.25%) said that the learners complained of very long passages in languages. Reading and responding to such long passages could cause fatigue to the learners. Three teachers, (18.75%) reported a possibility of learners experiencing some form of anxiety during examinations. Presence of unfriendly supervisors and invigilators during examinations was reported by 2 (12.50%) of the teachers. The two teachers reported that some learners with visual impairment often complained of unfriendly examination supervisors and invigilators who never made any attempt to create some rapport with them during examinations. A new strange voice to a learner who is not able to see the person who is speaking can easily make them uneasy. This can be countered if the supervisors and invigilators took time to build some rapport with the learners before they start the examination.

Though among the least rated, there is broad agreement in literature that test anxiety is responsible for lower academic performance. Hill and Wigfield (1984) reported that test anxiety has affected about 25% American learners at both primary and secondary levels.

In support of this was Seipp, (1991) who meta-analyzed 126 American and European studies and found negative correlation between academic performance and anxiety. So, it is no wonder that some teachers (18.75%) in this study brought it up as one of the issues that their learners complained about.

VII. Conclusions and Recommendations

A number of conclusions were drawn from the findings of the study. First, the findings indicated that performance of learners with visual impairment in summative evaluation was below average. Mathematics and Science were the worst done subjects at secondary level whereas Social Studies and Kiswahili were the two worst done at the primary level. The teachers pointed out a number of issues that most likely affected the performance.

a) Recommendations

The following recommendations were proposed in line with the findings.

To ensure that learners with VI are not disadvantaged when it comes to sitting examinations, the Kenya National Examination Council should;

(i) Improve on making diagrams more tactually clear,
(ii) Adjust the extra time added according to the demands of different subjects,
(iii) Consider presenting examinations through other media e.g. auditory and use of scribes since some learners are not proficient in Braille, On the other hand, Learners with visual impairment should be provided with relevant and adequate equipment so

as to close the gap between them and their sighted peers,

(iv) There should be capacity building for teachers for learners with visual impairment in order to make them more competent.

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Self-Regulation among Students with Learning Disabilities in English Language and its Relationship to Some Variables

By Mohamad Ahmad Saleem Khasawneh

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Abstract- The present study aimed at identifying the level of self-regulation among students with learning disabilities in English language in Irbid Governorate and its relationship with the variables of gender and school grade. The study sample consisted of (380) male and female students in the elementary stage. The study used the descriptive approach and developed the self-regulation scale as an instrument to collect data. The content validity and reliability of the instrument were ensured using the Cronbach Alpha and repetition methods. The results showed that there were statistically significant differences in the level of self-regulation among those with learning disabilities due to the gender variable in favor of males, and to the school grade variable in favor of the second primary grade.

SELFREGULATIONAMONGSTUDENTSWITHLEARNINGDISABILITIESINENGLISHLANGUAGEANDITSRELATIONSHIPTOSOMEVARIABLES

Strictly as per the compliance and regulations of:

Self-Regulation among Students with Learning Disabilities in English Language and its Relationship to Some Variables

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Abstract- The present study aimed at identifying the level of self-regulation among students with learning disabilities in English language in Irbid Governorate and its relationship with the variables of gender and school grade. The study sample consisted of (380) male and female students in the elementary stage. The study used the descriptive approach and developed the self-regulation scale as an instrument to collect data. The content validity and reliability of the instrument were ensured using the Cronbach Alpha and repetition methods. The results showed that there were statistically significant differences in the level of self-regulation among those with learning disabilities due to the gender variable in favor of males, and to the school grade variable in favor of the second primary grade.

Keywords: self-regulation, learning difficulties, english language, elementary stage.

I. Introduction

Students with learning disabilities need to learn thinking skills to adapt to new circumstances around them, and to think in new innovative ways to deal effectively with their surroundings. This requires them to learn the skill of cognitive flexibility in thinking, as cognitive flexibility is the equivalent of adapting to new educational circumstances and situations by reducing them, comparing them with old experiences, simplifying the complex ones, and looking at the familiar in it as familiar and ordinary. Students adapt to these conditions in a routine way, while their reality requires them to deal with the complex ones without simplification and to look at them in an unfamiliar and ordinary way (Sweid, 2013).

As a result of the increase in options required by the skill of cognitive flexibility, opinions differed in their view of cognitive flexibility according to the different theoretical backgrounds. Al-Atoum (2017) indicated that cognitive flexibility is an important component of creative thinking and indicates the automatic cognitive state by changing the situation or its characteristics. This means the ability to produce a variety of ideas about a specific problem or situation and the shift from a certain type of thinking to another when responding to a stimulus that challenges the individual's thinking. Cognitive flexibility has two forms. The first is adaptive flexibility, which refers to the ability of the individual in changing the state

of mind through which a solution to a specific problem is seen. The second is automatic flexibility that indicates the speed of an individual to produce the largest possible number of different types of ideas that are related to a specific situation (Amani, Fadaei, Tavakoli, M., Shiri, & Shiri, 2018).

Accordingly, self-regulation refers to the individual's ability to organize the use of skills to achieve goals through understanding the individual's viewpoint and identifying his qualities that help achieve goals. This is done by clearly defining the individual's goals through self-monitoring, evaluation, and promotion (Youssef & Wahba, 2021).

Therefore, we conclude that the existence of self-organization is necessary for students with learning disabilities because the student at this stage needs such skills. The purpose of the current study is to identify the level of self-organization of students with learning disabilities in English language and its relationship to some variables.

a) Research Questions

The present study seeks to give answers to the following research questions:

1. What is the level of self-organization among students with learning disabilities in Irbid Governorate?
2. Does the level of self-organization differ among students with LDs in English language in Irbid Governorate according to gender and school grade?

b) Significance of the Study

The theoretical significance of this study appears in identifying the relationship between cognitive flexibility and self-organization among students with learning disabilities. The self-organization skill would contribute to increasing students' awareness of what is going on around them and increasing the adequacy of their mental ability in dealing with situations, as well as helping them to develop positive trends towards classroom experiences and about the school. This will also help them solve their problems, which increases the vitality and activity of students in organizing situations and planning them. In light of the theoretical significance, the current study will be useful to those in

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charge of the educational process to realize the cognitive flexibility that students with learning disabilities enjoy and the ability to organize themselves (Cartwright, Marshall, Huemer, & Payne, 2019).

The practical significance of this study appears in helping those in charge of the educational process in planning for curriculum development and developing advanced teaching methods by introducing a measure of self-organization.

c) Delimitations of the Study

The results of this study are limited to the sample, as it was applied to students with learning disabilities in English language in schools within the Directorate of Education in Irbid Governorate in the first semester of the academic year 2020/2021. The generalization of the results of this study limits the extent to which the study sample represents its community, the procedures for applying the study tools, and the availability of acceptable standards of validity and reliability. The results are also limited to the accuracy of the response of the study sample members and their seriousness in responding to the scale used in the study.

d) Definition of Operational Terms

The present study included many terms, which can be defined as follows:

Self-regulation: Bandy and Moore (2010) define it as "the ability of an individual to regulate and control the conscious and subconscious processes that he uses in his responses to various situations in a way that helps him overcome disappointments and failures, and achieve his goals. Is defined procedurally as the degree obtained by the student on the Self-regulation Scale prepared for this study.

Students with learning disabilities: Those who have disorders in one or more of the basic psychological processes, which include understanding of written or spoken language and their use.

II. Literature Review

Self-regulation is one of the important variables that help the individual lead a high-quality life. Students who possess high levels of cognitive flexibility are more able to succeed and find effective solutions to the social, academic, and behavioral problems they face inside and outside the classroom (Periáñez, Lubrini, García-Gutiérrez, & Ríos-Lago, 2021). Self-regulation positively affects the individual's ability to adapt to internal and external sources of psychological stress, in addition to its positive impact on the individual's mental and physical health, and it also plays an important role in social interaction with others (Koesten, Schrodt & Ford, 2009).

Moreover, Self-regulation helps students to provide automatic responses to new problems and situations, and to deal with the presented academic situations and tasks, since it helps them in the production of new and multiple ideas and alternatives (Miconi, Moscardino, Altoè, & Salcuni, 2019.).

a) Previous Studies

Al-Ramamneh (2019) aimed to reveal the level of possession of self-regulation of students with learning difficulties and its relationship with academic achievement from the perspective of their teachers. In addition, to achieve that the researcher designed a valid and reliable measure to reveal the level of possession of self-regulation of students learning difficulties, which consisted of 38 paragraphs and was randomly distributed to teachers of learning difficulties. The sample of this study consisted of 30 teachers, 15 males, and 15 females from the academic year of 2017-2018. The results of the study show that the level to which students with Learning Disabilities possess planning skills and setting goals comes at a low level, followed by self-monitoring and self-evaluation at the intermediate level, while the level of self-promotion and control of external stimuli is high. The results also show that females outperform males on all dimensions and the total score of the measure.

Al-Muqham (2019) aimed to identify the effectiveness of modeling techniques in improving the self-regulation skills of female students with learning disabilities. The sample of this study consisted of 13 female students with learning disabilities in learning disabilities programs in Shaqra City, Saudi Arabia aged between 9 – 11 years old. They were divided into an experimental group of 7 students, with an average age of 9,859, and a control group of 6 students with an average age of 10 years old. The researcher used picture modeling, imaginative modeling, story modeling, concurrent modeling, and live modeling. This study consisted of 22 sessions and the result showed the effectiveness of modeling techniques to improve the self-regulation skills of female pupils with learning disabilities.

Sezgin (2020) examined the direct and indirect relationships of children's self-regulation skills and their higher-order cognitive skills of cognitive flexibility and abstraction skills with their early academic competencies. The sample of the study consisted of 185 preschool children aged between 60 – 72 months attending educational institutions in the central province of Bursa, Turkey. Effortful control and behavior regulation were evaluated to determine the children's self-regulation skills, and the data were obtained were processed at the end of the second semester of the 2018-2019 academic year. The result of the study determined that the self-regulation skills of effortful control and behavior regulation predicted early academic skills and attitudes, and it found a statistically significant relationship of cognitive flexibility and

abstraction skills with early academic success scale scores.

III. Research Methodology

a) Population and Sample

The study population consisted of all students with learning disabilities in English language in schools within the Education Directorate in Irbid Governorate, and their number was (800) students, for the academic year 2020/2021. The study sample consisted of (400) students, who were chosen randomly, and they were distributed according to gender and school grade as shown in Table (1).

Table 1: Distribution of study sample according to gender and grade

Grade	Gender		Total
	Number	Percentage	
Second grade	65	65	130
Third grade	65	65	130
Fourth grade	60	60	120
Total	190	190	380

b) Research Instrument

Self-regulation scale

The researcher developed the Self-Regulation Scale by reviewing the literature and previous studies related to self-regulation, selecting statements from those standards, and reformulating them in line with the objectives of the current study and its new environment.

The validity of the instrument

The validity of the instrument was verified by presenting it in its initial form to a group of experienced and competent judges, to identify the indications of the apparent validity of the content of the instrument to suit the purposes of the study. The judges followed the following criteria: the appropriateness of the statement to the scale, the integrity of the wording of the statements, and the extent of clarity of meaning from a linguistic point of view. The proposed amendments agreed upon (80%) of the judges were taken into account.

To extract the construct validity indication of the instrument, the correlation coefficients were extracted for the statements of the instrument. The instrument was applied to an exploratory sample from outside the study sample consisting of (50) male and female students. The total score and the score on each statement and its correlation with the dimension to which it belongs were calculated. The correlation coefficients for the scores on the statements of the instrument as a whole ranged between (0.31-0.65), and with the dimension (0.32-0.63) as shown in the following table.

Table 2: Correlation coefficients between scores on the statements, the overall score, and the dimensions of the self-regulation scale

dimension	Statement No.	P-value with the dimension	P-value with the instrument	dimension	Statement No.	P-value with the dimension	P-value with the instrument	dimension	Statement No.	P-value with the dimension	P-value with the instrument
Setting and identifying goals	1	**.32***	**.31***		22	.38*	.51*		43	.38*	.45*
	2	.49*	.40*		23	.32*	.30*		44	.52*	.58*
	3	.49*	.41*		24	.40*	.40*		45	**.31***	.35*
	4	**.63***	**.65***		25	.36*	.38*		47	.54*	.46*
	5	.45*	.31*		26	.39*	.35*		47	.32*	.37*
	6	.54*	.44*		27	.36*	.40*		48	.35*	.39*
	7	.41*	.36*		28	.37*	.31*		49	.44*	.41*
	8	.36*	.33*		29	.35*	**.30***		50	.31*	.34*
	9	.34*	.35*		30	.36*	.34*		52	.42*	.48*

	Item			Dimension	Item			Dimension	Item		
	10	.35*	.37*		31	.39*	.35*		52	.48*	.40*
	11	**.31***	.33*		32	.31*	.38*		54	.41*	.42*
	12	.38*	**.30***		33	.51*	.37*		54	.58*	.59*
	13	.46*	.47*	Evaluation and self-control	34	.40*	.32*		55	.35*	.36*
	14	.42*	.46*		36	.49*	.51*		56	.46*	.51*
	15	.57*	.53*		36	.44*	.43*		57	.37*	.31*
Self-monitoring and observation	16	.46*	.35*		37	.35*	.36*	Self-response	58	.56*	.39*
	17	.56*	.43*		38	.37*	.36*		59	.47*	.36*
	18	.44*	.34*		39	.35*	.35*		60	.56*	.35*
	19	.38*	.38*		40	.37*	.36*		61	.61*	.54*
	20	.37*	.34*		41	.39*	.44*		62	.43*	.39*
	21	.42*	.46*		41	.48*	.44*		62	.52*	.46*

* Statistically significant at (0.05).

It should be noted that all correlation coefficients were of acceptable scores and statistically significant, and therefore none of these statements was omitted.

Table 3: Correlation coefficients between dimensions and the overall score

Dimension	Setting and identifying goals	Self-monitoring and observation	Evaluation and self-control	Self-response	Overall score
Setting and identifying goals	1				
Self-monitoring and observation	.353*	1			
Evaluation and self-control	.468*	.522*	1		
Self-response	.502*	.465*	.487*	1	
Overall score	.750*	.730*	.827*	.785*	1

* Statistically significant at (0.05).

c) Reliability of the instrument

The reliability of the self-regulation scale was verified by following two methods. The test-retest method by applying the instrument to an exploratory sample of 61 students from outside the study sample, and re-applying the scale to the same group two weeks after the first application. The Pearson correlation coefficient was calculated between the scores of the two applications. The overall stability coefficient was (0.88), which is a high and acceptable reliability coefficient for application, and Table (4) shows the stability coefficients for the scale fields and the total score.

The second method was the internal consistency method using the Cronbach alpha equation. The method was applied to the sample of secondary school students in Irbid city. The overall stability coefficient was (0.87), which is a high and acceptable reliability coefficient for the application.

Table 4: Reliability coefficients for the Self-regulation scale using test re-test and Cronbach's alpha

Dimension	Cronbach's alpha	test retest
Setting and identifying goals	0.88	0.88
Self-monitoring and observation	0.88	0.85
Evaluation and self-control	0.87	0.88
Self-response	0.89	0.88
Overall score	0.88	0.87

IV. Findings and Discussion

First: results of the first question

To answer this question, the mean scores and standard deviations of the level of self-regulation of students with learning disabilities in Irbid city were extracted as illustrated in the following table.

Table 5: The mean scores and standard deviations of the dimensions of the level of self-regulation of students with LDs arranged in descending order according to the mean scores

Rank	No.	dimension	Means score	Standard deviation	level
1	1	Setting and identifying goals	3.74	.410	High
2	4	Self-response	3.59	.503	Medium
3	3	Evaluation and self-control	3.39	.391	Medium
4	2	Self-monitoring and observation	3.18	.310	Medium
		Total	3.45	.307	Medium

Table (5) shows that the mean scores of the dimensions of self-regulation ranged between (3.18-3.74). Setting goals came in the first place with a mean score of (3.74) and a high level. The self-response came second with a mean score of (3.59) and a medium level. The evaluation and self-judgment dimension came third with a mean score of (3.39) and a medium level. The self-observation dimension came in the last place, with a mean score of (3.18) and a medium level. The total mean score of the level of self-regulation as a whole was (3.45) and with a medium level.

This result could be attributed to the inclusion of the skill of self-regulation into higher skills and the need for training and practice to master this skill. Since the official school curriculum is concerned with developing the cognitive aspects more than it is concerned with the development of personality, it is natural that these skills decrease among students. The results also could be due to the nature of the traditional school and family upbringing processes that are practiced on children, which hinder the high levels of self-regulation to high levels. The skill of self-regulation needs training on freedom and independence in expressing opinions, and assigning the students various tasks to enhance their self-confidence, and accustom them to organizing tasks and duties, face diverse situations, and enable them to assume responsibility and the ability to make decisions.

Second: results of the second question

To answer the second question, the mean scores and standard deviations of the level of self-regulation of students with LDs in Irbid city were extracted according to the variables of gender and school grade as shown in Table (6).

Table 6: The mean scores and standard deviations of the level of self-regulation of students with LDs according to gender and school grade

Dimension	Grade	Male			Female			Total		
		Mean score	St. Dev	No.	Mean score	St. Dev	No.	Mean score	St. Dev	No.
Setting and identifying goals	2nd grade	3.68	.325	64	3.65	.432	65	3.68	.381	129
	3rd gradr	3.90	.461	59	3.74	.349	63	3.81	.410	122
	4th grade	3.67	.408	61	3.73	.451	68	3.76	.429	129
	Total	3.79	.415	184	3.70	.412	196	3.75	.410	380
Self-monitoring and observation	2nd grade	3.16	.259	64	3.24	.235	65	3.15	.245	129
	3rd gradr	3.25	.355	59	3.13	.253	63	3.18	.306	122
	4th grade	3.33	.344	61	3.29	.395	68	3.21	.370	129
	Total	3.22	.321	184	3.16	.300	196	3.18	.310	380
Evaluation and self-control	2nd grade	3.36	.324	64	3.32	.325	65	3.33	.324	129
	3rd gradr	3.46	.348	59	3.25	.239	63	3.34	.311	122
	4th grade	3.58	.509	61	3.46	.476	68	3.52	.493	129
	Total	3.46	.408	184	3.34	.366	196	3.39	.391	380
Self-response	2nd	3.44	.331	64	3.44	.523	65	3.45	.444	129

	grade								
	3rd gradr	3.64	.512	59	3.63	.562	63	3.64	.534	122
	4th grade	3.85	.569	61	3.47	.374	68	3.70	.497	129
	Total	3.64	.534	184	3.54	.499	196	3.59	.504	380
Total	2nd grade	3.40	.213	64	3.36	.278	65	3.39	.254	129
	3rd gradr	3.55	.301	59	3.42	.269	63	3.47	.290	122
	4th grade	3.48	.366	61	3.57	.356	68	3.51	.359	129
	Total	3.52	.306	184	3.41	.303	196	3.45	.308	380

Table (6) shows an apparent variation in the mean scores and standard deviations of the level of self-regulation among elementary school students in Irbid city due to the different categories of the variables of gender and grade school. To demonstrate the significance of the statistical differences between the mean scores, the two-way ANOVA analysis of variance was used as shown in Table (7).

Table 7: The two-way ANOVA analysis of the effect of gender and grade on the dimensions of self-regulation among the sample of the study

Source of variance	Dimension	Sum of squares	Freedom value	Mean square	F value	Sig.
Gender	Setting and identifying goals	.768	1	.768	4.687	.032
	Self-monitoring and observation	.366	1	.366	3.824	.052
	Evaluation and self-control	1.513	1	1.513	10.574	.001
	Self-response	.792	1	.792	3.292	.070
Grade	Setting and identifying goals	1.591	2	.796	4.861	.008
	Self-monitoring and observation	.216	2	.108	1.129	.325
	Evaluation and self-control	2.769	2	1.386	9.684	.000
	Self-response	5.039	2	2.515	10.469	.000
Error	Setting and identifying goals	64.794	396	.164		
	Self-monitoring and observation	37.789	396	.095		
	Evaluation and self-control	56.622	396	.143		
	Self-response	95.106	396	.240		
Total	Setting and identifying goals	67.138	399			
	Self-monitoring and observation	38.375	399			
	Evaluation and self-control	60.975	399			
	Self-response	100.942	399			

Table (7) shows the presence of statistically significant differences due to the effect of gender in the dimensions of setting and identifying goals, evaluation, and self-judgment, and the differences came in favor of males, while no differences appeared in the rest of the dimensions. The table also shows the presence of statistically significant differences attributed to the effect of the school grade in all dimensions except for the dimension of self-monitoring and observation. To show the statistically significant differences between the mean scores, the Scheffe compression was used in as shown in Table (8).

Table 8: The Scheffe analysis for the effect of the school grade on self-regulation

Dimension	Grade	Mean score	2nd grade	3rd grade	4th grade
Setting and identifying goals	2nd grade	3.68			
	3rd grade	3.83	.15*		
	4th grade	3.76	.08	.07	
Self-monitoring and observation	2nd grade	3.34			
	3rd grade	3.35	.01		
	4th grade	3.52	.18*	.18*	
Self-response	2nd grade	3.45			
	3rd grade	3.64	.19*		
	4th grade	3.72	.26*	.07	
The total	2nd grade	3.39			
	3rd grade	3.48	.08		
	4th grade	3.53	.14*	.06	

* Statistically significant at (0.05).

It can be seen from Table (9) the existence of statistically significant differences due to the effect of the school grade between the third and second grades. The differences came in favor of the third grade in the dimension of setting and identifying goals. The table also shows the presence of statistically significant differences due to the effect of the school grade between the fourth grade on the one hand and each of the second and third grades on the other hand. The differences came in favor of the fourth grade in the dimension of evaluation and self-control. There were statistically significant differences between the second grade on the one hand and each of the third and fourth grades on the other hand, and the differences came in favor of both the second and the third in the self-response dimension. There were also statistically significant differences between the fourth grade and the second grade, and the differences came in favor of the fourth grade in the self-regulation scale in general.

These results could be attributed to the fact that the Jordanian society is dominated by many social and cultural customs and traditions that pay great attention to males, depend on them in all areas of life and hold them responsible for many things, which would make males more experienced in various areas of life. Males in society seem to face different problems and situations and are more able to define their goals, follow them, evaluate them, and respond to all developments that happen in an orderly and positive manner. On the other hand, females are less open to experiences due to the nature of society.

V. Recommendations

Based on these results, the study recommends paying attention to setting up various programs to develop the skills of self-regulation among students by educational officials. The study also recommends counselors and teachers take more interest in educational activities that develop self-regulation skills for students with learning disabilities.

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Functional Groups Detection: Do Chemistry Teachers Demonstrate Conceptual Difficulties in Teaching?

By Benjamin Anim-Eduful & Kenneth Adu-Gyamfi

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Abstract- The chemistry chief examiner of the West African Examination Council has complaint a lot about the weak performance of students on organic chemistry, including functional group detection. The study, therefore, investigated whether senior high school teachers who teach chemical concepts to students also demonstrated conceptual difficulties on functional group detection under organic qualitative analysis. The study adopted convergent mixed methods procedures to collect both quantitative and qualitative data from 47 chemistry teachers. The 47 teachers were sampled through multistage sampling procedures to respond to the Organic Qualitative Analysis Diagnostic Test for Teachers. The quantitative data was analyzed using means, standard deviations, and percentages to reflect no scientific understanding, partial scientific understanding, and scientific understanding of functional group detection. The qualitative data was open-coded and constantly compared to established teachers' alternative conceptions and factual difficulties on functional group detection.

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Benjamin Anim-Eduful [α] & Kenneth Adu-Gyamfi [σ]

Abstract The chemistry chief examiner of the West African Examination Council has complaint a lot about the weak performance of students on organic chemistry, including functional group detection. The study, therefore, investigated whether senior high school teachers who teach chemical concepts to students also demonstrated conceptual difficulties on functional group detection under organic qualitative analysis. The study adopted convergent mixed methods procedures to collect both quantitative and qualitative data from 47 chemistry teachers. The 47 teachers were sampled through multistage sampling procedures to respond to the Organic Qualitative Analysis Diagnostic Test for Teachers. The quantitative data was analyzed using means, standard deviations, and percentages to reflect no scientific understanding, partial scientific understanding, and scientific understanding of functional group detection. The qualitative data was open-coded and constantly compared to established teachers' alternative conceptions and factual difficulties on functional group detection. Teachers demonstrated conceptual difficulties in the form of alternative conceptions and factual difficulties. It is, therefore, recommended that chemistry educators and researchers should design and develop instructional strategies that challenge alternative conceptions among teachers.

Keywords: alternative conceptions; factual difficulties; functional groups; teachers.

I. Introduction

Analysis of chemical compounds is one of the areas under chemistry that is classified into two categories. The two categories are quantitative analysis and qualitative analysis. The quantitative analysis finds the amounts of each atom of element or group present in a given solution whereas, the qualitative analysis finds the type of each atom of element or group present in a given sample of solution (Matthews, 2011). The qualitative analysis deals with the detections and identification of elements or group of atoms of elements present in a given solution. This qualitative analysis is also classified into two categories: an inorganic qualitative and organic qualitative analysis. The inorganic qualitative analysis is used to detect the presence of inorganic ions (anions and cations), and gases or compounds in an unknown sample, whereas organic qualitative analysis is used to establish the

presence or absence of particular functional groups as specified in the Ministry of Education [MOE] (2010) curriculum. According to Cooley and Williams (1999), qualitative analysis is of relevance and importance to learning chemistry as it improves students' chemistry concepts understanding. The qualitative analysis increases the conceptual understanding of chemical principles and the interactions of matter and its application in our daily lives. The qualitative analysis concepts are difficult for students to learn as their understanding requires process skills and an understanding of many chemistry concepts (Goh, Toh, & Chia, 1987).

Organic chemistry is part of senior high school chemistry as its concepts are applied in our everyday lives (Yong, 1994). From the food we consume, dyes applied in our hair color, a medication used to treat sickness, and our everyday lives are rooted in core organic chemical processes (Rice, 2016). These applications of organic chemistry in our daily lives and the need for scientific progress necessitate constant attention to education in the field. Organic compounds have unique groups called functional groups. "Functional groups are individual atoms or groupings of atoms that are attached to the carbon chains or rings of organic molecules and give the molecules their characteristic properties" (Petrucci, Herring, Madura, & Bissonnette, 2017, pp. 96.97). Functional group detection is a key in learning organic chemistry and that of organic qualitative analysis. Functional groups in organic chemistry at the senior high school level are hydrocarbons (alkanes, alkenes, alkynes, and benzene), alcohols ($-OH$); aldehydes ($-CHO$); ketones ($-C=O$); carboxylic acids ($-COOH$); esters ($-COO-$); and amides ($-CONH_2$) (MOE, 2010). Functional group categorization is a common feature used by both higher and lower ability students for classifying organic compounds (Domin, Al-Masum, & Mensah, 2008; Hassan, Hill, & Reid, 2004). However, the categorization of organic compounds using functional groups is a difficulty for students. A study by Strickland, Kraft, and Bhattacharyya (2010) pointed out that many organic chemistry students could not explain vividly functional groups. To the students, all organic compounds appear to be very similar, as a molecule composed of carbon, hydrogen, and oxygen.

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According to O'Dwyer and Childs (2017), research studies comparing teachers' and learners' perspectives of organic chemistry are rare. Teachers often struggle to make students aware of these due to their complexities. This, perhaps, a contributing factor for many of studies, which identify students' and teachers' perception of organic chemistry as one of the most difficult areas of chemistry (Childs & Sheehan, 2009; Greenbowe & Schroeder, 2008). Chemistry concepts are related to the structure of matter, which is difficult for many students because chemistry curricula commonly incorporate many abstract concepts, which are central to further learning in both chemistry and other sciences (Taber, 2002). These abstract concepts are relevant because chemistry concepts or theories cannot be understood without these concepts insufficiently grasped by students (Coll & Treagust, 2001). This abstract nature of chemistry, along and other content learning difficulties, means that chemistry contents require a high-level skill set (Taber, 2002).

Schwartz (1993) stated that, an aspect of acquiring new knowledge is comprehending the relationships between various related concepts. Likewise, Deci, Vallerand, Pelletier, and Ryan (1991) reported that learning is a combination of conceptual understanding and flexible use of knowledge. In this sense, modern teaching approaches indicate that permanent learning of chemistry concepts depends on the conceptual understanding of the teacher and the learner (Simsek, 2009). This implies that when concepts are used accurately and conveniently to establish relationships, these concepts are properly learned, the effective acquisition of knowledge is achieved. The problems that emerge when a relationship is not established between the concepts cause not only a failure in learning but also lead to alternative conceptions (Nakhleh, 1992).

Conceptual understanding is generally learning with understanding (Driver, Asoko, Leach, Scott, & Mortimer, 1994). It is often contrasted with declarative knowledge learning, where the learner simply memorizes a relationship between things, events, or processes (Darmofal, Soderholm, & Brodeur, 2002). To many, conceptual understanding entails just more than rote memorization of relationships; but requires the ability to apply previous learning across some kind of previously unexpected experiences (Smith & Ragan, 1999). Unless prior knowledge is properly associated with new knowledge, learners may fail to correctly grasp new concepts, and this impedes meaningful learning (Bodner, 1986).

An awareness of the fact that alternative conceptions prevent meaningful learning has paved the way for studies that determine students' levels of conceptual understanding in science concepts including, those of chemistry (Adu-Gyamfi & Ampiah, 2019; Adu-Gyamfi, Ampiah, & Agyei, 2015). Conceptual understanding can promote students' learning and thus, has become an area of interest for educational research. Gaining insights into students' existing conceptions might help educators design effective teaching approaches targeting conceptual understanding. Determination of teachers and students' conceptual level in functional groups detection might also help educators in selecting the more effective teaching strategy that promotes conceptual understanding (Özkaya, Üce, Saricayir, & Sahin, 2006).

Conceptual understanding is an important goal in learning in general but is particularly relevant in science education because such understanding is required to make sense of scientific phenomena. To understand means being able to construct meaningful knowledge, interpret and explain (Anderson, Krathwohl, & Bloom, 2001). Students taught to develop a conceptual understanding will be more proficient at problem-solving, abstract reasoning, applying their knowledge to new situations, and more likely to connect to related information (Ormrod, 1999).

Sadler, Sonnert, Coyle, Cook-Smith, and Miller (2013) found that teachers' conceptual understanding of science concepts, to extent, influences students' conceptual understanding of the concept taught. Hence, teachers' content knowledge greatly improves students' understanding of science concepts and reduces alternative conceptions among students. Studies that rigorously investigate the relationship between teachers' knowledge and their students' gains in understanding of science concepts are rare (Baumert et al., 2010). Teachers' content knowledge potentially affects their choice of instructional practice and their students' achievement gains (Hill, Rowan, & Ball, 2005). It is found that science teachers with strong content knowledge can better communicate scientific concepts and ideas and are skillfully able to engage students in the content (Ball, Thames, & Phelps, 2008). Teachers with inadequate content knowledge mostly misrepresent the content to their students, resulting in students developing alternative conceptions (Ball et al., 2008).

In Ghana, the WAEC Chemistry Chief Examiner's reports have repeatedly identified weakness of most students in functional group detection under organic chemistry both in practical or theory examination (WAEC, 2001; 2003; 2004; 2005; 2007; 2012; 2014; 2016; 2017; 2018). These reports suggest that SHS chemistry students have challenges with the conceptual understanding of functional group detection. However, the reports were not clear about the nature of the challenge and whether there was a problem with the teaching and learning. It was, therefore, necessary to investigate whether chemistry teachers teaching functional groups through qualitative analysis in Ghanaian senior high schools had conceptual difficulties on the concept and hence, their inability to

help their students develop the scientific conception of functional groups.

Johnston (2005) opined that what is simple to the chemistry teacher may not be so for the learner. Teachers with a better understanding of their learners' cognition should be better able to adapt their lessons to facilitate a more holistic understanding of the content (Azuka, Durujaiye. Okwuoza, & Jekayinka, 2013; Ogembol, Otunga, & Yaki, 2015; Unanma, Abugu, Dike, & Umeobika, 2013). The teaching and learning process of science depends on the nature and structure of the discipline. Ferguson & Bodner (2008) asserted that teachers should understand the nature of their content and that teachers' understanding of that will influence the way they teach, and consequently the way their learners learn the content (Childs & Sheehan, 2009; Simsek, 2009, Tatli & Ayas, 2013). Hence, the nature of the content also influences the way the subject is taught and learned. Innovative learning strategies, therefore could be used by teachers at all levels of chemistry education to enhance students' learning of chemistry (Eybe & Schmidt, 2004). Teachers' deep and strong content knowledge is a necessary tool in a constructivist classroom (Adu-Gyamfi, Ampiah & Appiah, 2018; Aregawi & Meressa, 2017; Grayson, Anderson, & Crossley, 2001; Özkaya, Üce, Saricayir, & Sahin, 2006). This is because those teachers could provide students with opportunities to develop a deep understanding of concepts, internalize the concepts, and develop complex cognitive structures for connections to other bodies of knowledge. Taber (2011) reiterated that a good number of students make meaning of concepts in more or less similar ways as they are taught by their teachers. Hence, to investigate what is being learned, it is equally important to know the teacher's knowledge of a specific content; and the need for this current research.

Jurišević, Glažar, Pučko, and Devetak (2008) found that teachers undergoing training in the colleges and universities have conceptual difficulties with regards to learning of chemistry, and this greatly influences their future teaching. Chemistry teachers' difficulties in chemistry concepts are potentially transferable to their students, which mostly results in learners' misconceptions about chemistry (Chavan, 2017). Therefore, chemistry teachers should be well equipped with the subject matter to help teach students true conception and avoid misconceptions (Arokoyo & Amadi, 2018; Delmang & Gongden, 2016) on functional groups.

II. Research Design

The convergent mixed methods design procedures (Creswell & Plano Clark, 2018) were adopted to investigating whether teachers demonstrate conceptual difficulties in teaching organic functional group detection to their SHS students. A diagnostic test was used through a cross-sectional survey to collect both quantitative and qualitative data on teacher conceptual difficulties on functional group detection. From the diagnostic test, the performance of teachers was analyzed using means, standard deviations, and percentages. This helped to determine whether teachers demonstrated full scientific understanding, partial scientific understanding, or no scientific understanding. After that we thematically analyzed the qualitative data to investigate whether teachers had conceptual difficulties when they demonstrated any partial scientific understanding of functional group detection. The quantitative and qualitative aspects were merged through discussion to investigate whether chemistry teachers had conceptual difficulties on functional groups detection they teach students.

III. Sampling Procedure

The research was carried out in the Central Region of the Republic of Ghana. Central Region was selected by the researchers for the study due to the school types, proximity, and researchers' familiarity within the area. There were 68 senior high schools in this region during the 2019/2020 academic year when the research was carried out. The 68 schools were stratified into six Class A schools, 18 Class B schools, and 32 Class C schools. Of the 68 schools, 55 offered students chemistry as one of their elective subjects. From the 55 schools, 18 were selected through the simple random procedures for Classes B and C schools and the purposive procedures for the Class A schools. That is, six schools each from the three classes of the school. However, during the period of the data collection, only 12 schools were available due to COVID-19 related issues and protocols. It was estimated that there were nine teachers teaching chemistry in the 12 schools giving an accessible population of 108 teachers. All chemistry teachers who had once taught organic chemistry and were willing and ready to respond to the diagnostic test were purposively selected for the research. The purposive selection of the teachers was because their experiences immensely contributed to the research. In all, 47 teachers were involved from the 12 schools.

IV. Data Collection Instrument

The diagnostic test, Organic Qualitative Analysis Diagnostic Test for Teachers (OQADTT), was in two sections. Section A sought for biodata of teachers: age, sex, class of the school, and teaching experience. Section B was made of nine two-tier four-option multiple-choice test items. Teachers were required to correctly respond to each item by selecting one of the four options with a reason. The reason provided for selecting a particular option helped to explore the

conceptual understanding of teachers. The other two tests items were not multiple-choice but essay-type. The essay-type items involved the detection and analysis of functional groups with organic reagents. Here, teachers' conceptual understanding and difficulty in conceptualizing functional groups were explored. That is, their ability to:

1. Identify some functional groups like alkenes, alkynes, alkanols, benzene, alkanoic acids, and alkyl alkanoates.
2. Write observation that will be envisaged when known oxidizing and reducing agents reacts with certain organic compounds.

Test items on OQADTT were constructed by the researchers. In designing the test, the researchers compared the items to standardized questions on functional group detections and organic reactions in chemistry textbooks and questions set by the WAEC for the West African Secondary School Certificate Examinations. The purpose of the comparison was to ensure the content validity of OQADTT. To also ensure face validity of the instrument, OQADTT was shown to two colleague chemistry teachers of author1 and a colleague science educator of author2 for expert advice and critique on the content. The face validity helped improve the quality of OQADTT items before they were pilot-tested with ten teachers from senior high schools in the Sekondi-Takoradi Metropolis of the Western Region. The pilot-testing of OQADTT helped determine the difficulty and discrimination indices of the test items, which in turn helped improve the internal consistency of the instrument. Item 20 was modified into an alkanol undergoing a complete oxidation reaction to form alkenone. Items 5,7, 8, 9, 13, 17, and 18 were deleted as they had similarities with the measurement of benzene, alkanols, amides, alkanoic acids, combustion reactions of hydrocarbons, alkenes, and aldehydes, respectively on the essay-type items. The calculated Kuder-Richardson (KR) 21 coefficient of reliability was 0.74 after we deleted the seven items.

V. Data Collection Procedure

The research instrument (OQADTT) was administered by the researchers. During the administration of OQADTT, a brief discussion on the purpose of the research was held between the researchers and teachers. The briefing helped the research a lot as teachers appreciated the need to participate. After the briefing sessions, researchers found out if chemistry teachers have covered enough on organic chemistry in each school and that if they have been teaching organic chemistry in the last five years. The selected schools and teachers who had not covered enough were exempted from the research. Other schools were made to replace those selected but

exempted schools. In all, it took four weeks to administer OQADTT.

VI. Data Processing and Analysis

Each specific concept on OQADTT scores two marks, and this gave a total of 18 scores for the nine items. The two essay-type items had 13 specific concepts that gave a total of 26 scores. The total score from OQADTT was expected to be 44. The structure of the level of understanding informing the scores was adapted from previous research in the area of conceptual understanding (Ültay & Çalik, 2016) and modified to suit this research. The three levels of conceptual understanding were;

1. A full scientific understanding was the first level that went with correct content and reason responses; being two scores,
2. A partial scientific understanding was the second level that went with correct responses for either content or reason but not both; being one score, and
3. A no scientific understanding was the third level with incorrect responses for both content and reason; being zero score.

We used means, standard deviations, and percentages to analyze the data. A mean between 0.0 to 0.49 was considered a no scientific understanding, between 0.50 and 1.49 as a partial scientific understanding, and between 1.50 and 2.0 as a full scientific understanding. For the qualitative aspect, the explanations given by the selected teachers for any content response were open-coded and constantly compared. We then made meanings of them to develop themes to present any conceptual difficulties teachers had on organic functional group detection.

VII. Results

To provide the answers on whether chemistry teachers teaching functional groups through qualitative analysis do demonstrate conceptual difficulties, we first investigated their levels of conceptual understanding. This was important as we needed to appreciate whether teachers demonstrated partial scientific understanding of functional group detection and to be able to investigate their conceptual difficulties. The results are presented in Table 1. In general, teachers demonstrated partial scientific understanding on functional group detection. This is because the mean scientific understanding of teachers on all items was 1.00 (SD = 0.894).

Table 1: Levels of Teachers' Conceptual Understanding on Functional Groups Detection (N= 47)

Item	No Scientific Understanding		Partial Scientific Understanding		Full Scientific Understanding		M	SD
	n	%	n	%	n	%		
hydrocarbons								
6	12	25.5	10	21.3	25	53.2	1.28	0.852
5	6	12.8	13	27.7	28	59.6	1.47	0.718
10	5	10.6	17	36.2	25	53.2	1.43	0.683
12	23	48.9	15	31.9	9	19.1	0.70	0.778
α14B	22	46.8	0	0	25	53.2	0.89	1.005
β14B	25	53.2	0	0	22	46.8	0.94	1.009
15β	23	48.9	0	0	24	51.1	1.02	1.011
18	22	44.7	19	40.4	6	12.8	0.66	0.700
8	5	10.6	17	36.2	25	53.2	1.43	0.683
21	21	44.7	7	14.9	19	40.4	0.96	0.932
alkanols								
9	15	31.9	18	38.3	14	29.8	0.98	0.794
α14D	23	48.9	0	0	24	51.1	1.02	1.011
β14D	26	55.3	0	0	21	44.7	0.89	1.005
15α	18	38.3	0	0	29	61.7	1.23	0.983
16	24	51.1	17	36.2	6	12.8	0.62	0.709
20	27	57.4	0	0	20	42.6	0.85	1.000
alkanoic acid								
11	7	14.9	19	40.4	21	44.7	1.30	0.720
13	17	36.2	13	27.7	17	36.2	1.00	0.860
α14A	22	46.8	0	0	25	53.2	1.06	1.009
α14E	24	51.1	0	0	23	48.9	0.98	1.011
β14A	23	48.9	0	0	24	51.1	1.02	1.011
β14E	27	57.4	0	0	20	42.6	0.85	1.011
19	24	51.1	0	0	23	48.9	0.98	1.011
alkylalkanoates								
7	6	12.8	13	27.7	28	59.6	1.47	0.718
α14C	26	55.3	0	0	21	44.7	0.94	1.009
β14C	30	63.8	0	0	17	36.2	0.72	0.971
15γ	23	48.9	0	0	24	51.1	1.02	1.011
amides								
17	22	46.8	11	23.4	14	29.8	0.83	0.868
alkanals and alkanones	34	72.3	2	4.3		23.4		
22					11		0.51	0.856

For instance, to ascertain that propane readily dissolves in tetrachloromethane, Item 6 was used. The results from Table 1 show that 21.3% of the teachers at a mean of 1.28 (SD=0.852) demonstrated a partial scientific understanding of the concept. This indicates that 25.5% teachers had no scientific understanding, and 53.2% had a full understanding of the concept. Hence, teachers have a partial scientific understanding that propane readily dissolves in tetrachloromethane. To ascertain that alkenes and alkynes are organic compounds that usually undergo addition reactions, Item 5 was used. The results show that 27.7% of the teachers at a mean of 1.47 (SD=0.718) demonstrated a partial scientific understanding of the concept. This indicates that 12.8% teachers had no understanding and 59.6% had a full scientific understanding of the

concept. Hence, teachers have a partial scientific understanding that alkenes and alkynes are organic compounds that usually undergo addition reactions. On Item 10, the results show that 36.2% of the teachers at a mean of 1.43 (SD=0.683) demonstrated a partial scientific understanding on the fact that ethene decolorizes both Br_2/CCl_4 and acidified $KMnO_4$. This indicate that 53.2% of the teachers fully understood and 10.6% had no understanding on the concept. Hence, teachers have a partial scientific understanding that ethene is an organic compound that decolorizes both Br_2/CCl_4 and acidified $KMnO_4$. On Item 12, the results show that 31.9% of the teachers at a mean of 0.70 (SD=0.778) demonstrated a partial scientific understanding that propene gives a brown color solution with alkaline potassium tetraoxomanganate(VII). This indicates that 48.9% teachers had no understanding and 19.1% had a full scientific understanding of the concept. Hence, teachers have a partial scientific understanding that propene gives brown colour solution with alkaline potassium tetraoxomanganate (VII).

On Item α14B that investigated conceptual understanding of the formation of propene from the dehydration of propanol using concentrated tetraoxosulphate(VI) acid, none of the teachers at a mean of 0.89(SD=1.005) demonstrated a partial scientific understanding, and 46.8% had no scientific understanding, and 53.2% demonstrated a full scientific understanding. Hence, teachers have no partial scientific understanding but a full understanding that propene is formed when propanol is dehydrated in the presence of concentrated tetraoxosulphate(VI) acid and heat. To ascertain that an alkene functional group is present in propene, Item β14B was used. The results show that none of the teachers at a mean of 0.94 (SD=1.009) demonstrated a partial scientific understanding. This indicates that 46.8% teachers fully understood and 53.2% teachers did not understand the concept. Hence, teachers have no partial scientific understanding but a full scientific understanding that an alkene functional group is present in propene. On Item 15β that investigated dehydration as a type of chemical reaction involved in the conversion of propanol to propene, the results show none of the teachers at a mean of 1.02 (SD=1.011) demonstrated a partial scientific understanding, but 51.1% fully understood. and 48.9% demonstrated no scientific understanding of the concept. Hence, teachers demonstrate no partial understanding but a full understanding that dehydration is the type of chemical reaction involved in the conversion of propanol to propene.

To ascertain that 2-butyne is unsaturated and will decolorizes bromine solution, Item 18 was used. The results show that 40.4% of the teachers at a mean of 0.66 (SD=0.700) demonstrated a partial scientific understanding of the concept. This indicates that 46.7% of teachers had no scientific understanding and 12.8%

of teachers had full scientific understanding of the concept. Hence, teachers have a partial scientific understanding that 2-butyne is unsaturated and can decolorize bromine solution. On Item 8, the results show that 36.2% of the teachers at a mean of 1.43 (SD=0.683) demonstrated a partial scientific understanding that complete hydrogenation of benzene gives cyclohexane. This indicates that 10.6% of teachers had no scientific understanding and 53.2% of teachers had full scientific understanding of the concept. Hence, teachers have a partial scientific understanding that complete hydrogenation of benzene gives cyclohexane. On Item 21, the results show that 14.9% of the teachers at a mean of 0.96 (SD=0.932) demonstrated a partial scientific understanding that either bromine solution or acidified $KMnO_4$ is used to distinguish between benzene and ethene. This indicates that 44.7% of teachers had no scientific understanding and 40.4% of teachers fully understood the concept. Hence, teachers have a partial scientific understanding that either bromine solution or acidified $KMnO_4$ is used to distinguish between benzene and ethane.

In the area of detection of a functional group of alkanols, the results on Item 9 show that 38.3% of the teachers at a mean of 0.98 (SD=0.794) demonstrated a partial scientific understanding that secondary alkanol undergoes a complete oxidation reaction to produce an alkenone. This indicate that 29.8% of teachers fully understood and 31.9% of teachers had no scientific understanding of the concept. Hence, teachers have a partial scientific understanding that secondary alkanol undergoes a complete oxidation reaction to produce an alkenone. To ascertain that ethanol and propanoic acid are produced when ethyl propanoate undergoes acid hydrolysis, Item α14D was used. The results show that none of the teachers at a mean of 1.02 (SD=1.011) demonstrated a partial scientific understanding. This indicates that 48.9% teachers had no scientific understanding and 51.1% of teachers had full understanding of the concept. Hence, teachers have no partial scientific understanding, but a full scientific understanding that ethanol and propanoic acid are produced when ethyl propanoate undergoes acid hydrolysis. On Item β14D, the results show that none of the teachers at a mean of 0.89 (SD=1.005) demonstrated a partial scientific understanding of the fact that alkanol and alkanoic acid functional groups are present when ethyl propanoate undergoes acid hydrolysis. This indicates that 44.7% of teachers fully understood, and 55.3% of teachers had no scientific understanding of the concept. Hence, teachers have no partial scientific understanding, but a full scientific understanding that alkanol and alkanoic acid functional groups are present when ethyl propanoate undergoes acid hydrolysis. To ascertain that that oxidation is the type of chemical reaction involved in the conversion of propanol to propanoic acid, Item 15α was used. The

results show that none of the teachers at a mean of 1.23 (SD=0.983) demonstrated partial scientific understanding of the concept. This indicates that most (61.7%) teachers had full scientific understanding, and 38.3% of teachers had no understanding of the concept. Hence, teachers demonstrate no partial scientific understanding but a full scientific understanding that oxidation reaction occurs in the conversion of propanol to propanoic acid. On Item 16, the results show that 36.2% of the teachers at a mean of 0.62 (SD=0.709) demonstrated partial scientific understanding of the fact that an alkanol reacts with yellow-colored potassium heptaoxodichromate (VI) solution and changes it to green. This indicates that 12.8% of teachers fully understood, and 51.1% of teachers demonstrated no understanding of the concept. Hence, teachers have a partial scientific understanding that an alkanol reacts with yellow-colored potassium heptaoxodichromate (VI) solution and changes it to green. On Item 20, the results show that none of the teachers at a mean of 0.85 (SD=1.000) demonstrated a partial scientific understanding of the concept. This indicates that 57.4% of teachers demonstrated no scientific understanding, and 42.6% of teachers had full understanding on the concept. Hence, teachers demonstrate no partial scientific understanding but a full scientific understanding that yellow precipitate is formed when an alkanol is treated with a hot solution of iodine in sodium hydroxide.

In the area of detection of a functional group of alkanoic acids, Item 11 was used to investigate whether hydrogen gas is liberated when alkanoic acid reacts with sodium metal. The results from Table 1 show that 40.4% of the teachers at a mean of 1.30 (SD=0.720) demonstrated a partial scientific understanding on the concept. This indicates that 14.9% of teachers demonstrated no scientific understanding, and 44.7% of teachers demonstrated a full scientific understanding of the concept. Hence, teachers demonstrate a partial scientific understanding that hydrogen gas is liberated when alkanoic acid reacts with sodium metal. On Item 13, the results show that 27.7% of the teachers at a mean of 1.00 (SD=0.860) demonstrated a partial scientific understanding of a complete oxidation of propanol to propanoic acid. This indicates that 36.2% of teachers demonstrated no scientific understanding, and 36.2% of teachers fully understood the concept. Hence, teachers have a partial scientific understanding that a complete oxidation of propanol in the presence of oxidizing agents such as potassium heptaoxodichromate (IV) and heat produces propanoic acid. To ascertain whether teachers understand that propanoic acid is produced when propanol undergoes oxidation reaction in the presence of acidified potassium dichromate (VI), Item α14A was used. The results show that none of the teachers at a mean of 1.06 (SD=1.009) demonstrated a partial scientific understanding of the

concept, 46.8% of teachers demonstrated no scientific understanding, and 53.2% of teachers had a full scientific understanding of the concept. Hence, teachers have no partial scientific understanding, but a full understanding that propanoic acid is produced when propanol undergoes oxidation reaction in the presence of acidified potassium dichromate(VI). On Item α14E, the results show that none of the teachers at a mean of 0.98 (SD=1.011) demonstrated a partial scientific understanding, 51.1% of teachers, no scientific understanding, and 48.9% of teachers fully understood the concept. Hence, teachers have no partial scientific understanding, but a full scientific understanding that both ethanol and propanoic acid are produced when ethyl propanoate undergoes acid hydrolysis. On Item β14A, the results show that none of the teachers at a mean of 1.02 (SD=1.011) demonstrated a partial scientific understanding on the fact that an alkanoic acid functional group is present when propanol undergoes oxidation reaction in the presence of acidified potassium dichromate(VI), 48.9% of teachers demonstrate no scientific understanding, and 51.1% of teachers had a full understanding of the concept. Hence, teachers have no partial scientific understanding, but a full scientific understanding that an alkanoic acid functional group is present when propanol undergoes oxidation reaction in the presence of acidified potassium dichromate(VI). On Item β14E, the results show that none of the teachers at a mean of 0.85 (SD=1.011) demonstrated a partial scientific understanding of the fact that both alkanol and alkanoic acid functional groups are present when ethyl propanoate undergoes acid hydrolysis. This indicates that 57.4 % of teachers demonstrated no scientific understanding, and 42.6% of teachers fully understood the concept. Hence, teachers have no partial scientific understanding, but a full understanding that both alkanol and alkanoic acid functional groups are present when ethyl propanoate undergoes acid hydrolysis. On Item 19, the results show that none of the teachers at a mean of 0.98 (SD=1.011) demonstrated a partial scientific understanding of the fact that carbon(IV) dioxide is evolved when propanoic acid reacts with sodium hydrogentrioxocarbonate(IV), 51.1% of teachers demonstrated no scientific understanding, and 48.9% of teachers fully understood the concept. Hence, teachers have no partial scientific understanding, but a full understanding that carbon (IV) dioxide is evolved when propanoic acid reacts with sodium hydrogentrioxocarbonate(IV).

In the area of detection of a functional group of alkyl alkanoates, Item 7 investigated whether teachers scientifically understand that ethyl methanoate is an ester and sweet-scented. The results show that 27.7% of the teachers at a mean of 1.47 (SD=0.718) demonstrated a partial understanding of the concept, 12.8% of teachers have no scientific understanding, and 59.6% of teacher fully understood the concept. Hence,

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teachers demonstrate partial scientific understanding that ethyl methanoate is an ester, and hence, is sweet-scented. On Item α14C, the results from Table 1 show that none of the teachers at a mean of 0.94 (SD=1.009) demonstrated a partial scientific understanding, 55.3% of teachers demonstrated no understanding, and 44.7% of teachers fully understood that ethyl propanoate is produced when propanoic acid reacts with ethanol. Hence, teachers have no partial understanding, but a full scientific understanding that ethyl propanoate is produced when propanoic acid reacts with ethanol. On Item β14C, the results show that none of the teachers at a mean of 0.72 (SD=0.971) demonstrated a partial scientific understanding of the fact that an alkyl alkanoate functional group is present in a product formed from chemical reaction between propanoic acid and ethanol. This indicates that 63.8% of teachers demonstrated no scientific understanding, and 36.2% of teachers fully understood the concept. Hence, teachers have no a partial understanding, but a full understanding that an alkyl alkanoate functional group is present in a product formed from chemical reaction between propanoic acid and ethanol. On Item 15γ, the results show that none of the teachers at a mean of 1.02 (SD=1.011) demonstrated a partial scientific understanding of the fact that the conversion of propanol to ethyl propanoate is an esterification. This indicates that 48.9% of teacher demonstrated no scientific understanding, and 51.1% of teachers fully understood the concept. Hence, teachers have no partial understanding, but a full scientific understanding that the type of chemical reaction involved in converting propanol to ethyl propanoate is an esterification.

In the area of an amide functional group detection, Item 17 was used. The results show that 23.4% of the teachers at a mean of 0.83 (SD=0.868) demonstrated a partial scientific understanding of the concept. This indicates that 46.8% of teachers demonstrated no scientific understanding, and 29.8% of teachers had a full understanding of the concept. Hence, teachers have a partial scientific understanding that ammonia gas is evolved when an amide is warmed with dilute sodium hydroxide solution.

In the area of the carbonyl groups, Item 22 was used to investigate whether teachers have an understanding that the ammoniacal silver nitrate or Fehling's solution is used to distinguish between alkanals and alkenones. The results from Table 1 show that only 4.3% of the teachers at a mean of 0.51 (SD=0.856) demonstrated partial understanding of the concept. This indicates that 72.3% of teachers demonstrated no scientific understanding, and 23.4% of teachers had fully understood the concept. Hence, teachers have a partial understanding that either the ammoniacal silver nitrate or Fehlings solutions can be used to distinguish between alkanals and alkenones.

To further investigate the conceptual difficulties teachers may have on teaching organic functional group detection to students, the explanation aspects of the teachers who demonstrated partial scientific understanding were examined. This was important as it helps identify any alternative conceptions and other factual difficulties teachers had on functional group detection. For instance, Item 5 was less difficult for teachers with an index of 0.87. Of the 47 teachers, none of them demonstrated any alternative conceptions, but 27.66% of teachers' explanations were in the category of factual difficulties relating to alkenes and alkynes undergoing an addition reaction. The evidence of factual difficulties in a teacher's explanations is:

Factual difficulties: teachers explained that hydrocarbons undergo an addition reaction. An excerpt is:

> *alkenes and alkynes are hydrocarbons hence undergo addition reactions* (Teacher, 23).

Also, Item 6 was less difficult for teachers with an index of 0.74. Of the 47 teachers, an equal proportion (14.93%) of teachers' explanations were alternative conceptions and factual difficulties relating to propane readily dissolves in tetrachloromethane, but not alkene and alkyne molecules. The evidence of alternative conceptions and factual difficulties is:

Alternative conceptions: alkenes and alkynes are polar compounds and thus, decolorize polar tetrachloromethane. An excerpt is:

> *alkenes and alkynes are polar compounds thus decolorize polar tetrachloromethane"* (Teacher, 6).

> *Both alkenes and alkynes are polar … the reason why they can decolorize tetrachloromethane* (Teacher, 17).

Factual difficulties: alkenes and alkynes usually undergo an addition reaction because the pi bonds in the carbon-carbon multiple bonds are very strong to break by tetrachloromethane solution. An excerpt is:

> *alkenes and alkynes undergo an addition reaction because pi bonds in the carbon-carbon double and triple bonds are strong hence unreactive to polar tetrachloromethane* (Teacher, 42).

Item 8 was less difficult for teachers with an index of 0.87. Of the 47 teachers, an equal proportion (25.37%) of teachers' explanations were categorized into alternative conceptions and conceptual difficulties. The evidence of alternative conceptions and factual difficulties is:

Alternative conceptions: hydrogenation of benzene produces cycloalkane compounds. An excerpt is:

> *benzene hydrogenate to produce cyclohexane because benzene is a cyclic compound with double bonds between each other carbon atoms* (Teacher, 31).

… when hydrogen is added to benzene, the double bonds break and cyclohexane is formed (Teacher, 10).

Factual difficulties: Some teachers simply mentioned that benzene hydrogenates to form hexane with no scientific explanation. An excerpt is:

complete hydrogenation of benzene produces hexane (Teacher, 24).

Benzene is hydrogenated to form hexane (Teacher, 33).

Item 10 was less difficult for teachers with an index of 0.89. Of the 47 teachers, an equal proportion (36.17%) of teachers' explanations were alternative conceptions and factual difficulties, respectively, relating to ethene decolorizes both Br_2/CCl_4 and acidified $KMnO_4$. The evidence of alternative conceptions and factual difficulties is:

Alternative conceptions: (i) ethane is saturated and hence, decolorizes Br_2/CCl_4 and acidified $KMnO_4$. Excerpts are:

Ethane is an alkane, and being saturated molecule changes (Br_2/CCl_4) and acidified ($KMnO_4$) solutions white ppt (Teacher, 25).

Ethane is saturated and all saturated organic compounds change the color of acidified $KMnO_4$ (Teacher, 6).

(ii) propane to decolorize Br_2/CCl_4 and acidified $KMnO_4$. An excerpt is:

propane changes Br_2/CCl_4 and acidified $KMnO_4$ to colorless (Teacher, 12).

Factual difficulties: some of the teachers could only restate that ethene changed (Br_2/CCl_4) and acidified ($KMnO_4$) solutions with no justification for the process. The excerpts are:

… ethene is the compound as it changes color of (Br_2/CCl_4) and acidified ($KMnO_4$) solutions (Teacher, 39).

ethene changes color of (Br_2/CCl_4) and acidified ($KMnO_4$) solutions (Teacher, 46).

Item 12 was difficult for teachers with an index of 0.51. Of the 47 teachers, 31.91% of teachers' explanations were alternative conceptions with no factual difficulties relating to propene gives brown color solution with alkaline potassium tetraoxomanganate(VII). The evidence of alternative conceptions is:

Alternative conceptions: (i) propane reacts with alkaline potassium tetraoxomanganate(VII) to give a brown color. Excerpts are:

propane reacts with alkaline potassium tetraoxomanganate(VII) to give a brown color (Teacher, 27)

propane reacts with alkaline potassium tetraoxomanganate(VII) solution to give a brown color because oxidation states of Manganese reduces from

+7 which is purple color to +2 which is a brown color (Teacher, 19).

Item 18 was moderately difficult for teachers with an index of 0.53. Of the 47 teachers, 19.15% of teachers' explanations were alternative conceptions and 21.28% were factual difficulties relating to 2-butyne is unsaturation and thus, decolorizes bromine solution. The evidence of alternative conceptions and factual difficulties is:

Alternative conceptions: (i) 2-butyne is an alkane and thus decolorizes bromine solution. An excerpt is:

alkane such as 2-butyne decolorizes bromine solution (Teacher, 19).

Factual difficulties: some teachers did not know that 2-butyne is an unsaturated hydrocarbon. An excerpt is:

2-butyne contains alkanoic functional group acid; hence, changes color of bromine solution to colorless (Teacher, 35).

Also, Item 21 was moderately difficult for teachers with an index of 0.55. Of the 47 teachers, 19.15% of teachers' explanations were alternative conceptions and 2.13% were factual difficulties relating to bromine solution or acidified $KMnO_4$ used to distinguish between benzene and ethene. The evidence of alternative conceptions and factual difficulties is:

Alternative conceptions: (i) bromine atom is used to distinguish between benzene and ethene. An excerpt is:

benzene and ethene is differentiated using bromine atom (Teacher, 3).

the bromine atom in bromine solution can be used to differentiate ethene and benzene (Teacher, 17).

Factual difficulties: (i) some teachers did not know that indicators are not reagents for detection of functional groups, but that of titration. An excerpt is:

benzene changes phenolphthalein from colorless to pink but ethene is unreactive to phenolphthalein (Teacher, 8).

Item 9 was less difficult for teachers with an index of 0.68. Of the 47 teachers, 38.30% of teachers' explanations were alternative conceptions with no factual difficulties relating to secondary alkanol undergoes a complete oxidation to produce an alkenone. The evidence of alternative conceptions is:

Alternative conceptions: (i) the presence of the two hydroxyl groups on secondary alkanols oxidize completely to produce ketones. An excerpt is:

secondary alkanols undergo complete oxidation to produce alkenone because in secondary alcohols there are two hydroxyl (-OH) groups present hence forming an alkenone" (Teacher, 12).

usually for secondary alcohols the hydroxyl groups are two on the carbon giving alkenone on complete oxidation (Teacher, 5).

Factual difficulties: (i) some teachers only stated that secondary alkanols can form alkenones with no further explanation. An excerpt is:

Secondary alkanols can form alkenones (Teacher, 28).

Item 16 was very difficult for teachers with an index of 0.43. Of the 47 teachers, 21.28% of teachers' explanations were alternative conceptions and 14.89% were factual difficulties relating to alkanol reacts with a yellow color potassium heptaoxodichromate(VI) solution, and changes it to green. The evidence of alternative conceptions and factual difficulties is:

Alternative conceptions: (i) alkanols react with yellow potassium heptaoxodichromate(VI) solution to form white precipitate. An excerpt is:

alkanol react with yellow color of potassium heptaoxodichromate(VI) solution to form a white precipitate (Teacher, 5).

Items 11 was less difficult for teachers with an index of 0.83. Of the 47 teachers, 40.43% of teachers' explanations were alternative conceptions without any factual difficulties relating to hydrogen gas is liberated when alkanoic acid reacts with sodium metal. The evidence of alternative conceptions is:

Alternative conceptions: (i) a black precipitate is formed when alkanoic acid reacts with sodium metal. An excerpt is:

propanoic acid reacts with sodium metal to produce black precipitate (Teacher, 16).

(ii) carbonyl group reacts with sodium metal to liberate a hydrogen gas. An excerpt is:

a hydrogen gas is liberated when alkanals reacts with sodium metal (Teacher, 32).

Item 13 was moderately difficult for teachers with an index of 0.64. Of the 47 teachers, 27.66% of teachers' explanations were alternative conceptions without any factual difficulties relating to a complete oxidation of propanol produces propanoic acid. The evidence of alternative conceptions is:

Alternative conceptions: complete oxidation of propanol produces propyl propanoate. An excerpt is:

Propyl propanoate is produced when propanol oxidizes completely (Teacher, 32).

Item 7 was less difficult for teachers with an index 0.85. Of the 47 teachers, 27.66% of teachers' explanations were in the category of factual difficulties without any alternative conceptions relating to the sweet scent associated with alkyl alkanoate functional group detection. The evidence of factual difficulties is:

Factual difficulties: (i) some teachers did not know that methanamide is not an ester. An excerpt is:

methanamide is an ester so is sweet-scented (Teacher, 32).

(ii) some teachers did not know that sodium ethanoate is a salt but an ester. An excerpt is:

sodium ethanoate is an ester so is sweet-scented (Teacher, 17).

If sodium ethanoate is sweet-centred, then is likely an ester (Teacher, 23)

Item 17 was moderately difficult for teachers with an index of 0.51. Of the 47 teachers, 12.77% of teachers' explanations were alternative conceptions, and 10.64% were factual difficulties relating to ammonia gas is evolved when amide is warmed with dilute sodium hydroxide solution. The evidence of alternative conceptions and factual difficulties is:

Alternative conception: hydrogen gas is evolved when amide reacts with dilute sodium hydroxide solution. An excerpt is:

hydrogen gas is liberated when amide reacts with dilute sodium hydroxide solution (Teacher, 41).

Item 22 was very difficult for teachers with an index of 0.28. Of the 47 teachers, an equal proportion (4.26%) of teachers' explanations were alternative conceptions and factual difficulties relating to the Tollen's reagent or Fehling's solutions is used qualitatively to distinguish between carbonyl functional groups. Most of the teachers failed to provide reasons for the options they selected. Evidence of conceptual difficulties is:

Factual difficulties: aldehydes react with Tollen's reagent to form an acidic solution. An excerpt is:

aldehyde like propanal (CH_3CH_2CHO) reacts with Tollen's reagent to form acid solutions (Teacher, 16).

It reacts with Tollen's reagent to produce an acid (Teacher, 9).

VIII. Discussion

Teachers' demonstration of the low (partial) level of conceptual understanding of functional group detection is not only limited to hydrocarbons but nonhydrocarbons (such as alkanols, alkanoic acids, alkyl alkanoates, amides, alkanals, and alkenones) as well. This low level of conceptual understanding of detection of functional groups of saturation and unsaturation carbon compounds means that teachers are not rightly addressing the targeted specific objectives of the curriculum (MOE, 2010), where students are to test for saturation and unsaturation using acidified and alkaline purple $KMnO_4$, Br_2/H_2O. Teachers may not only have problems with enacting the curriculum (MOE, 2010) with appropriate pedagogical knowledge but may have problems of content knowledge of that they are supposed to teach to students. This is also evident as teachers demonstrate a low conceptual understanding of functional group detection of benzene using cold dilute $KMnO_4$, Br_2/H_2O

or $Br_2/CHCl_3$, and to test for alkanals and alkenones using 2, 4-dinitrophenylhydrazine, Fehling's or Benedict's solution, and Tollen's reagent (ammoniacal silver nitrate). Teachers could be just transferring information (Jonassen, Peck, & Wilson, 1999) on organic chemistry from textbooks to their students with no meaningful learning from both sides. Teachers may have not sufficient mental models (Konicek-Moran & Keeley, 2015) of functional groups of organic compounds. This is because teachers have a low conceptual understanding that alkanols change yellow heptaoxodichromate(VI) solution green. These conceptual difficulties could account for teachers' inability to demonstrate a full scientific understanding of functional group detection but a partial scientific understanding, and even no scientific understanding in some instances. Not only is functional group detection under organic chemistry difficult for students (Goh et al., 1987), but also difficult for teachers who teach the students. Teachers' conceptual difficulties in detecting all functional groups either through the use of suitable organic reagents or the use of chemical reactions could be partly due to their insufficient knowledge of organic chemistry (Coll & Treagust, 2001; Nicoll, 2001) when they were in high school or college students, their inability to identify chemical structures of organic compounds, and give correct names of these organic compounds (Adu-Gyamfi et al., 2017).

Also, the results showed that even though teachers are unable to identify most organic chemical reactions, the very few who are able fail to state and explain clearly the functional group present in those compounds. Hence, teachers are unable to give correct chemical structures of organic compounds undergoing chemical reactions. Teachers demonstrate factual difficulties, and alternative conceptions on functional group detection. Alternative conceptions seem to be a common phenomenon with students about chemical concepts globally, and the same can be said to teachers under organic qualitative analysis where functional groups are detected. Teachers in this study are demonstrating alternative conceptions, and other factual difficulties of functional group detection and that could be a contributing factor to students' alternative conceptions on chemical concepts. Teachers being a contributing factor to students' alternative conceptions is a confirmation of conceptual misunderstanding (a category of alternative conceptions) based on teacher's inability to use chemistry lessons to help students challenged their preconceived notions and nonscientific beliefs they bring to the classroom (Adu-Gyamfi & Ampiah, 2019).

Teachers' demonstration of a wide range of factual difficulties and alternative conceptions of functional group detection could be partly due to the difficult nature of organic qualitative analysis (Stieff, 2007). Organic chemistry is known to be difficult for

students. These teachers likely had difficulties learning the content at the high school and college levels and even at the university hence, their possible difficulties in teaching the concept. The nature of the content influences the way the subject is taught and learned (Tatli & Ayas, 2013). This implies that teachers' difficulties in conceptualizing difficult content are potentially transferable to their students, resulting in learners' alternative conceptions about the concepts (Chavan, 2017).

Teachers' alternative conceptions and factual difficulties could be partly due to teachers' weak content knowledge. Teachers' deep and strong content knowledge is a necessary tool in students' learning (Adu-Gyamfi et al., 2018; Aregawi & Meressa, 2017). A good number of students make meaning of concepts in similar ways as their teachers (Taber, 2011). Teachers' understanding of science content influences the way they teach, and consequently, the way their learners learn the content (Childs & Sheehan, 2009; Greenbowe & Schroeder, 2008; Simsek, 2009, Tatli & Ayas, 2013). Teachers weak content knowledge could partly be due to teachers' demonstration of factual difficulties: which are teachers' conceptions developed from false ideas learned at the early ages and have remained unchallenged; lack of preparation before teaching the content; not specializing in chemistry at the university level; lack of frequent teaching of organic chemistry and functional groups content to students.

If WAEC Chief Examiner on chemistry complains about students' poor show on organic chemistry, then the study shows that what students learn is equally dependent on the teacher's knowledge of that specific content. The results show that teachers, just as their students, also have little knowledge about organic reagents needed to test for the various functional groups, and give exact colour changes that occurs during these functional groups detection. Teachers also fail to provide names and explain reagents needed to detect for these functional groups. For instance, teachers have factual difficulties distinguishing reactions between saturation and unsaturation, primary and secondary alkanols, alkyl alkanoates, amides, and alkanals and alkenones. The results further show that teachers have factual difficulties and alternative conceptions in identifying the name of particular chemical reaction such as oxidation, dehydration and esterification. This implies that not only do teachers have conceptual difficulties in providing and predicting final product in organic reactions with reasons (Tang, Zain, & Abdullah, 2010), but will find it difficult to teach them. This study also confirms an earlier work (Goh et al., 1987) that qualitative analysis (functional group detection) is difficult and that teachers who do not have adequate and sufficient understanding of the scientific concept can misrepresent the content to

their students, causing them to have misunderstandings (Ball et al., 2008).

IX. Conclusion

The study has shown that functional group detection under organic qualitative analysis was difficult for teachers and they, therefore, demonstrate conceptual difficulties on the concept. The teachers' conceptual difficulties were qualitatively seen as alternative conceptions and factual difficulties. Those alternative conceptions and factual difficulties were seen under various functional groups as saturated and unsaturated hydrocarbons, alkanols, alkanoic acids, alkyl alkanoates, alkenones and aldehydes, and amides. The study has added to the literature that alternative conceptions exist in functional group detection as there are in other areas of chemistry. As teachers demonstrated a partial scientific conceptual understanding of functional group detection, the Ministry of Education through the Ghana Education Service should liaise with the teacher education universities to organise short courses for teachers to help upgrade their content knowledge in chemistry. And as teachers' factual difficulties and alternative conceptions existed on functional group detection, chemistry educators and researchers should design and develop instructional strategies that challenge alternative conceptions among teachers.

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Navigating Ancestral Shores: A Study on the Revivalism of the Transcendentalist's Reverential Treatment of Nature in Select Poems of Mary Oliver

By Dr. Adenuo Shirat Luikham, Moatila & Lideno Ezung

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INTRODUCTION

It would not be far-reaching to say that the American poet, Mary Oliver, is a direct intellectual descendent of the New Englander(s) better known as the transcendentalists in the canons of American literature. The sources which have influenced Oliver's treatment of nature in her poems are manifold – from her childhood memories of the suburbia of Ohio to her difficult relationship with her parents while growing up. These memories are recreated in her nature poems and she considers its divinity as a spiritual mediator to negotiate the troubled world of her past and the frenzy of modern living which she disdained just as Thoreau had renounced in *Walden*.

Oliver's encounter with the natural world is one of great reverence and awareness that the sacred resided in the wilderness. Her poetry is filled with imageries of animals in their natural habitations: 'shore birds, swans, water snakes, the phases of the moon and humpback whales.' Nature is both a teacher and a mirror of the soul, and an engagement with its divinity is where one is able to 'transcend' mundane existence and realise a true purpose just as everything in nature functions purposefully.

This paper will attempt to analyse Oliver's thematic preoccupation with nature and a reverential treatment towards it by studying some of her select poems taken from different collections. This thematic preoccupation found in her poems is a residual inheritance from her predecessors and so in essence, a revivalism of the transcendentalist tenet that the divinity of nature and the natural world is a path to self-realization instead of seeking it through institutionalized beliefs and traditions.

In this paper, the word 'nature' is understood as the natural physical world including plants and animals and landscapes. The term is used in line with the Romantic philosophy that the "natural world was a vast analogue of the spiritual," attributing the quality of the divine, the presence of the Universal Soul in the individual soul, which Emerson put forward in his essay "Nature" (Philominraj 127).

Born in 1935, in the semi-rural suburbs of Cleveland, Oliver acquired a natural affinity with nature being an avid walker and explorer of the woods which surrounded her childhood home. This would continue into her adulthood and fanned the fires of her creative impulse in her observances of nature. It was her collection of poetry *American Primitive* that won her the Pulitzer Prize in 1984. This collection glorified the natural world and reflected a fascination with the ideal of the pastoral life. Many of her poems on nature originated from the walks she would go on, in and around her adopted home of New England where she moved to sometime in the 1960s (*www.britannica.com*).

That Oliver located herself in New England, the birthing home of the American Romantics, is no coincidence as her poetic influences included Thoreau and Whitman. Like Whitman, she adopted the structure of free verse for many of her poems, this form, allowing her to capture the inner monologues and rhapsodies that nature stirred up in her.

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The poetry of Oliver as mentioned previously ties in closely with the ideas set by the transcendentalists. George Hochfield commented that American transcendentalism was a "… historical influence that still affects the intellectual life of contemporary America." Transcendentalism has undoubtedly left a "lasting impression on the American character" (Introduction ix).

As a movement, the years 1836 to1846, can be said to be the blossoming of transcendentalism in New England. It exerted a fascination over most of the active literary minds of the country and "flowered brilliantly in the masterpieces of Emerson, Thoreau and Whitman" (Introduction ix).

The word 'transcendentalism' was derived from German Romantic philosophy – in the ideas of Kant, Hegel, Fitch and Schelling who espoused a "distrust of the intellect" and exalted "intuition." For them, 'intuition' knew truths which 'transcended' those truths which were accessible to faculties that employed logical arguments and scientific inquiries. These key ideas imported from Europe appealed to the transcendentalists as it provided a metaphysical justification for the ideal of the individual freedom – "if every man could apprehend the truth by direct intuition, then any form of external authority, political or religious was unnecessary." This meant that man had the capacity for "direct spiritual insight." This concept also directly translated into their approach to nature and the natural world – that man could attain spiritual insight by engaging with nature and thereby seeing and accessing the divine in it (Parkes 23).

Emerson, the leading spokesman of the movement, believed that "the human spirit and the natural universe were expressions of God" (Parkes 24). For Whitman, the transcendentalist conception of nature meant that the "material world and all its inhabitants were emanations of divinity, and therefore sacred, and that man could achieve a sense of unity with God" (Parkes 31).

Taking this transcendentalist tenet of the conception of the sacred and divine in nature, the poetry of Oliver also embodies a reverential attitude towards nature. Oliver, like Thoreau who described himself as a "saunterer," loved wandering in the woods and the wetlands and this evoked an image of the zealous worshipper's unwillingness to be estranged from her spiritual church (Parkes, "Thoreau" 109). Many of her nature poems reflect her deep conviction that there is a spiritual sense of revelation when she enters into its microcosmic world; the attention to detail that would ordinarily escape the eyes of others is vividly delivered. The pebbles in a riverbed or the sensuous description of a swan 'transcends' the immediate reality of the physical to find a message or lesson and offers a fresh perspective of objects in the natural world. Maxine

Kumin in the *Women's Review of Books* describes Oliver's poetry as an "indefatigable guide to the natural world, particularly to its lesser-known aspects" (*www.poetryfoundation.org*).

In her poems "Sleeping in the Forest" and "Morning Poem," the awe and wonderment that accompanies the believer of nature's magnanimity, a virtue that is associated with God(s), is shown to be akin to entering the kingdom of a supreme being.

In "Sleeping in the Forest," Oliver speaks of the earth remembering her and of taking her back in so tenderly (lines 1-2). There is an immediate suggestion here that she believes in a primitive connection with nature – that her soul and nature can recognise each other having the cosmic vein of "original energy" coursing through her. This idea of a primal connection is repeated throughout in Whitman's "Song of Myself" where he wrote on his belief of the universe working in tandem as an "undivided unity" (Philominraj 128).

In the succeeding lines, Oliver writes:

… I slept as never before, a stone

On the riverbed, nothing

Between me and the white fire of the stars

But my thoughts and they floated

Light as moths among the branches

Of the perfect trees. ("Sleeping in the Forest")

This section demonstrates the munificence of nature and its power to heal and restore the human soul. Having "slept as never before," Oliver becomes a part of elemental nature where she is transformed into "a stone on the river bed" having no barrier to stop her communing with the "fire" of the stars above her. Her choice of the word 'perfect' to describe the trees only furthers the idea that nature epitomizes flawlessness and is without defect or corruption, the state of ideality that the human soul can aspire for, considering the deprave materialism that modern-living and its malaise poses.

The concluding lines of the poem announce that:

By morning

I had vanished at least a dozen times

Into something better. ("Sleeping in the Forest")

By vanishing, Oliver is saying that she has attained insight in the act of surrendering the 'self'. And that in her encounter with nature even while "sleeping" which is suggestive of inactivity and rest, by immersing her 'self' and surrendering to nature, it turned her into "something better." Her transformative journey into the "better" self is attained through her 'sleeping in the forest' – "Self-discovery is thus linked with the discovery of fact outside of oneself" (Viegas 241).

In "Morning Poem," the opening lines touch on approaching nature with awe:

Every morning

The world

Is created.

Under the orange

Sticks of the sun

In nature, morning, which is suggestive of new beginnings, give every human and life form the opportunity to start over. Thoreau wrote in *Walden* in the chapter "Where I Lived, and What I Lived For" that: "Every morning was a cheerful invitation to make my life of equal simplicity, and I may say innocence, with Nature herself" (Fisher et al 140). In stanza 7 of the poem, Oliver directly addresses her reader that:

… somewhere deep within you

A beast shouting that the earth

Is exactly what it wanted

The phrase "deep within you" and the image of a beast shouting out strikes us as a primal cry from the soul that it desires to be achieve oneness with nature. The benevolence of nature is in the "blazing lilies" of the ponds, if we are willing to stop and observe and acknowledge that the beauty in the details of nature is as Oliver says: "… a prayer heard and answered/ Lavishly/ Every Morning." Just as a benevolent deity, nature is ready to offer her beauty every new day:

Whether or not

You have ever dared to be happy,

Whether or not

You have ever dared to be pray. ("Morning Poem" stanza 9)

Thoreau's transcendentalist approach to nature meant that he saw it as the "symbol of spirit" and Oliver incarnates this attitude (Viegas 238). Beauty, solitude, and peace are not the only offerings of nature but nature in her poems is symbolic of spiritual facts. Physical things and processes are emblems of some further awareness.

Seen in this light Oliver's nature poems are also a critique of human society. She juxtaposes the human world versus the animal world, and uses the contrast to create a guidebook for misguided souls looking for reprieve and redemption from spiritual barrenness.

In "Wild Geese," she juxtaposes the purposeful lives of the wild geese and her own life, and broadly of every individual. While man incarcerates himself within a society of institutionalised forms of religion and beliefs; of a life of 'trying to be good' or living in constant 'repentance,' the wild geese in following its own instincts and purposeful life that nature has charted out for it is able to assimilate itself into the grand design of the universe.

You do not have to be good.

You do not have to walk on your knees

For a hundred miles through the desert, repenting

You only have to let the soft animal of your body

Love what it loves.

Oliver indicates that man, unlike animals that unquestioningly follow their instincts fails to understand his/her place in the scheme of things. Against our strife to acquire and to accumulate worldly material goods, Oliver points out that we lose out on the treasure of serenity that nature offers.

Meanwhile the world goes on.

Meanwhile the sun and the clear pebbles of the rain

Are moving across the landscapes,

Over the prairies and the deep trees,

The mountains and the rivers … (Stanza 2)

… whoever you are, no matter how lonely,

The world offers itself to your imagination,

Calls to you like the wild geese, harsh and exciting – Over and over announcing your place

In the family of things. ("Wild Geese" stanza 3)

Oliver gives a gentle reminder that we are an intrinsic part of nature and just as the wild geese 'know' their place in the "family of things," so should we.

In nature, Oliver believes that the animals and elements in it such as the trees, flowers, lichens and seeds all represent answered prayers. In the poem/ prose piece "How I Go to the Woods," she announces that she usually ventures into the woods 'alone' which impresses the idea that it is a sacred space for her.

Ordinarily I go to the woods alone,

With not a single friend, for they are all smilers and talkers and therefore

Unsuitable.

The phrase "smilers and talkers" is a reference to the outside world (the world that is outside of nature, specifically referencing to the human world) and for Oliver they are "unsuitable" companions who cannot accompany her into the holy precincts of the woods. Thoreau who considered the act of going to the woods as a deliberate act of learning the "essential facts of life," perceived nature as a teacher (Fisher et al. 142). Similarly, Oliver writes that:

I don't really want to be witnessed talking to the catbirds

 or hugging the old black oak tree. I have my way

of praying, as you no doubt have yours.

For Oliver, going into the woods and talking to the birds and hugging a tree is an intimate act akin to praying in a temple, and she considers this as too intimate to allow the gaze of others into this private world that she has created for herself. Nature is a sanctuary away from the superfluous, from the prison of details and the "… lives of quiet desperation" that we confine ourselves in (Fisher et al. 135, 142). A "sanctity which shames our religions …," according to Emerson ("Nature" Tilak 132).

The poem continues:

> Besides, when I am alone I can become invisible. I can sit
>
> On the top of a dune as motionless as an uprise of weeds,
>
> Until the foxes run by unconcerned. I can hear the almost
>
> Unhearable sound of the roses singing.

According to Bruce Bennetin, Oliver's poetry "insists on the primacy of the physical" (*www.poetryfoundation.org*). She explores the intersection between the human and the natural world and the limitations of language in articulating such a meeting. Oliver takes a subjective approach to moulding herself into one with a world of objects, finding it almost natural to blend her consciousness with the physical elements that make up what is nature. The words "invisible," "motionless," and "unconcerned" all suggest a tranquil state that can be achieved living in close quarters with nature – the same serene and tranquil state that the transcendentalists experienced when going into the woods.

Oliver's nature poems as seen in the study above, then, is a clarion call for a return to the 'primal energy' that coursed through the arteries of her poetic predecessors and a prime example of its revivalism in contemporary American poetry. Nature is an overarching thematic concern and manifested brilliantly in her verse. The two-dimensional world around us is transformed into an expression of tactile tangibility. Elaborate details and imageries of nature is weaved into her poems and she paints it with an exuberant colour of awe and reverence which suggests a direct link and draws parallels in Emerson, Thoreau and Whitman. In conclusion, it can be said that Mary Oliver's nature poems are ships that navigate the ancestral shores of her transcendentalists' ancestors.

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Gender Differential Item Functioning of Test Items of 2015 Joint Senior Secondary II Mathematics Promotion Examination in Ondo State, Nigeria

By Oloda Festus Sunday Smart

Abstract- The research is aimed at finding out whether the multiple-choice mathematic items of Ondo State Joint Senior Secondary II Promotion Examination (OSJSSPE) administered in 2015 function differentially in terms of the gender (male and female) of the examinees and also investigate the general performance of students in the OSJSSPE multiple–choice mathematics items administered in 2015. The study employed an ex-post facto research design. A sample of 3,135 examinees was selected from a population of 52,922 examinees who sat for the examination using two-stage random sampling techniques. One research question was raised, and one hypothesis formulated and tested for significance at $p < 0.05$ level. The analyses revealed that the general performance of the students in the OSJSSPE multiple– choice mathematics items administered in 2015 was high. However, the examinees of equal ability from both male and female students had a different probability of answering some items correctly; thus, the multiple-choice mathematics items of OSJSSPE administered in 2015 functioned differentially on male and female examinees.

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Keywords: differential item functioning, item biased, joint senior secondary ii promotion examination, latent trait, mathematics.

I. Introduction

The importance of mathematics in the manpower and technological development of a nation cannot be overemphasized. According to Oloda and Fakinlede (2017), mathematics is a discipline that has various areas of studies which relate with other discipline or subjects such as Basic Science, Basic technology and others which plays important role in the security, sustainability and technological development of any nation. In other words, mathematics is the linchpin in the task of technological development of any nation. Ale & Adetula (2010) highlights the intricate link of mathematics to science, and technology and opined that without the knowledge of mathematics, there would be no science, and without science, there will be no technology and without technology, there is no modern society.

Despite the importance accorded mathematic, it has been observed that students still perform poorly at both internal and external examinations. The poor performance of students at the secondary school level has been a concern to the public in Nigeria. This is usually noticed when the yearly West African Senior School Certificate Examination (WASSCE) and Senior School Certificate Examination (SSCE) conducted by National Examination Council (NECO) results are released. This is evident in the performance of Nigerian candidates in general mathematics in the West African Secondary School Certificate Examination (WASSCE) from 2006 to 2011, which revealed that the percentage of students that passed mathematics at credit level was between 39% and 47%, except for a little improvement of 57.27% in 2008.

One of the factors attributed to the poor performance of students in mathematics achievement tests in schools as observed in literature is gender. There is the general belief that male students seem to perform better than female students in mathematics and mathematics-related subjects. According to Smith & Walker (1988) and Popoola & Ajani (2011), male students perform better than female students in mathematics. Etukudo (2002) opined that boys generally perform better than girls even though they are put into the same classroom situation. However, Cronbach (1977) was of the opinion that boys and girls do not differ much on ability measures. This is not unconnected with the fact that opportunities for development are much more the same until the school leaving age.

Multiple-choice is one of the various types of objective tests that can be used to measure learning outcomes; the score of the multiple-choice item is independent of the subjective influence of the marker or the examiner. Thus, the individual examiner doing the scoring is not required to make the judgment; the score is consistent regardless of the prejudice of the examiner. According to Barret (2001), multiple-choice tests are generally biased towards males, while the female students experience more difficulties with questions involving numerical, spatial, or high reasoning skills. It is generally believed that multiple-choice tests are prone to guessing. Thus, guesswork in most multiple-choice achievement tests has become the order of the day in most institutions. Ojerinde (1985) reported that in Nigeria, most students who do not have a flare for

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mathematics would result in guesswork at the secondary and tertiary levels. This is not unconnected with students testing their luck and thus gets out of the examination hall as quickly as possible. However, no statistics exist in this regard as to why students resort to guesswork, but if critically viewed within the test theories, it is assumed to be due to some psychological and situational factors.

Also, Lee, as cited in Adebule (2013), observed that questions always arise concerning whether high average test scores by certain groups are due to actual achievement differences, bias in test, or a combination of both. Conversely, the favored groups are the advantaged group during promotion and admission or selection into science-based courses in the high institutions while, the disadvantaged groups, on the other hand, are disallowed due to some factors tagged extraneous and irrelevant variables that interfere with the measurement of the underlying psychological construct being measured. These factors relate to the group like gender, socio-economic status, location has significant influence on the examinees' response to the item. This implies that the test is multidimensional or measures more than one trait.

Consequently, Smith (1985) referred to the above as measurement disturbance which was classified by Smith (1985) into three categories:

1. Disturbances as a result of characteristics of the person that is independent of the items such as fatigue, boredom, illness, cheating, among others.
2. Disturbances as a result of interaction between the characteristics of the person and the properties of the item, such as item content, item type, guessing, item bias, among others.
3. Disturbances as a result of the properties of the items which are independent of the characteristics of the person, such as the person's ability and item difficulty.

Many research findings have shown that there are differences in the academic performance of separate groups since the inception of testing. An item is biased if it discriminates between members of different groups who have the same ability on what is being measured. Put differently, members of different groups who have the same trait level differ in their score on the item. In his contribution, Plake, as cited in Adebule (2009), defines bias in tests as a situation when items in an achievement tests are found to favour one group over another for reasons not explainable by differences in achievement level between groups. Generally, bias in test items is regarded as a systematic error in measurement. Item bias is the degree to which items that comprise a measurement scale are systematically related to various exogenous variables (e.g., age, gender, location, race, and so on) after conditioning on the latent variable of interest. Items that

show bias in any measuring instrument may affect the properties of the measuring instrument; for instance, test items that are for a group of equal ability should not have statistical differences between the groups. However, if differences exist between the groups, then the validity of the test items is threatened.

A test is gender-biased if men and women with comparable ability levels tend to obtain different scores. Thus, we can say that the test contained items that measure different traits for male and female examinees with comparable abilities. Test fairness is very important in test development; a test is said to be fair if systematic errors (biases) are not present. A systematic error occurs when the construct measured by a test contains some irrelevant elements that can threaten the validity of the test. A test should enable all examinees to have an equal chance to demonstrate personal skills and knowledge vital to the purpose of the test. Items that show bias in any measuring instrument may affect the properties of the measuring instrument. Thus, score generated from a test that contains items that are biased against one group or the other or test result from unfair testing procedures cannot be used to make a valid quality decisions in education.

Item response theory (IRT), also known as the latent trait theory or strong true score theory, is a family of latent trait models that are used to establish psychometric properties of items. According to Ojerinde, Popoola, Ojo, & Onyeneho (2012). Item response theory connotes and theoretically assumes that there exist a relatively common trait or characteristic that can be used to determine an individual's ability to succeed with a particular task. Such tasks may be in terms of the individual's response by thinking (cognitive), feeling (affective), and acting (psychomotor). This theory is considered to be one of the most important developments in psychological testing in recent times. Item response theory (IRT) model was designed to solve the problems of classical test theory (CTT); it has been the only theory that gives the valid measurement in terms of test construction and interpretation for assessment of test taker's ability in psychometric analysis. Many of the recent development in testing have their origin in the concept of IRT, such as tailored testing, adaptive computer testing, and improved equating of test forms. According to Pine (1977), Item bias based on the Item response theory (IRT) concept is classified as unbiased if all individuals having the same underlying trait (ability) have an equal probability of getting the item correct regardless of sub-group membership.

Differential item functioning (DIF), also referred to as measurement bias, exists when persons with different group membership but identical overall test scores have different probabilities of solving a test item correctly or giving a certain response on a

questionnaire. According to Kamata and Vaughn (2004), Differential Item Functioning (DIF) occurs whenever people of the same ability level but different groups have different probabilities of endorsing an item. The focus of DIF analysis is on differences in performance between groups that are matched concerning ability, knowledge or skill of interest. Lee (1990) opined that to investigate bias at the item level, developers of large-scale assessments usually conduct a differential item functioning (DIF) analysis. However, not all cases of DIF necessarily have to be interpreted as item bias that will jeopardize the fairness of the test. Instead, DIF is a necessary but not sufficient condition for item bias. Thus, if DIF is not apparent for an item, then no item bias is present. However, if DIF is present, then its presence is not a sufficient condition to declare the item bias; rather one would have to apply a follow-up item bias analysis (e.g. content analysis, empirical evaluation) to determine the presence of item bias. For instance, if in a mathematics test, students of equal ability level from urban areas display a higher probability of answering an item correctly more than students from rural areas of equal ability level because the content in the test is biased against students from rural areas, then we say the item exhibit DIF and should be considered for modification or removal from the test items.

The Ondo State Joint Senior Secondary II Promotion Examination (OSJSSPE) was introduced as an intervention measure to reduce the poor performances of students in public examinations. It is only those students that passed the OSJSSPE both in public and private secondary schools that the state government would pay their registration fees and also allow them to sit for the West African Senior School Certificate Examination (WASSCE) and the Senior School Certificate Examination (SSCE) conducted by NECO in the Ondo State. The senior secondary II students that take these examinations are expected to have been exposed to the same course content at the same time frame within the same number of periods. Thus, they are supposed to be of equal probability of success irrespective of gender, location, and type of school.

The 2014 Ondo State Joint Senior Secondary II Promotion Examination (OSJSSPE) has undergone criticism from stakeholders in the education sector due to the failure rate, which was as bad as having less than half of the senior secondary II students in some schools promoted. Some critics believed that the state government, through the state functionaries in the ministry of education, influenced the result of the examination of the public schools to reduce the number of students in the Senior Secondary School III (SSS3), which will, in turn reduce the total amount to be paid to WAEC or NECO for registration by the state government through the ministry of education. The study investigated the differential item functioning (DIF) of all

items in mathematics multiple-choice items of the 2015 Ondo State Joint Senior Secondary II Promotion Examination concerning the gender (male and female). The study was guided by the research question: What is the general performance of the students in the OSJSSPE multiple-choice mathematics items administered in 2015? Also, a Null hypothesis was postulated to guide the study; that is, the Ondo state Joint Senior Secondary II Promotion Examination (OSJSSPE) multiple-choice mathematics items administered in 2015 will not function differentially between males and female examinees.

II. Research Method

The study adopted an ex-post-facto research design. For the ex-post facto design, the researcher started with the observation of the dependent variable and then studied the independent variables in retrospect for their possible relation to an effect on the dependent variable(s). This design is therefore relevant to this study because the researcher does not have direct control over the independent variables since the manifestations had directly occurred and the analysis would be performed on existing data. The population for the study consisted of 52,922 of male and female students in the senior secondary II that responded to the 50 multiple-choice items in mathematics of Ondo State Joint Senior Secondary II Promotion Examination (OSJSSPE) administered in 2015. The total sample for the study consisted of 3,135 senior secondary II students that responded to the 50 multiple-choice items in mathematics of OSJSSPE administered in 2015 as contained in the Optical Mark Recorder (OMR) sheets from twenty-four selected senior secondary schools in Ondo State, Nigeria, using two-stage sampling techniques. In the first stage, two local government areas (LGA) in each of the three senatorial districts of Ondo State were selected using the purposive sampling technique. In stage two, two public schools (one each from rural and urban areas) and two private schools (one each from rural and urban areas); thus, 12 public schools and 12 private schools were selected using a stratified sampling technique. A total of 24 schools were used for the study. The instruments used for the study were the responses of all the sampled students to the 50 multiple-choice items in mathematics of the OSJSSPE administered in 2015 in the selected schools as contained in the Optical Mark Recorder (OMR) sheets. The items were already subjected to the processes of validation and standardization by the examination Department of Ondo State Ministry of Education. Thus, they were already valid and reliable instruments.

The 50 multiple-choice items in mathematics which the students responded to and were used for this study was constructed, conducted, and administered by the Examination Department of the Ministry of Education

in Ondo State. The OMR sheets comprised of section A and section B. Section A contains the demographic data of the respondents, while section B consisted of all items whose differential item functioning was determined. Descriptive statistics like percentages was used to answer the research question, while inferential statistics like the Welch t-test was used to test the hypothesis at a 0.05 level of significance.

III. Results

The results of the analysis are presented below.
What is the general performance of students in the OSJSSPE multiple-choice mathematics items for 2015?

Table 1: General performance of the students in the OSJSSPE multiple – choice mathematics items for 2015?

Academic Performance	2015	
	N	%
Fail (0 -39)	678	21.6
Pass (40 – 49)	192	6.1
Credit (50 – 69)	579	18.5
Distinction (70 -100)	1686	53.8
Total	3135	100.0

Table 1 shows that 1686 (53.8%) of the students who sat for OSJSSPE had Distinction in Mathematics, 579 (18.5) had credit, 192 (6.1%) passed, while 678 (21.6%) failed. This implies that the General performance of the students in the OSJSSPE multiple-choice mathematics items for 2015 is high. The performance of the students in the OSJSSPE multiple-choice mathematics items for 2015 is further depicted in the figure below.
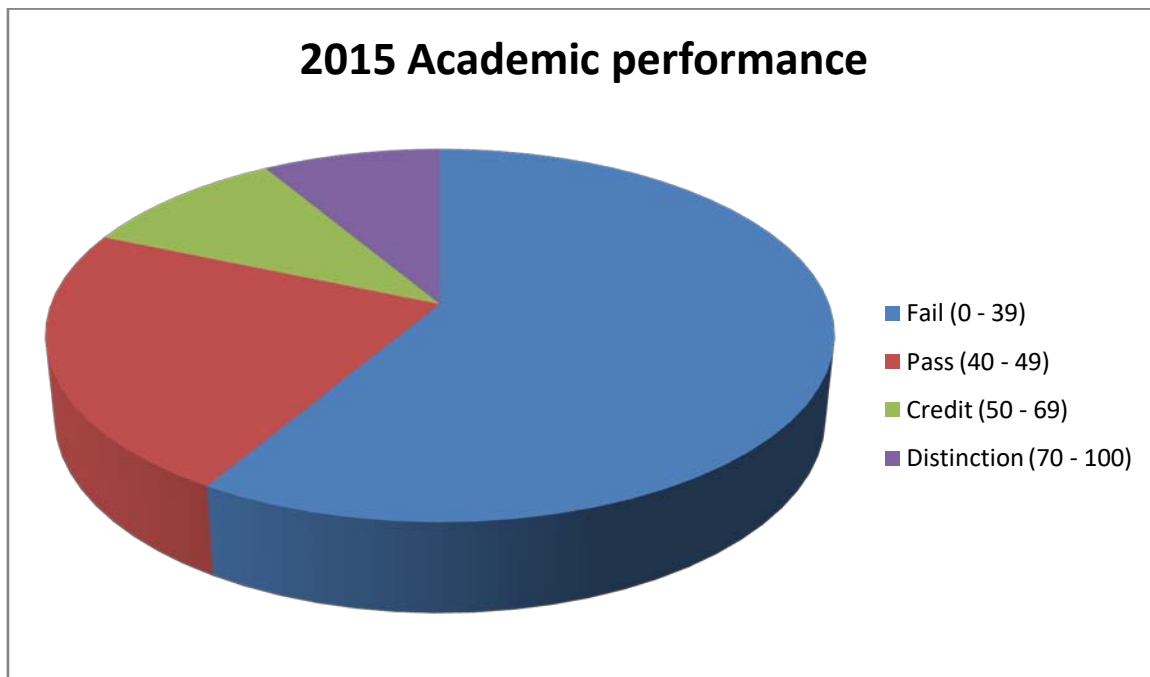

Figure 1: General performance of the students in the OSJSSPE multiple-choice mathematics items for 2015?

Testing the Null hypothesis: The Ondo state Joint Senior Secondary II Promotion Examination (OSJSSPE) multiple – choice mathematics items administered in 2015 will not function differentially between male and female examinees.

Table 2: Summary of DIF Class Specification of 2015 OSJSSPE Based on
Gender   male = 1   female = 2

Item Numb	Item Name	Joint S E	DIF Contras	Rasch – Welch			Bias Against	Decision
				t	df	Prob		
1	I0001	.11	.19	.19	INF	.0729		No DIF
2	I0002	.10	-.03	-.03	INF	.7534		No DIF
3	I0003	.11	.00	.00	INF	1.000	Female	No DIF
4	I0004	.10	-.29	-.29	INF	.0045		DIF
5	I0005	.10	.00	.00	INF	1.000		No DIF
6	I0006	.10	.00	.00	INF	1.000	Male	No DIF
7	I0007	.10	.15	.15	INF	.1605	Female	No DIF
8	I0008	.10	.27	.27	INF	.0077		DIF
9	I0009	.09	-.46	-.46	INF	.0000		DIF
10	I0010	.09	.00	.00	INF	1.000	Female	No DIF
11	I0011	.10	.00	.00	INF	1.000	Female	No DIF
12	I0012	.10	-.18	-.18	INF	.0703	Female	No DIF
13	I0013	.09	-.48	-.48	INF	.0000	Male	DIF
14	I0014	.10	-.21	-.21	INF	.0340	Male	DIF
15	I0015	.10	-.25	-.25	INF	.0117		DIF
16	I0016	.09	.21	.21	INF	.0177	Female	DIF
17	I0017	.09	.36	.36	INF	.0000	Male	DIF
18	I0018	.10	-.06	-.06	INF	.5396	Female	No DIF
19	I0019	.09	-.54	-.54	INF	.0000	Male	DIF
20	I0020	.10	.23	.23	INF	.0235		DIF
21	I0021	.10	-.25	-.25	INF	.0087	Male	DIF
22	I0022	.09	.59	.59	INF	.0000	Female	DIF
23	I0023	.10	.00	.00	INF	1.000		No DIF
24	I0024	.10	-.12	-.12	INF	.2269		No DIF
25	I0025	.09	.32	.32	INF	.0004		DIF
26	I0026	.09	-.76	-.76	INF	.0000		DIF
27	I0027	.10	-.06	-.06	INF	.5236	Male	No DIF
28	I0028	.10	.12	.12	INF	.2319	Male	No DIF
29	I0029	.09	.07	.07	INF	.4365	Male	No DIF
30	I0030	.10	-.18	-.18	INF	.0642	Female	No DIF
31	I0031	.10	.00	.00	INF	1.000	Male	No DIF
32	I0032	.09	.14	.14	INF	.1286	Female	No DIF
33	I0033	.10	.44	.44	INF	.0000		DIF
34	I0034	.10	.42	.42	INF	.0000	Female	DIF
35	I0035	.09	.92	.92	INF	.0000		DIF
36	I0036	.10	-,22	-,22	INF	.0268	Male	DIF
37	I0037	.09	.36	.36	INF	.0001	Female	DIF
38	I0038	.10	-.27	-.27	INF	.0062	Female	DIF
39	I0039	.09	.00	.00	INF	1.000	Female	No DIF
40	I0040	.09	-.20	-.20	INF	.0257	Female	DIF
41	I0041	.10	.12	.12	INF	.2148	Male	No DIF
42	I0042	.10	.52	.52	INF	.0000		DIF
43	I0043	.09	-.57	-.57	INF	.0000	Male	DIF
44	I0044	.09	-.22	-.22	INF	.0131		DIF
45	I0045	.10	-.84	-.84	INF	.0000		DIF
46	I0046	.10	-.49	-.49	INF	.0000		DIF
47	I0047	.09	.62	.62	INF	.0000		DIF
48	I0048	.10	-.02	-.02	INF	.8247		No DIF
49	I0049	.09	-.14	-.14	INF	.1065		No DIF
50	I0050	.10	.61	.61	INF	.0000		DIF

$P < 0.05$ (Significant)

A cursory look at Table 2 above shows that 28 (56%) items were flagged as DIF against both male and female examinees since their P value were less than 0.05. 13 items were flagged as DIF items against male examinees. The flagged items against male examinees are 8,16,17,20,22,25,33,34,35,37,42,47 and 50. This is because their p – values are less than 0.05 in each case. Similarly, 15 items were flagged as DIF items against female examinees because their p-values are less than 0.05 in each case. The items that flagged as DIF items against female examinees are as follows: items 4,9,13,14,15,19,21,26,36,38,40,43,44,45 and 46 respectively. The study showed that 28 items listed above are statistically functioning differentially between males and females at the significance level of 0.05. The null hypothesis is rejected. This implies that the OSJSSPE multiple-Choice Mathematics items administered in 2015 function differentially between males and females examinees.

IV. Discussion

The result showed that the general performance of the students in the OSJSSPE multiple-choice mathematics items administered in 2015 was high. The findings also revealed that 28 (56%) of the OSJSSPE multiple-choice mathematics items administered in 2015 displayed DIF based on the gender of the examinees using a statistically significant level of P-value of 0.05 (P < 0.05) (Linacre, 2010a). 13 items favoured male examinees while 15 items favoured the female examinees. The null hypothesis is rejected. This implies that the OSJSSPE multiple-choice mathematics items administered in 2015 functioned differentially between male and female examinees. This finding conforms with the finding of Adedoyin (2010) that mathematics items were gender-biased. Also, the result agrees with the findings of Banabas (2012) that mathematics questions used by WAEC contained items that measure different things for male and female examinees with the same mathematics ability. Abedalaziz (2010) and Madu (2012) also reported that mathematics items exhibit differential item functioning in favour of male examinees. However, the study contradicts Adebule (2013) that mathematics items did not function differentially based on the gender of the examinees.

V. Conclusion

The study investigated items that exhibit differential item functioning in the 2015 Joint Senior Secondary II Mathematics Promotion Examination in Ondo State, Nigeria. Based on the findings, it was concluded that the general performance of the students in the OSJSSPE multiple-choice mathematics items administered in 2015 was high. Also, examinees of equal ability from both male and female students had a different probability of answering some items correctly; thus, the multiple-choice mathematics items of OSJSSPE administered in 2015 functioned differentially on male and female examinees.

VI. Recommendations

Based on the findings, the following recommendations are made:

1) Examination bodies, Test experts, and people charged with developing, validating, and administering tests need to carry out differential item functioning analysis for all items before administration of a test.
2) There is a need for teachers, officials of the examination department in the ministry of Education to be trained by experts on item writing. This would acquit them with the processes of finding the psychometric properties and the detection of DIF of each item, which will, in turn, improve the quality of students' assessment in our schools.
3) Detection of DIF has been investigated using OSJSSPE multiple-choice mathematics items in this study. There is a need for replication using other cognitive subjects in OSJSSPE.

Conflict of Interest Statement

The author declares no conflicts of interest regarding the article entitled "Gender Differential Item Functioning of Test Items of 2015 Joint Senior Secondary II Mathematics Promotion Examination in Ondo State, Nigeria".

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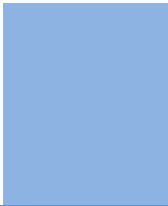
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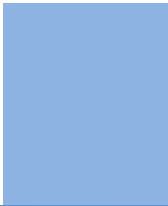
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The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

FORMAT STRUCTURE

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

TIPS FOR WRITING A GOOD QUALITY SOCIAL SCIENCE RESEARCH PAPER

Techniques for writing a good quality homan social science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of homan social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

19. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

20. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

21. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

22. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

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Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

o Explain the value (significance) of the study.
o Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
o Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
o Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

o Report the method and not the particulars of each process that engaged the same methodology.
o Describe the method entirely.
o To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
o Simplify—detail how procedures were completed, not how they were performed on a particular day.
o If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

o Resources and methods are not a set of information.
o Skip all descriptive information and surroundings—save it for the argument.
o Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

o   Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
o   In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
o   Present a background, such as by describing the question that was addressed by creation of an exacting study.
o   Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
o   Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

o   Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
o   Do not include raw data or intermediate calculations in a research manuscript.
o   Do not present similar data more than once.
o   A manuscript should complement any figures or tables, not duplicate information.
o   Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

o You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
o Give details of all of your remarks as much as possible, focusing on mechanisms.
o Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
o One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
o Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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Global Journal of Human Social Science