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Between the Frontier of Learning and School Failure in Attention Deficit Hyperactivity Disorder

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Abstract: *The schooling of children with Attention Deficit Hyperactivity Disorder (ADHD) is still a great challenge, since in addition to the difficulties in responding to academic demands in terms of learning, the pattern of social interactions, with colleagues and teachers, also imposes obstacles to effective participation in all activities in the school environment. Raising factors that lead children with ADHD to not learn at school was the aim of this longitudinal retrospective study of the historical cohort type that used the review of 49 medical records, with 3 units of analysis: personal and socioeconomic data, educational training data and specific data containing dichotomous questions with a single answer. The little explored data yet shown here, for patients with ADHD in the sample, are: 4.1% of history of adoption, 2% of existence of underlying pathology, 22.4% of history of drug addiction for the father and 10,2% for the mother. Disagreeing data from the literature: 87.7% of non-failure. It is essential to constantly seek to know more about this disorder, both on the part of education professionals and the family, from diagnosis to treatment, in order to contribute to offer, in the school context, a meaningful teaching for patients with ADHD.*

Key terms: *ADHD, Elementary school, Sociodemographic factors, Family history.*

1. INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a mental disorder that presents as main manifestations inattention, impulsivity, difficulty concentrating and hyperactivity according to the Diagnostic and Statistical Manual of Mental Diseases - 5th Edition (DSM-V) [1]. It is a psychiatric disorder of great importance in public health, considering the problems caused both in childhood, adolescence and at school; whether in adulthood and at work; or both, and in relationships with others.

It is estimated that around 5 to 8% of the world's child population and 2.5% in adults have this disorder [1,2].

The lack of diagnosis and appropriate treatment causes great damage to the life of the child and the adult, in the professional, social, personal and emotional aspects. Without treatment, other disturbances can be associated with the condition, self-esteem is increasingly compromised, and the individual can isolate himself from the world.

2. ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

ADHD was first described in 1902 by the English pediatrician George Still, who observed changes in behavior in children. He believed that the factor was not attributed to educational problems, but to biological determinants. The disorder has been studied in several countries and since 1960 it has received different names [3].

Epidemiological studies have shown associations between ADHD and various environmental factors. These mainly include pre- and perinatal risk factors (maternal stress, smoking or alcohol consumption during pregnancy, low birth weight, prematurity), environmental toxins (organophosphates, polychlorinated biphenyls, lead), unfavorable psychosocial conditions (severe deprivation of early childhood, maternal hostility) and dietary factors [4,5].

ADHD is a mental health disorder and has three basic characteristics: inattention, hyperactivity and impulsivity. This disorder has a great impact on the life of the child or adolescent and the people with whom they live (friends, parents and teachers). It can lead to emotional difficulties, family and social relationships, as well as poor school performance [6].

According to DSM-V [1], ADHD is defined by 18 symptoms that make up two dimensions: inattention and hyperactivity/impulsivity. Individuals with proven ADHD are considered to have the main symptoms such as inattention and hyperactivity/impulsivity for a period of six months or more.

The hyperactive child often feels isolated and separated from peers but does not understand why he/she is so different. He/she is disturbed by his/her own disabilities. Without being able to complete a child's normal tasks at school or at home, the hyperactive child may suffer from stress, sadness and low self-esteem [1].

2.1. School Performance in ADHD

In both children and adolescents, ADHD is directly related to poor academic performance and academic unaccomplishment, social rejection and high levels of interpersonal conflicts. Children with ADHD are significantly more likely to develop conduct disorder in adolescence and antisocial personality disorder as adults, thus increasing the chances of developing substance use and prison disorders [1].

According to a research by Goldstein [7], it is concluded that about 20 to 30% of children with ADHD may have problems of inattention without significant problems of over activity or impulsivity and that such children are more likely to develop depression anxiety, disruptive behavior and poorer school performance, with greater learning difficulties.

In the learning of students diagnosed with ADHD, it is essential to understand what level of operation they are in, for their activities to be adjusted according to their performance. These students need to be stimulated with fun games, playful games and rule games, which help the student to socialize and to know how to lose and win. These students are very disorganized, they need to have someone to help them organize better. This is up to the professional in the field and family members, to give them more time to adjust to their activities. Knowing how to understand the learning process of these students is particularly important [3].

2.2. The Teacher before ADHD

Few teachers are aware of ADHD and often have a misperception about the disorder.

As the teacher is the mediator of knowledge, he must understand exactly his educational responsibility in the life of the student with ADHD. According to the Brazilian Association of Attention Deficit (BAAD):

> *"The teacher is one of the great observers of children, he/she is the one who knows them as few, because he/she manages to maintain his individual view, even in the midst of a 'crowd'. Unlike other professionals, he/she is one of the few who sees children and adolescents in their routine, in the reality in which they are inserted. " [8]*

Teachers must know about ADHD, be resourceful and flexible to help the student with ADHD. Information is the most important step in understanding how these children's heads work. It is not up to the teacher to diagnose ADHD, but if he/she perceives characteristic symptoms in any student, he/she should guide the family to seek for help. The sooner medical and psychotherapeutic treatment is chosen, the less difficulties he/she will have in his/her school life, which will be reflected in adult life [9].

However, practice has shown that the educational system is still quite stratified, and teachers find it difficult, sometimes unsurpassed, to make the adaptations that are necessary to assist the student with ADHD. The teacher must first understand that the student is not a problem, but that he has a problem; which is not the result of a lack of education and/or an intellectual "deficit", but which compromises both conduct and academic performance. The most important thing is that the teacher allows himself to be intrigued, curious, that he sees this student as an opportunity to learn, as "reading" a student should be a passion in permanent construction for the teacher [10].

2.3. Family, School and the Child with ADHD

Parents should have knowledge about ADHD, the acceptance of the problem influences the quality of the investments that parents will make in helping and facilitating their children's lives. It is essential that parents accept their children's difficulties so that they can assume and fulfill the challenging role in the child's progress [11].

Studies indicate a high level of stress for parents in monitoring children aged three to six. It seems to decrease later, but it is always greater when compared to parents of control children. In addition, the stress of those parents is even greater when there is a comorbidity with challenging opposition disorder. Studies carried out with the parents of these children indicate that they feel more dissatisfied with their parental roles. Mothers have an increased vulnerability to depression and there is greater family consumption of alcohol due to stress [12].

School and family working cooperatively increase the likelihood of a child having a successful school life experience. The child with ADHD has difficulties which parents and the school need to work together for this student to achieve success. We can understand that when Cavalcante states "The collaboration between parents and school improves the school environment and transforms the students' educational experience into a more meaningful experience" [13].

It is important to have a communication from parents with the school coordination to understand how the institution deals with students with ADHD, and whether teachers have specific guidelines to assist the learning process of children who have attention deficit and hyperactivity. When the child receives support, he/she is able to develop his/her activities, even with his/her limitations [3].

For Cunha [14], frequent communication between the school and the family is an important factor to guarantee this relationship, so that both teachers and parents can exchange relevant experiences during difficult times. Knowing what is happening during the time that the child is in the other environment helps to make up the real picture of the situation, and that trusting the other is what really establishes the partnership.

3. Purpose of the Present Study

The present study aims to raise factors that lead children with ADHD to not learn at school.

3.1. Methodology

This is a longitudinal retrospective study of the historical cohort type, which uses the review of medical records kept in files, and this research was approved by the Ethics and Research Committee CEP of Faculdades Integradas Padre Albino - FAMECA under OPINION CONSUBSTANCED OF CEP No. 3.486.315.

3.2. Sample

The sample universe of the research was composed of a total of 100 multidisciplinary medical records of students from the Municipal School of Elementary Education "Faride Aborihan", from the city of Marapoama, state of São Paulo, Brazil, from the years 2017 to June 2019. The medical records were allocated in the Archive Service of that school and they contain assistance information for students who were diagnosed with ADHD and were attended by a multidisciplinary team.

3.3. Variables

The variables were defined according to the personal and socioeconomic data provided for in the first part of the data collection, being composed of continuous variables and discrete variables. The remaining of the specific variables were defined according to the data found in the medical records.

The independent variables were: gender, age, ethnicity, parents' marital status, family income, place of residence and with whom they live with.

The dependent variables were: whether parents have a history/situation of drug addiction, history of domestic violence, school failures (if so, how many, the grades in which failures occurred, in which subjects, whether parents were aware of all school failures), regular grade in which he is currently enrolled, if he has always studied at the same school, if there were school expulsions, observable behaviors in school routine, beginning of ADHD signs and symptoms (school year), subjects that present greater difficulty, student's academic performance and confirmed medical diagnosis of ADHD.

3.4. Design

The medical records were analyzed individually one by one and for the registration and organization of data. The units of analysis were separated and divided into three parts: personal and socioeconomic data, educational background data and specific data containing the answers to the single answer dichotomous questions.

The unit of analysis used was the object of the absolute and comparative strategy assessment. The descriptive analysis included absolute and relative frequency for categorical variables, tables and graphs using the IBM-SPSS Statistics version 24 software (IBM Corporation, NY, USA) for statistical treatment.

4. RESULTS

4.1. Final Sample Size

In this study, it was initially proposed to investigate 100 medical records, however 51 medical records did not have conditions for inclusion in the research due to lack of filling in correct data, medical records that were incomplete or lacking consistent data and other medical records that did not meet the research requirements. Thus, out of 100 medical records, only 49 (49%) medical records were included in this research.

4.2. Independent Variables

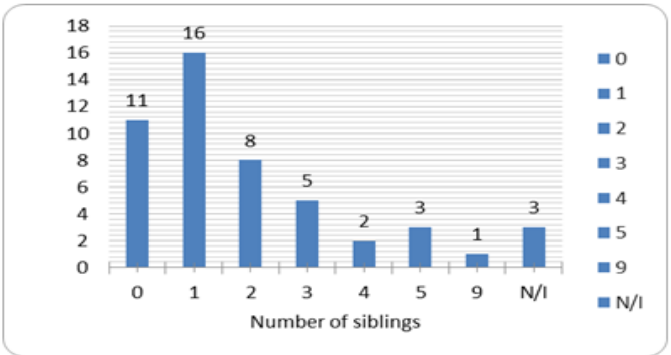
Of the 49 medical records surveyed, 31 (63.2%) were male children and 18 (36.7%) were female. Thus, in this research it was evident that more male children were diagnosed with ADHD.

As for the age of children who have been diagnosed with ADHD and attended to, there is a huge variety and range of ages, with the oldest being 17 years old, and the youngest in the age group of 6 years.

Regarding ethnicity, the vast majority of children 36 (73.4%) were white, and only 13 (26.5%) were brown skinned and there was no presence of black, Indian or Japanese children.

Regarding the number of siblings, the data are shown in Graph 1.

Graph 1: *Number of siblings (n = 49, 2019)*



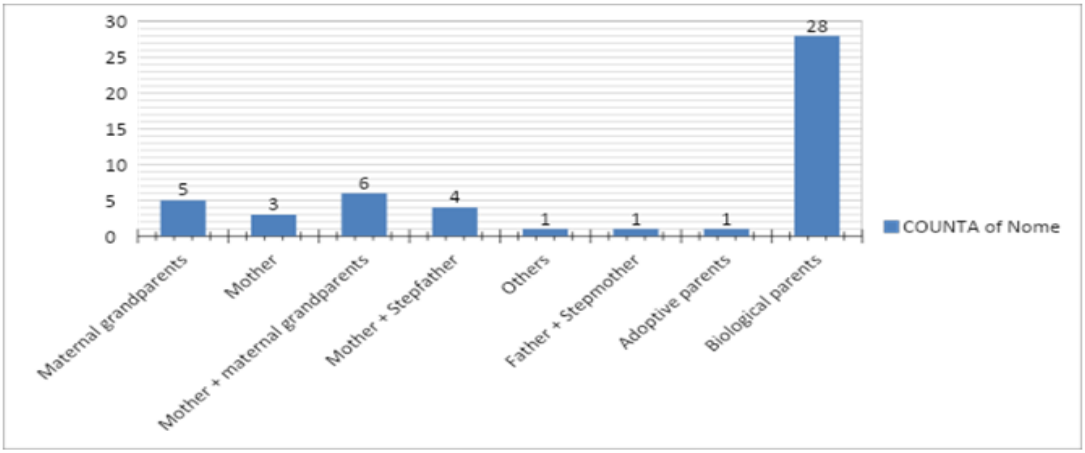
We also sought to find out if some children in this research were adopted, and it was found that 47 (95.9%) are biological children and only 2 (4.08%) have a history of adoption.

Regarding the existence of a basic pathology, it was found that in 48 (98%) medical records there was no basic pathology and only one child had a confirmed diagnosis of Fetal Alcohol Syndrome (ICD Q86.0).

Regarding the parents' marital status, 28 (57.1%) are married and 21 (42.8%) are separated.

In order to identify who are current guardian for the minor and with whom he/she resides, the research identified that there is a great plurality as can be seen in the graph 2.

Graph 2: *Current guardian for the minor and with whom he/she resides (n = 49, 2019)*

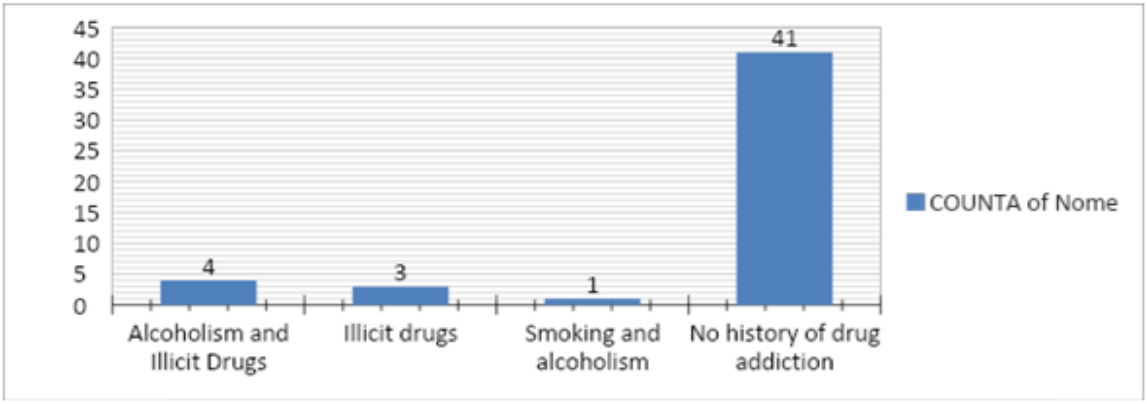


Regarding if there are parents in prison, 45 (91.8%) of the parents are not in prison, 4 (8.2%) are, the theft being the reason for the confinement.

When raising the father's history and drug addiction situation, it was found that 35 (71.4%) of the fathers do not have a history of drug addiction and 11 (22.4%) of the fathers have a history of drug addiction. According to what was found in the survey, fathers involved with drug addiction have been so since adolescence, the most prevalent type of drug being alcohol.

Regarding the involvement of the mother in a drug addiction situation, it was found that 41 (83.6%) do not have a history of drug addiction, 5 (10.2%) have been involved with drug addiction since childhood or adolescence. As for the most prevalent type of drugs among mothers, the results are shown in Graph 3.

Graph 3: *Types of drugs prevalent among mothers (n = 49, 2019)*

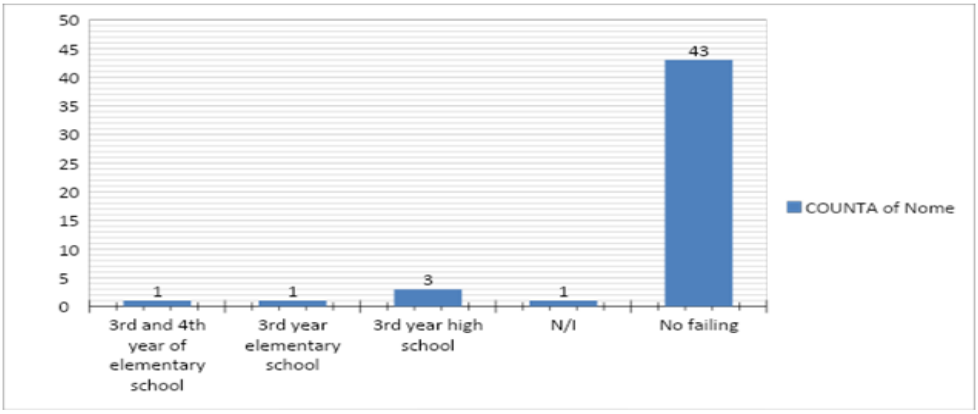


In the investigation of the history of domestic violence, it was found that in 40 (81.6%) there are no reports of domestic violence, however in 9 (18.3%) there are reports of domestic violence in homes where children have ADHD.

Of the 49 medical records investigated for children with ADHD, 12 (24.4%) live in rural areas and 37 (75.5%) in urban areas. In this research it was found that 49 (100%) of residential homes have a family income of 1 to 3 minimum wages.

Despite the children's history of ADHD, it was found that 43 (87.7%) of them never failed and only 6 (12.2%) had a history of failing. Of the 6 (12.2%) children who failed 4 failed 1 year and 2 failed 2 years. The grades in which the failures occurred can be seen in Graph 4. Regarding the question whether the parents were aware of their children's failure, 6 (100%) were.

Graph 4: *Grades in which failures occurred (n = 49, 2019)*



The failures occurred due to three basic reasons: 2 for excessive absences, 2 in two main subjects (Portuguese and Mathematics) and 1 presented a poor performance in all subjects, which culminated in failure.

At the time of data collection, the 49-year-old students surveyed with ADHD were distributed in several grades of elementary school I and II as shown in table 1.

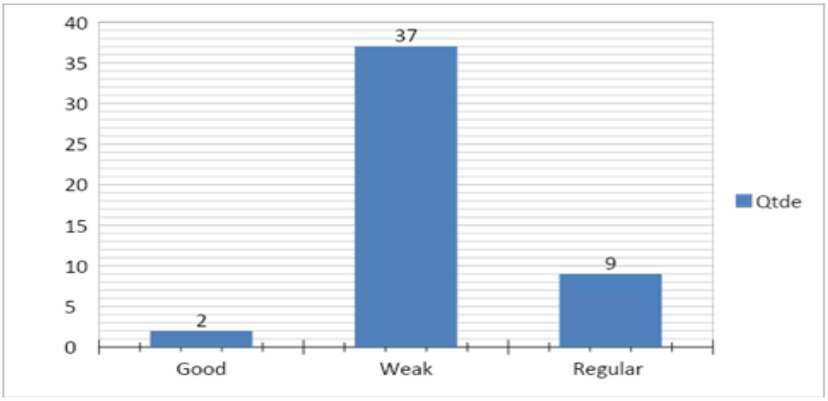
Table 1: *Grades in which students with ADHD are enrolled (n = 49, 2019)*

Elementary School		*High school*	
Grade	*n*	*Grade*	*n*
1st	2	1st	1
2nd	6	2nd	2
3rd	9	3rd	5
4th	5		
5th	7		
6th	3		
7th	7		
8th	1		
9th	1		

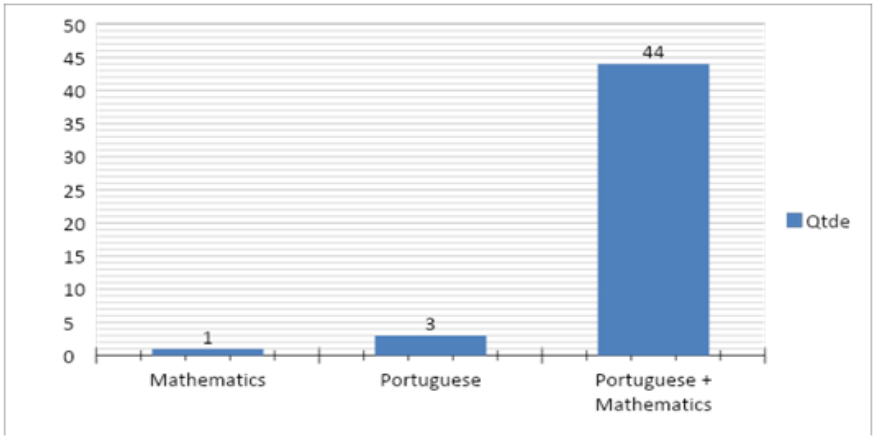
When assessing whether those included in the survey always studied at the same school, 30 (61.2%) always studied at the same school, while 19 (38.7%) came from other schools. The students of this research, although they have ADHD, were never expelled from any school they attended as verified in the researched medical records.

The data regarding general school performance and in which subjects are more difficult can be seen in graphs 5 and 6.

Graph 5: *Overall school performance of students with ADHD (n = 49, 2019)*

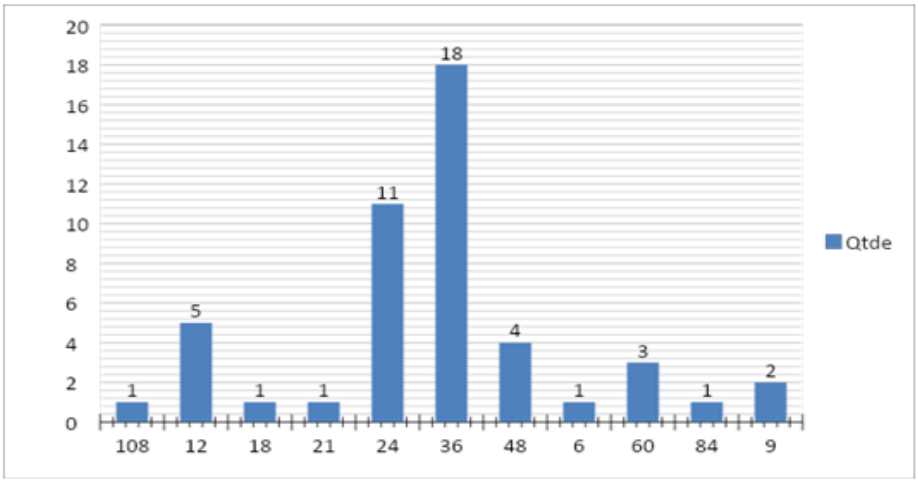


Graph 6: *Main subjects that students with ADHD have greater difficulty (n = 49, 2019)*



The time lapse between the medical diagnosis of ADHD and the collection of data in medical records is shown in Graph 7.

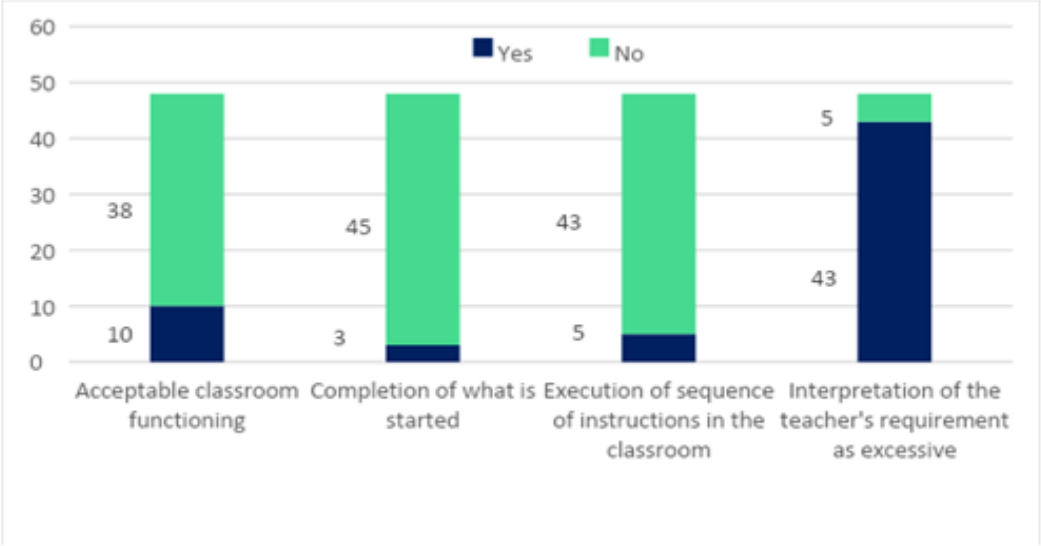
Graph 7: *Time lapse (in months) between medical diagnosis of ADHD and data collection from medical records (n = 49, 2019)*



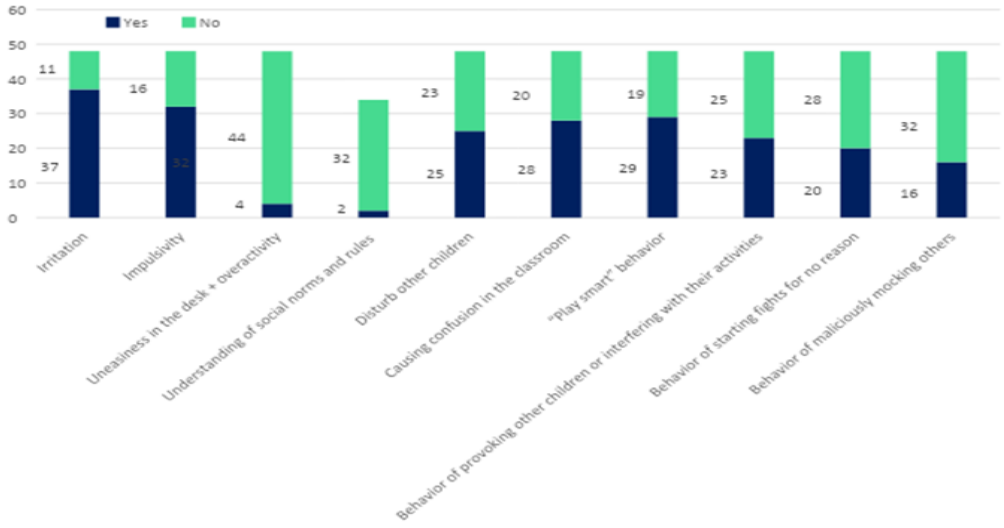
4.3. Dependent Variables

Data on observable daily school behaviors specifically related to ADHD signs and symptoms and diagnostic criteria (DSM-5, 2014) in the children surveyed can be seen in graphs 8 to 11.

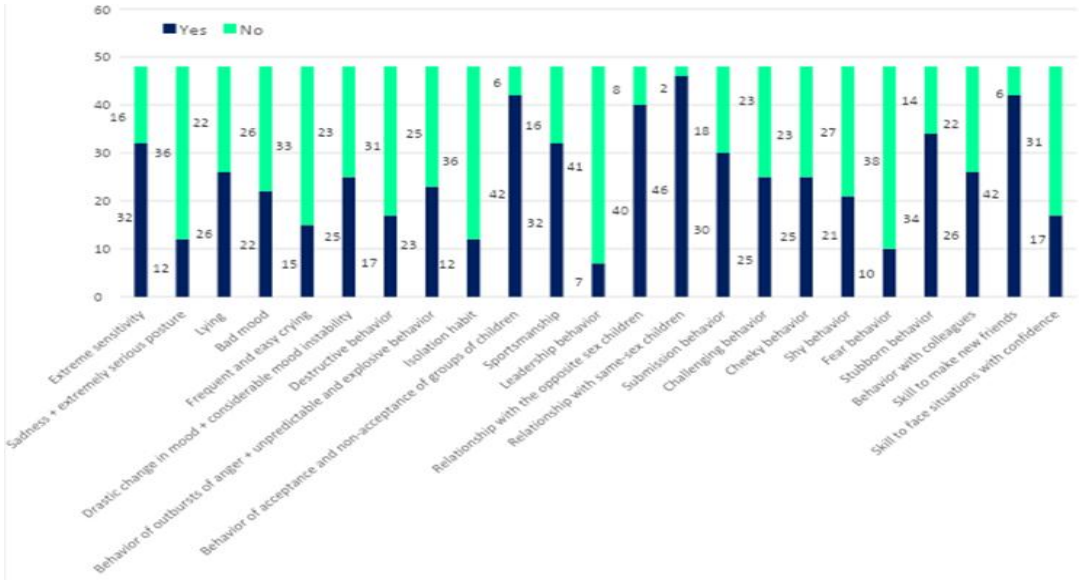
Graph 8: *Frequency of observable daily school behaviors, related to ADHD signs and symptoms and diagnostic criteria - Inattention criteria (n = 49, 2019)*



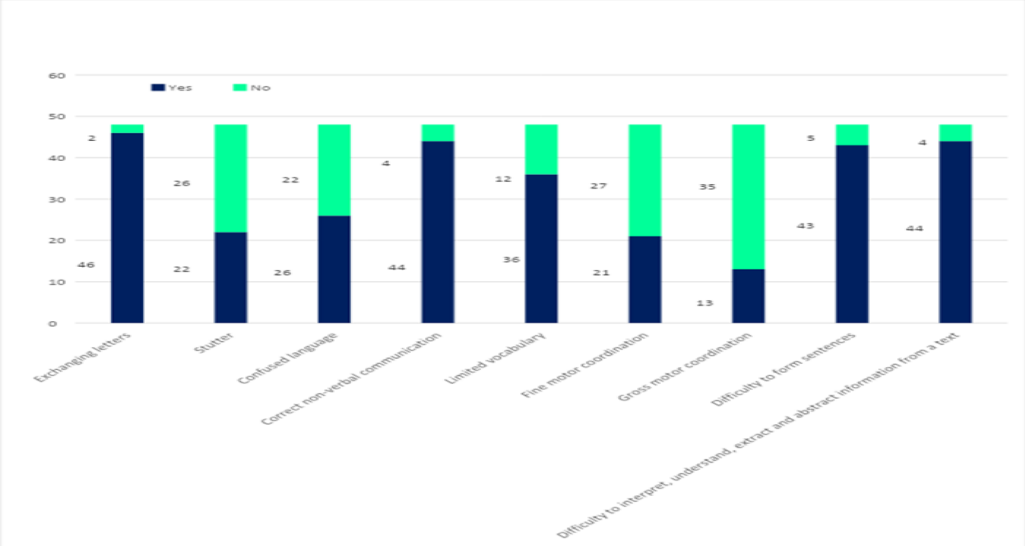
Graph 9: *Frequency of observable daily school behaviors, related to ADHD signs and symptoms and diagnostic criteria - Criteria for hyperactivity and impulsivity (n = 49, 2019)*



Graph 10: *Frequency of observable daily school behaviors, related to ADHD signs and symptoms, showing damage in social functioning (n = 49, 2019)*



Graph 11: *Frequency of observable daily school behaviors, related to ADHD signs and symptoms, showing damage in school functioning (n = 49, 2019)*



5. DISCUSSION

Research shows that the prevalence of ADHD is higher among boys than among girls, with a ratio of 2:1 in population samples and 9:1 in clinical samples [15], data corroborated in the present study. One of the justifications presented for this fact is based on the psychosocial profile of the girls, who are generally inattentive and have no other symptoms, being less uncomfortable for the family and the school, resulting in a lower number of referrals for treatment [16], Exclude: ,2009). In addition, the greater proportion of the disorder in male individuals may be related to the greater number of referrals by boys due to the attribution of hyperactivity to their typical behavior [17].

According to the American Psychiatric Association [1], ADHD, considered a neurodevelopmental disorder, appears before the age of seven.

The fact that ADHD patients are diagnosed mainly during the school period is related to the greater evidence of the signs during the children's entry into school activities, due to from that moment the relationship difficulties with teachers and colleagues become evident, since in the school period the child expands his social system - from the family nucleus to the school and starts to relate with colleagues and teachers [18].

The etiological factors of this pathology are still unknown; however, it is supposed to have a neurological basis, being strongly influenced by the psychic condition and the patient's family context. Many studies show that, despite not being the cause of the development of ADHD, in children with neurobiological predisposition, exposure to a troubled family context acts as a risk factor that can trigger the manifestation of symptoms and alter the course of the disorder [17,18]. In Brazil, a study has revealed that children exposed to constant marital confrontation are 11.66 times more likely to be diagnosed with the disorder [20].

Also according to the line of thought of Rohde & Benczik [21], a very permissive parenting style can be a consequence and not a cause of the disorder, family characteristics such as: chaotic family functioning, high degree of marital conflict; low maternal education; families with lower socioeconomic status; families with only one parent or guardian, or that the father leaves the family, elements found in the present investigation.

Other literature data also show a relationship in family dysfunction and in ADHD, where dys functionality in family dynamics at home is associated with the presence of symptoms of the disturbance [22], corroborated by the present study. With regard to religiosity, data not raised in this research, students who report not having any religion have greater family dysfunction than Christian students and students who do not have religion have greater attention difficulties in relation to Catholics [22].

The literature reports up to 3 times greater chances of failure [23] given that this is not consistent with those found here (6 cases of failure, 12.2%), but we reiterate the question of continued progression existing in our system educational policy.

With regard to the lower school performance of the child with ADHD when compared to the child without ADHD, it is emphasized that the practical-productive performance involved in the act of reading and writing, may be compromised with neurofunctional changes in the brain regions responsible for entry, processing and execution of information, which can affect children with ADHD [24]. These children have little persistence of effort for tasks and low sustained attention, which justifies our data on the predominance of poor school performance (37, 75.5%). However, this problem usually arises when it is attributed to boring, tedious, prolonged or repetitive activities that have no intrinsic appeal to him [25].

However, Oliveira *et al.* [17] showed in their sample that intrinsic motivation and total motivation were not related to school performance.

Pastura *et al.* [23] by stating that the need for 50% of children diagnosed with ADHD to take tutoring in reading and arithmetic, endorse our results that 44 children (89.8%) have more difficulty in Portuguese and Mathematics. It is important to highlight that factors such as lack of attention and motor delays present in children with learning difficulties may be associated with unaccomplishment in school activities [26]. Each time a new motor gesture is learned, it activates brain areas responsible for attention and reasoning, stimulating several brain areas responsible for primarily cognitive learning, such as reading, writing and arithmetic. [27]

Children with ADHD have difficulties in modulating and self-regulating their levels of intrinsic motivation, indicating a primary dysfunction of the reward system that implies the greater need for positive reinforcement by the mediator or teacher to perform school tasks and there is a relationship between extrinsic motivation and performance in reading, writing and arithmetic tasks [17].

Also, according to the American Psychiatric Association [1], ADHD has three main symptoms: inattention, hyperactivity and impulsivity.

Individuals with ADHD experience great difficulty in staying engaged in tasks which have no immediate reward and have a high degree of aversion to delay [28]. Even with the possibility of obtaining more significant rewards in the future, they tend not to be able to self-regulate their behavior and end up preferring immediate rewards, even when they are smaller. Barkley [29] and Montiel *et al.* [30] refer such behaviors to damages in executive functions, specifically in inhibitory control, which is the ability to control a strong impulse in favor of behavior that is more appropriate to the situation (Diamond & Lee, 2015). The aforementioned behavioral characteristics in combination with the attentional deficits common to ADHD are the main causes of damages in the learning process [31] by promoting the inattention observed through everyday school behavior such as not functioning in the classroom, the non-completion of the tasks initiated and the failure to execute sequences of instructions in the classroom, considering the demands of the teacher to be excessive.

The resistance to remain seated and quiet during situations in which the child is expected to remain that way clearly demonstrates hyperactivity and the difficulty in waiting for his/her turn, interrupting people and speaking in a hasty way, the impulsiveness.

Tonelotto and Gonçalves [32] showed that children with attention problems, when compared to the group without the same problems, had a more negative perception of their performance in the classroom context, perceived teachers as less sympathetic towards them and were more cited by their colleagues as rejected and, in the same proportion, less cited when the question was acceptance. Likewise, the study by Capelatto *et al.* [33] identified that children with ADHD feel more guilty, believe that they do more wrong things and have negative self-esteem. For the authors, the difficulties in the attention and executive functions negatively affect the performances in schoolwork and daily tasks, which in turn, can impact the development of self-esteem and cause more feelings of guilt. These 2 studies were carried out with Brazilian children. Molina and Maglio [34] working with Argentine children in the same age group, showed the same trend as in Brazilian studies, with the most negative self-perception being reported by children with ADHD when assessing their academic competence, social acceptance, behavior and global self-esteem . These same children also showed a positive bias, when compared to the parents' perception, in the domains of academic, social and behavioral competence.

All of this reiterates that children with ADHD have difficulties in learning and social interaction with their peers, directly influencing their school performance [23,35]. For positive changes to occur, activities need to be interesting and stimulating to all students, especially students who have attention difficulties and low engagement in the proposed activity. The teacher needs to be clear in his explanations, being able to use images and writing as an aid, it is essential to verify the student's real understanding in the activity [36]. These activities must be playful, as they are indispensable to the educational practice, contributing and enriching the intellectual development of children [37].

Data in the literature show that the low performance in the motor action of the child with ADHD [38] reinforces the characteristics of the disorder emphasized by scholars in the area [39-43]. Children with ADHD have a constant alternation of tasks, reluctance to engage in complex activities that require organization and rules, tolerance to waiting, difficulties in controlling their impulsiveness and staying focused on the task, needing immediate reward. Thus, possibly the fact that the child with ADHD needs to wait his/her turn to participate in the activities, as well as have diversified materials in the same task, contributes to the dispersion. The delays in motor performance, which reinforce the need for activity modification, also favor that he/she gets involved in confusion and transits around other spaces in the classroom. Attention problems can influence basic motor skills (fine and gross stabilizer, locomotive and manipulative) [38,44]. Students with ADHD have a tendency to give quick, although inaccurate answers [39], as well as difficulties with the spatial organization, alignment and maintenance of body posture [45], and this difficulty in maintaining posture can be a determining factor in the ability to maintain attention in activities. The attitudes of engagement demonstrate that the child with ADHD performs most of the skills with difficulties to concentrate, consequently reflecting on the delay of his/her performance in the skills proposed during the class. [38]

With regard to social interactions, most of them have difficulties to carry out school activities in groups and to participate in the games and difficulties to make friends outside the school environment, which implies a restricted number of friends and social isolation, which can be seen in their reports of friends rejection when they want to play together, and the desire to have more friends and to be accepted. In the social interactions with adults, it is reported that they are also permeated by more aversive than positive interactions, with most of the children reporting being targets of scolding and cursing. [46]

5.1. Implications for Practice

It is important to emphasize that children learn in an integrated way, the movement experiences of any activity, must make connection with other areas of knowledge, such as associative, deductive and abstract thinking for the learning of reading, written language, mathematics, among others. In this sense, the importance of teachers' pedagogical reflection is emphasized, redimensioning the role of the educator and placing the learner, especially when he has difficulties in attention and learning, at the center of the teaching-learning process. For this process to occur, it is essential that each teacher uses different methodological proposals, opting for those that best fit the needs of the learners, the school context and the convictions of the educator himself [38].

Low school performance has been strongly associated with the presentation of lower levels of intrinsic motivation [47-49]. Low levels of intrinsic motivation may imply a greater need for external rewards, especially when performing tasks which require greater cognitive effort, as is the case with school tasks. Thus, this result can help to think about management strategies for children with ADHD in the classroom, such as, for example, the positive reinforcement by the teacher [50] since the lower the performance in reading, writing and arithmetic tasks is, the higher the rate of extrinsic motivation [17].

Difficulties in the classroom are challenges encountered by the school with several students and it is necessary to seek to overcome these challenges through strategies that aim to meet the needs of each one, with an emphasis on learning, including those diagnosed with ADHD [51].

6. Conclusion

Considering that ADHD is a disorder that affects the student, causes learning difficulties, generates insecurity and anxiety, it is possible to blame this disorder for the behaviors presented by students in cognitive and intellectual development, the difficulties in the teaching-learning process in the classroom can be overcome when the teacher proposes to confront his own knowledge, actions and practices with new knowledge and strategies, aiming at quality teaching and that the way of teaching a student with ADHD proves to be complex and difficult, it is important to realize the potential that this student may or may not develop and that someone has the ability to recognize his responsibility for the result. Therefore, the teacher must have an emotional balance, be creative, and properly know the student's disorder, as this will make it easier for these students to participate in the classroom, and this is what the present investigation presents: data that show how one can properly know the student's disorder, obtained within the school context, since it is up to the school to provide students with ADHD, meaningful learning according to their potential, trying to guarantee everyone a quality education, in an inclusive way.

It is essential to constantly seek to know more about this disorder, both on the part of the education professionals and the family, from diagnosis to treatment, in order to contribute to offer, in the school context, a meaningful teaching for ADHD.

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The State of Art Education Students' Project Works: the Case of UEW

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Abstract: *This paper, grounded in the mixed-method design and descriptive analysis, is aimed to draw attentions toward the importance of storing, preserving and archiving students' art works to aid teaching and learning of visual arts and howstudents' project works produced by Art Education students at the University of Education were documented, stored, preserve or archived after assessment. The researcher looked at seven units within the Department of Art Education of the University of Education, Winneba and how best they have documented, stored, preserved, or archived students' project works since the inception of the Department or any work done in this regard. The seven units the researcher looked at were the basketry, ceramics, jewellery, leatherwork, painting, sculpture and textiles. It turned out that no attempt has been done in storing, archiving or documenting any sort; apart from disposing of quality works of students, giving them away for free and leaving them at the mercy of the weather to be destroyed. The researcher interacted with seven senior members within seven units of the Department Art Education through the purposive sampling technique to secure data for this paper. These seven senior members were Purposively selected to obtain data for this paper using the unstructured interview and observational methods. Primary data obtained were analysed descriptively and narratively. The only standard forty-seatercapacity lecture room sized convertedinto gallery of the Department of Art Education is not able to hold all the selected best final year students' project works. The gallery is not in the best condition to hold art works as dust continue to destroy the works as well as the gallery has no curator but left in the care of office assistants. The researcher recommends that the Department of Art Education contract web designers to design a databaseto host still images and 360º moving images of these art works to start with in solving this challenge of the Department.*

Key terms: *Art, archive, education, project, Winneba*

1. INTRODUCTION

Final year art education students of the Department of Art Education at the University of Education, Winneba (UEW) as part of their study for the award of various certification take practical courses within each semester throughout their study and they produce a minimum of sixteen or more art (project) works depending on the programme the student offers. Art unlike other theoretical inclined programmes, require extensive time and studio to come out with compelling works (Nortey & Bodjawah, 2014). The Department of Art Education of the University of Education, Winneba is one of the oldest departments of the University when the department of the Teacher Training section of the Art and Crafts Specialist Course(ACSC) was transferred from Kumasi to Winneba in 1958 (Edusei, 2004; I.U.B., 2019; Seid'ou, 2020).This was part of the then Specialist Teacher Training College and the only department founded to train specialist art teachers by going through a vigorous and stringent training in art education until the 1973-1974 academic year when a three-year specialist course in Art was established in a number of basic Teacher Training Colleges (Edusei as cited by Kassah & Kemevor, 2016). The sole aim of the government was to deepen the study of art in Ghanaian schools and the establishment of a special training college was in the right direction to award a certificate and later diploma certificate. The Specialist Training College established in Winneba offered three flagship programmes viz; Home Economics Education, Art Education and Physical Education (PE) that supplied art, home economics and physical education teachers to Ghanaian schools. Teachers from the Specialist Training College were highly sought after by heads of secondary schools then and the headmasters of secondary schools who sought after teachers from (STC) enticed graduates who studied these three programmes within their means. The Specialist

Training College in Winneba was part of diploma awarding institutions that was put together in September 1992 under PNDC Law 322 to form the then University College of Education of Winneba (UCEW), (UEW, November, 2018).

The study of art in Ghana dates back to 1909 when visual art as a subject was included on the school time-table as "hand and eye" to change the mere bookishness of the school course, (Edusei, 2004). Before visual art was introduced to the school time-table in 1909, it had first been introduced in the then Gold Coast, now Ghana in 1908 (Foster as cited in Edusei, 2004). Visual art referred to as "hand and eye" involved the student copying various shapes and lines to enable develop the student's coordination (Edusei, 2004). Edusei (2004) elaborated the history of art by laying it bare how the missionaries who started education in the castle referred to art as 'paganistic' culture which the missionaries abhorred until 1919. It is obviously clear that visual art students produced art works that pertained to the indigenous Ghanaian culture, especially what the missionary teachers termed 'primitive' and 'fetishistic' relating to the Ghanaian indigenous religion (Edusei, 2004), was clear that the missionary castle school teachers did not make any attempt to preserve works produced by their students in this direction. Obviously, this attitude of the missionary castle school teachers contributed to the lack of the Ghanaian visual art schools to inculcate the habit of preserving, storing or archiving art works to date at every level of the Ghanaian school offering art especially at the tertiary levels.

The focus of this paper is to look at the state of students' art (project) works at the Department of Art Education of the University of Education, Winneba; how these works are stored, preserved or archived. The importance of storage, preservation and archiving of students' art works have seriously been neglected over a long period of time through all the Ghanaian educational levels as it stands.Jadzińska (2013) opines that to think of culture, art must be taken care of. Not even the 2019 Creative Arts curriculum for Primary Schools included in its subject aims the preservation, storage and archiving or creative art projects (NaCCA, Ministry of Education, 2019). Ohene-Adu as cited in Sei'dou, 2015 p.15 on a similar mission hinted that "the task would seem to be even more pertinent today when the charge of apathy towards the University's artefacts appears to be tenable", but which the writer suggested documentation and attributions to works on the KNUST[1] campus would find important resource.

The Department of Art Education at the University of Education, Winneba has existed from the onset of the establishment of the then University College of Education of Winneba in 1992 but cannot boast of a curator when KNUST has curators who spearhead regular exhibitions (Diallo, 2017). The Art Education Department run a diploma and bachelor programmes and; postgraduate programmes. Any student who study at the undergraduate level is mandated to choose elective courses in both 2-Dimensional and 3-Dimensional areas of visual art including other mandated general art courses. Depending on the programme one opts to study, a student goes through four semesters for a Diploma programme and eight semesters for a degree programme (Duku & Osei-Poku, 2012). During the course of study, students produce a minimum of either eight to fifteen projects.

The establishment of Achimota school influenced the strong introduction of African art and its principles influenced and shaped the school's programme. Kwame Nkrumah; Ghana's first Prime Minister and President (Elias, 1957) contributed greatly to the development of the creative industry in Ghanaincluding the commissioning works of leading artists like Kofi Antubam, Saka Acquaye, Dr Oku Ampofo, Philip Gbeho (who composed the Ghana national anthem), and Ephraim Amu (who composed the popular anthem "Yen ara ya Asase ni") in the Akan language. From the narrative above, much effort was made to establish art among the Ghanaian fabric of life. There have been major educational reforms in Ghana which have not left out visual art in the educational curriculum to serve its purpose in the development of the nation. The direct effect of theseeducational reforms has but little impact to show when one visitsall government owned Ghanaian schools which offer visual arts in Ghana today to show off. National educational systems change in response to the demands of the nation (Mereku, 2020). It is evident from the above narration that all visual art forms from time memorial allowed the practitioner produce art works which most commissioned sculptural works are evident on the Ghanaian streets to see and maintained for example the Kwame Nkrumah Mausoleum (Savage, 2009).

[1] Kwame Nkrumah University of Science and Technology, Kumasi-Ghana

The 1987 Educational reform programme saw visual art integrated into the school curriculum (Essel et al., 2017). Everyone is born an artist; as individuals have an artistic innate in them especially when we go shopping or faced with making a choice of daily items around us. Everyone needs art; as (Martin, 2014) identified several benefits of art in education to children. To grow the artistic innate in students, the challenge is how to nurture and sustain such artist traits (Essel,Nunoo& Ahiaklo-Kuz, 2017). The ability to store, document, preserve and archive art works should be seriously looked at. Art works typical of Ghanaians depict the Ghanaian culture and for that matter, artist and stakeholders in art in Ghana must endeavour to store, preserve, document and archive art works in any form.Ross (2004) stated that these art forms are part of the visual vernacular that serve to identify Ghana and Africa in general. Ross (2004) advanced her point by indicating the fact that, in Ghana, visual references to indigenous arts are everywhere, in architecture, corporate advertising, textiles, entertainment, artifacts and myriad forms of popular visual culture, much of which are produced for consumption. Obviously, there is the need to preserve, document and archive these works of art to make it available for teaching and learning within Ghanaian schools today. Much work has not been done in protecting Ghana's unique cultural heritage (Ross, 2004). This development has not changed since Ross made this observation. Though the government makes enormous effort in investing in education in Ghana today, the desired investments towards art education as compared to the investment the government makes towards Information and Communication Technology (ICT) does not commensurate that of art education; even though conscious efforts have been made in the direction of expanding internet access and digital skills to Ghanaian schools by the government of Ghana the problems persist (Endert, 2018). Theeffort of the government to invest in ICT and internet access lend itself to the effort tertiary institutions in Ghanaare making considering the portion of their budget they invest into ICT and internet access especially in the wake of COVID-19 but this effort is not extended at investing in art education. The creative arts continue to receive meagre logistic and financial support (Artwatch Ghana, 2017). Brobbey (2015) opined that creative art education is the ideal way to develop creative thinking in learners to be able to withstand the competitive challenges of the 21st century.

The call to integrate information and communication technology in education is the trump card of the 21st education which education stakeholders and policymakers across the globe continue to call for (Agyemang et al., 2019). Considering the strategic introduction of GARNET (Ghana Research and Academic Network, which cater for universities, research institutions and high schools (Quaynor et al., 2020) this system has not made room in the storage, preserving and archiving students' art works though some universities in Ghana are signed onto the DSpace[2]software to create repository to host students' theses. Considering the technology skills acquired by Ghanaian students today and the tools available, the issue of preserving, storing and archiving art works within tertiary institutions in Ghana should be looked at.The Smithsonian libraries hold a collection of digital modern African Art materials on its National Museum of African Art Branch Library repository as a work-in-progress (Stanley, 2020). The Smithsonian Libraries section on modern African art holds among other resources image gallery, art and artists files, audio and video files as well as exhibitions.

Researchers and students often refer to repository for materials to support their academic works; so, the unavailability of archived, preserved or stored art works in any form is a bad practice at the Department of Art Education and among Ghanaian government visual art schools goes a long way in discouraging visual arts students today. Visual arts projects at the Department of Art Education are invaluable asset to visual arts students as well as practicing visual artists. The importance of storage, documenting, preserving and archiving visual arts students' project are unavailablethough these project works are a wealth of source of knowledge that aid in the teaching and learning of Art Education at the Department of Art Education. There have been new and innovative ongoing developments at the College of Art at KNUST to help shape the contemporary Ghanaian art scene while the case of the Art Education Department in UEW[3] is in comma waiting for its resurrection but without any form of resuscitating itwhen the Ghanaian art scene requires a stronger infrastructure (Diallo, 2015). The Department of Art Education at the University of Education, Winneba obviously also require the "silence revolution" (I.U.B., 2019).

[2] It is an open source repository software package typically used for creating open access repositories for scholarly and/or published digital content.
[3] University of Education, Winneba

Kassah & Kemevor (2016) chronicled the challenges of visual arts education in Ghanaian colleges but the issue of the preservation, storing and archiving art works of Colleges of Education students was not touched on neither did they perceive this issue as a challenge that affect the teaching and learning of visual arts in Ghana. This is a major gap in the promotion of art education and the production of art works by students in Ghanaian schools to aid the teaching and learning of visual artsin Ghana as art education policy makers have failed to give the storage, preservation and archiving, the requisite attention so as to encourage art students to invest in their project works. Teachers have often dwelled on students' previous knowledge and teaching and learning materials in lesson delivery which the availability of students' project will serve in this case but are left at the peril of the weather. To buttress this challenge in visual art schools, Mensah (2009 p.16) stated that where studio conditions are good, "only few works are kept there leaving the rest to the mercy of the weather. Students seeing these are often discouraged from working hard to come out with quality works".

2. METHODOLOGY

This paper adopted the mixed method which offered the researcher a legitimate use of multiple approaches in providing answers to the demands of the paper. The qualitative and quantitative approaches and the descriptive analysis concurrently merge with the purposive sampling technique formed one interpretation of the basis of the data that influenced selecting seven units of the Department of Art Education as samples for the study. The seven units sampled were the basketry, ceramics, jewellery, leatherwork, painting, sculpture and textiles units. The purposive sampling technique was opted because initial studies taken show these unitshave large number of art works produced by students studying art education at the Department of Art Education.These works of art produced by students are scattered all over the department and sprawled out of the correspondingunits. The Department of Art Education has more than seven units out of which seven was selected for this study. The researcher interacted with seven senior members and thirty-four (34)course representatives comprising general representatives of each year group (100-400) across the seven units which came up to twenty-eight. In addition to these twenty-eight course representatives studying for first degree (levels one hundred to level four hundred), four diploma one and two (levels one hundred and level two hundred) course representatives for Textiles and Leatherworks were also interviewed which are also within the seven units of the Art Education Department to secure data for this paper. These seven senior members from these units have a range of twenty-five to a minimum of seven years teaching experience at the units in question. These seven senior members were purposively selected to obtain data for this paper using the unstructured interview and observational methods.

As of the time of collecting data for this paper, the Art Education Department run only two courses at the diploma level and these diploma programmesare for a duration of two years. The researcher worked with the course representatives because they worked closely with the various lecturers and their course mates among other duties including accepting and presenting assignments and projects of their course mates to their lecturers and return same when it has been assessed.

The duties of the course representatives were to also locate avenue for exhibition of their projects works for assessment by their various lecturers. Considering their invaluable role the course representatives play, they were the best choice for the researcher to obtain part of the primary data for this paper. The choice of two course representatives for each course in every year comprising a male and a female student was a perfect balanced. Primary data obtained were analysed descriptively and narratively. Four units viz; basketry, jewellery, painting and textiles out of the seven units selected for this study had students works over a period of five years while the other three had only current academic year students'works. These three units have serious space issue. It was evident how students' project works were stored, preserved or archived and made available.

3. RESULTS AND DISCUSSIONS

Technology today defies the traditional structures for exhibiting, collecting and preserving art (Noordegraaf et al., 2013).It appears much effort is being turned towards the collection, analysis, documentation, preservation and restoration of media art in the European universities which are among the leaders of teaching media art programmes but the case of art which most Ghanaian universities continue to teach have not been attended to in terms of its storage, preservation and archiving. Students' project works are rather disposed of at the Department of Art Education semester

by semester because the very studios and lecture rooms are required for teaching every semester. Students are forced to clear and discharge these projects works initially within a close proximity of either the lecture rooms or studios in which the said students used. The Department of Art Education in the era of University College of Education of Winneba had less than sixty-five students for their various diploma courses within an academic year (Opoku-Mensah, 2020; Acquah, 2020; Gyimah, 2020; Ockumpah-Bortei, 2020). In 2018, the Department of Art Education in the era of the University of Education had a total student population of nine hundred and seventy-four (University of Education, Winneba, 2018). From these data, the intake of students in the Department of Art Education in the era of University of Education, Winneba has exponentially increased but using the same lecture and studio spaces used in the days of the University College of Education of Winneba.

The Department of Art Education seriously lack both lecture and studio spaces even for lectures. This leave the authorities of the Department of Art Education with no option than to look on when students' project works are left at the mercy of the weather to destroy. Parsons the New School for Design with its prestigious reputation of a student-teacher ratio of 9:1 is considered as one of the best art schools in the world today (Format, 2018). Kanko-Arthur (2020) said "they were only eight students" in their painting class while studying for the Diploma in Art at the then University College of Education of Winneba. Kanko-Arthur further stated that the eight painting students had a whole studio to themselves.They left their aisles at the painting studio without bothering to move their work till it is assessed and they held exhibition at the end of the academic year till school reopened. Currently, five lecturers handle two hundred and eighty-four students offering Basic Drawing in their third year (Mensah, 2020). Mensah (2020) further stated that he had eighty-eight students offering Painting for the 2018/2019 academic year using the same painting studio. But nowhis students had to leave the studio after lectures for other lectures to take place in the studio. It is clearly evident thatUniversity of Education, Winneba continue to have challenges with studio spaces for the Department of Art Education to cater for the large students' intakes studying art education (UEW, 2016; UEW, 2018).Much has not been done in terms of studio space and storing away students' project works except a shed added to the existing lecture rooms and studios the Department of Art Education inherited from the Specialist Teacher Training College to the University of College of Education of Winneba in the early 1990s. Chassis of destroyed students' project works becomes nuisance and rubbish that the students' association of the department are compelled to clear this rubbish away at the beginning of every semester to make room for their lectures. This issue is observed every semester considering the total number of students the department has and the number of projects each student has to produce within a semester. Considering the number of students, the Department of Art Education hold and its related lack of infrastructure, specialized studios and rooms for specific lectures has not been able to help in this matter.

Students' are not able to leave ongoing projects at the department as the limited lecture rooms and studios are required for the use of other students. This practice has not been helpful especially with the studio projects which students take along with them whenthe theoretical aspect of the lecture is ended but the project is not done. Lecturers and technicians are not in the position to give assistance to students when project works are executed out of the studios and lecture rooms. It came to light from the interaction with the subjects (units) that lecturers have a challenge ascertaining if his or her students executed the project works by themselves. The other side of this challenge of the lecturers was with the students. Students often required the attention of their lecturers and technicians when they encounter challenges as they execute their project works out of the sight of the lectures and technicians. Due to lecture and studio spaces challenge at the Department of Art Education, students' lectures are cramped within a day.Multiples of lectures for students a day often leaves these students with lectures back-to-back throughout the week; forcingstudents to abandon uncompleted project work to join in the next lecture on a row which is often very tiring for the students. Students are forced to enterinto their next lecture with them their unfinished project works because the last lecture room has a lecture and the student has no locker to leave even his tools than to carry with him or her into the next lecture. Students' wish they could come in late in the night to continue with their project works but they are robbed of such opportunity.

Students are forced to bring in taxi cabs to collect their ongoing project works to and fro since the student cannot afford to leave their works at the studio or lecture room. Some units of the Department of Art Education had issues of storing materials for students' use because all form of lectures is held

in the suppose specialized studios and lecture rooms which is often a nuisance for both students and the lecturers. Due to lack of studio and lecture space at the Department of Art Education, students are forced to come in early to wait for their lecture because they may not have a comfortable sitting space or working space and in the process end up conversing among themselves. Such conversations often become loud and disturb and distract ongoing lectures. Course representatives draw the students' attention but the issue persist which requires that the lecturer has to come in and this is a challenge that needs attention.

Studio and lecture spaces are too tight for the number of students at the Department of Art Education offering each course that its often impossible for students to move around in class even if one has to use the toilet. Students are not able to exhibit their project works for commentary to aid them work on their weakness to perform better in their next project. Some students do not get the opportunity to collect their project works after assessment by the lecturer when they are readily not available. They only find their project works rather destroyed. The researcher observed that students cart truckloads of project works to the refuse dump at the beginning of every semester to make room for the new semester project works. This exercise comes at a cost to the students' association because the volume of rubbish these project works generate as well as the projects works that need to be cleared away are too large for the University cleaners assigned to the department to handle.

The issue of space at the Department of Art Education is out of hand as course leaders, of the various courses, have to lay ambush for lecture rooms. The impatiently wait at the entrance of these places to capture the venue for their use. The senior members could not stash their offices with students' project works and are often forced to instantly mark and return the project works to the students or they may not have space for themselves.Senior members of the Department of Art Education lamented the situation is not healthy for teaching and learning in this 21st century. The senior members observed this situation did not help them observe the progress of their students since every semester's project works has to be cleared to make room for the new semester's work. One could not leave best students project works in the studio and lecture rooms neither could they store such project works in their offices. It is disheartening to see project works being destroyed and some of the senior members of the Department of Art Education felt bad when they task students to execute good projects works considering the monetary aspect involved and one looks on helplessness when it has to be cart away to make room for new project works. Some large tools and machines had to be put away due to space.

It comes up among the senior members that they had no space to practice to encourage students. Some senior members are forced to practice at their residence instead. Lecturers could not task students to execute life size project works because of such project works would be destroyed to make room for other project. Senior members lamented that they are overwhelmed by the number of students the department admit every year which is a challenge for them. The only tiny art gallery of the Department of Art Education could neither hold any more works as it has been obsolete considering its size and the fact that it is a makeshift gallery. This gallery is not a purpose built one. Senior members of the Department of Art Education look forward to a befitting art gallery, studios and lecture rooms. A gallery would exhibit some good project works of students and aid teaching and learning at the department as some senior members observed. Senior members hoped they got help with the documentation and archival of students' project works in any form.

The researcher again observed that best selected project works for exhibitions are stored in the same lecture rooms and studios where students hold lectures. These best selected project works collect dust and often touched by students from other units within the Department of Art Education.These students are fascinated by these works as they use the studios and lecture rooms for their lectures eventually destroying these works.

4. Conclusion and Recommendations

Students' project worksare hard to find, inappropriate for reference purposes and does not support teaching and learning purposes at the Department of Art Education. Best selected project works of students exhibited at the art gallery have collected dust and are not appropriate for exhibition so the Department of Art Education are discouraged to keep more of such works. The project works of students at the department are nuisance and is nothing less than rubbish. Due to the issue of space at the department, students' project worksare not well stored considering the haphazardly manner in which works of studentsare handled within the studios of the Department of Art Education. Students

studying the various aspects of art should be encouraged to find solution in archiving their project works. This habit when formed early would be taken along with students from the department to teach visual art to students at the Senior High Schools.

Broken down chassis of students' sculpture works should be disposed of well as the clearing of rubbish and project works of students are often concentrated within the studios leaving works at the entrance to the department and around the buildings. Though the department has initiated the construction of sheds but it is a temporary solution to create space though it's not enough. The challenge at hand at the Department of Art Education requires a collective support from stakeholders and the University authorities. Construction of sheds within the department could temporarily ease the challenge to some extend while the Department of Art Education together with the University find a lasting solution.

Project works of students at the Department of Art Education should be collated, sorted, documented, archived and exhibited through digital archives. Digital archives would provide a solution to the myriad and variant media of art works as well as the cultural preservation produced by students year on year during their study at the Department of Art Education.Senior members at the department could employ the use of 3-D technology to cut down on the number of projects works students execute within a semester. The use of technology would be a first step in archiving to reach a wider audience and for research purposes.

The researcher recommends that the Department of Art Education contracts web designers to design a database to host still images and 360º moving images of these art works to start with in solving this challenge of the department. The Department of Art Education and the University of Education, Winneba should also build a digital repository to hold documented digital versions of the project works of students to aid teaching and learning. Senior members of the Department of Art Education should write grant proposal for funding to support this cause. The researcher hopes this paper opens a discussion and further studies in this direction to aid, establish and archive visual art well within the Ghanaian culture.

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Methods of Learning English Skills outside Classroom of Students: A Case Study in Vietnam

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Abstract: *This research looks into the methods that university students employed in their after-class practice and the factors affecting their options of those methods. An English questionnaire was designed to collect data on the most popular methods that they adopted to learn four skills: reading, writing, speaking and listening outside classroom, the frequency of using and the reason why they choose these methods. It has been revealed that students regularly exploited a variety of methods, such as doing reading and listening sections, free-writing about any topics, self-talking in order to polish skills. On the other hand, other useful methods such as talking to foreigners, reading literature works, group study or listening to radio are not highly appreciated. Generally, students' allotted time and test format at Trade Union University, Vietnam had the greatest impact on first year students' decision in utilizing certain learning methods. It is recommended that a wide range of helpful methods should be applied, which will contribute to students' acquisition of English.*

Key terms: *skills, university students, learning, outside classroom.*

1. Introduction

To master a foreign language, practicing frequently to form "skills" plays an important role. However, exploiting the appropriate methods to improve English skills is a matter of deep concerns of many students. According to previous study, regular practicing of English both in and, particularly, after class could drive students to their peak performance [1]. Therefore, it is essential to find out suitable methods for practicing, which is a focus of preceding research in the world. However, in Vietnam, language learning strategies had not been sufficiently paid attention to [2]. To investigate thoroughly this matter, a research was carried out to discover the useful methods of learning four English skills: reading, writing, listening and speaking outside classroom among English lessons at Trade Union University. It focused on discovering whether students had suitable learning methods, which methods were employed to accelerate study progress, the regularity of using these methods after school as well as what factors influenced students' options.

2. Materials And Methods

To collect data for the study, a questionnaire in English was developed. The questions were designed to find out if students formed their learning methods, what methods and how frequently they were used outside classroom together with why students selected those methods. A survey was carried out four hundreds seventy five at forty five classes of Trade Union University. Any queries or misunderstandings were fully answered before students progressed to finishing the questionnaire. All the handouts were collected 20 minutes later for the next processing.

3. Results

3.1. Current State of Forming Suitable Methods for Learning English Outside Classroom at Trade Union University

The investigation shows that the number of students who had suitable methods for learning English skills outside classroom appears to be dominant. As shown in chart 1, the percentage of students who formed their own learning methods (75%) is three times greater than that of students who did not have and were not sure (15% and 10%).

3.2. Methods for Learning Four English Skills Outside Classroom of Students

3.2.1. Reading Skill

Doing reading exercises seems to be the most popular method of all. Chart 1 shows that approximately 100 per cent of asked students chose reading exercises. 92% students regularly practiced doing reading sections. This skill can be explained by the format of reading test at Trade Union University and the reputation of international tests. In contrast, students rarely turned to newspapers, journals to progress reading competence with 5% and 22% of students respectively.

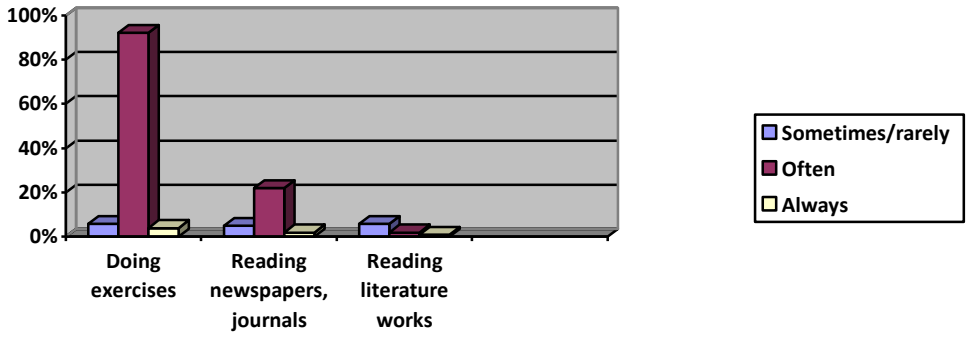

Chart 1. *Methods and frequency for improving reading skill outside classroom*

3.2.2. Writing Skill

Generally, there seems to be a stark discrepancy among the three methods with students' priority to "writing on free topics". The investigation indicates that writing on free topics was widely accepted by English lessons (75% of students). 69% students got used to writing on free topics in order to build up their skill. This finding is congruent with the statement [4, 5]. All of them insisted that more essays students wrote, the better writers they tended to be. On the contrary, the number of choices of reading English literature works is three times lower than for writing on free topics (34% of students); a few students (10%) had a habit of using this method.

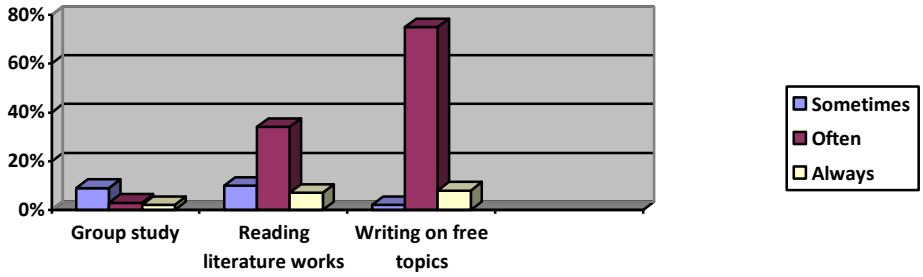

Chart2. *Methods and frequency for improving writing skill outside classroom*

3.2.3. Listening Skill

In general, students favored not only course books but also means of entertainment like watching TV and listening to songs to support their listening skill.

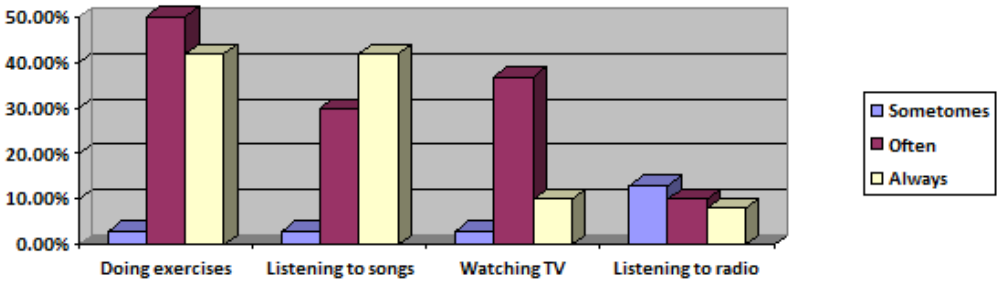

Chart3. *Methods and frequency for improving listening skill outside classroom*

Firstly, most of the students (95%) regarded doing listening exercises as the most popular method. Its popularity was proved by the fact that 42% students did listening exercises with high frequency and 50% often spent time practicing this method. This indicates that students tended to do preparation exercises to polish listening skill. This conclusion goes in line with the findings [4]. She asserted that students' skills and performance could be effectively improved by doing further exercises. Moreover, TOEIC listening exercises is highly valued worldwide because of their international standard of language assessment. Secondly, nearly 75 % of the students agreed that frequent listening to English songs enhanced their listening study. Finally, the number of students choosing listening to radio to improve listening skill is quite low (30%) and only equals to half of those watching TV (48%).

3.2.4. Speaking Skill

The majority of the students (87, 5%) considered self-talking the most valuable method and 80% of them had a habit of practicing this method regularly.

However, when it comes to speaking in front of other people such as talking to native speakers, joining speaking clubs or groups and communicating in daily life, the number of students who preferred those methods is lower (with about 25% of students respectively) than that for self-talking and using mass media. Nevertheless, there are particularly fewer students practicing those methods regularly. The possible reason could be students' inactive and apathetic way of learning. They demonstrated that students were passive and practiced speaking little English in front of other people because they were not confident.

4. DISCUSSION

This conclusion for learning English outside classroom disconfirms what Le [2] had explored. He proved that the efficiency of learning methods was not recognized by most learners of English. In reality, studying English at university requires a wide range of effective methods, of which all students should be fully conscious.

This result of improving reading skill outside classroom disconfirms the findings [3] in which they insisted that both literature works and journals were necessary for students to employ. The discrepancy may be resulted from students' passive learning method which might lead to the lack of practical reading skill in the future.

All research for improving writing skill outside classroom proved that reading English materials was a valuable tool which should be combined with writing to improve writing ability because those materials were copious sources of vocabulary, grammar and styles. Besides, not many students favored group working outside classroom. It reveals that students did not take group study into consideration and could not recognize its real efficiency.

Method for improving listening skill outside classroom seems that melodies could lead students to a good state of understanding spoken English. This confirms the research in "How to learn English" [5]. They stated that listening comprehension could be developed thanks to getting lyrics and singing after the artists because listeners got familiar with sounds, voices, intonations and rhythms of native speakers. Moreover, Santrock & Halonen [6] had the same idea about songs, which could naturally expose learners to English, and their good effects on student's memory. The reason might be TV is more attractive than radio. This is congruent with studies of Centre for Independent Language Learning [7]. All their research deduced that students could understand more about body languages and topics through realistic programs on TV than radio.

This coincides with what Donald & Kneale [3] and Gardner & Jewler [8] found out. They stated that "self-talking" technique could easily improve student's spoken language outside classroom and bring practical benefit to the development of communicating ability. Furthermore, among 80% students who voted for advantage of mass media, 65% of students approved that frequent exposure to mass media was a component of success in mastering speaking skill. This goes in line with the recommendation in "Learning English through movies" [10]. In this article, mass media (TV, radio, etc.) played an important role in learning spoken English because learners could experience native speakers' real-life situation, useful language expressions and phrases for conversation.

5. CONCLUSION

To sum up, through this small-scale investigation, some of the most used methods to improve English skills outside classroom of students at Trade union University were discovered. On the whole, certain methods of learning four English skills have been regularly applied by most of the students. For example, the students frequently practiced TOEIC exercises to enhance receptive skills (reading and listening). Furthermore, they regularly imposed upon mass media or self-talking in English to cultivate their writing and speaking capacity. Additionally, it was test format at university and time that affected their decision of selecting suitable methods the most. In addition, the other methods such as group-working, examined to be valuable for learning after school, were not reasonably evaluated. It is recommended that practicing English skills should involve active and flexible methods. They can boost their listening skill through means of entertainment, which is not only interesting but also very practical. Particularly, students should manage time reasonably to join English clubs and social activities to build up confidence and practical skills.

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Promotion of School Children Dietary Habits

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Abstract:

Aims/Background: *Promoting the health of children through adequate diet is a panacea to healthy development and meaningful contributions to society. Schools are ideal settings for the inculcation of the knowledge of adequate diet in children. Schools have the opportunity to teach young people about food and nutrition thereby inculcating the importance of a balanced-diet for future health.*

Method: *The paper is a theoretical review that reviewed articles on health-promotion among children aged 10 – 12 years in terms of inculcating knowledge of balanced-diet and healthy choice of food, and also identified lapses in school-based intervention in the promotion of healthy eating and lifestyle. Health promoting school concept was also viewed as providing a framework for a whole-school-approach to food and nutrition.*

Findings: *In order for school children's dietary habits to be promoted; schools need to be health promoting. A health promoting school is one which enables students, staff, parents and the community it serves to work together towards a healthier life, school and society. The school curriculum, school environment, and ethos; all working in synergy to re-enforce healthy dietary messages making for a whole school approach to food and nutrition is necessary in the promotion of healthy dietary habits in children.*

Conclusion: *This paper contributes to the body of knowledge of inculcating healthy eating knowledge to school children by critically analysing empirical studies under three themes - dietary habits of school-aged children; factors influencing children's choice of food; and health-promoting-school, and raising under each theme some pertinent questions begging for answers.*

Key terms: *health promotion, children, dietary habits, advertising, nutrition education*

Article Type: *Theoretical Review*

1. INTRODUCTION

Research studies show a growing concern about the diet of young people globally (Rugai and Hamilton-Ekeke, 2015). Data revealed for example, a movement away from regular meals, increase in snacking and low consumption of fruits and vegetables to a high consumption of fatty and sugary foods (Robert, Kingdom, Frith and Tudor-Smith, 1997; Umeh and Crabtree, 2006, Hamilton-Ekeke and Thomas, 2009 Hamilton-Ekeke, 2016). The level of evidence that a dietary factor could be involved in the promotion of or protection against the development of obesity has been put forward (Hamilton-Ekeke & Thomas, 2005). Research has revealed a relationship between diet (a high consumption of energy dense-food) and obesity (Jung, 1997). Most of the debate about fat and carbohydrate contents of diet in relation to obesity centres on the effects of altering the reciprocal proportions of carbohydrate and fat in the diet on energy density, total energy intake and body weight (Katan, Grundy and Willett, 1997). Most obesity interventions have taken place in clinical settings. However, schools, also provide an opportunity for preventing and treating obesity (Sahota, Rudolf, Dixey, Hill, Barth and Cade, 2001). However, the lapse of most of the school-based intervention

targets obese children (often volunteered by parents). Such targeting may increase stigmatisation of children at school.

It has long been recognised that schools can play a major role in dietary change (Hamilton-Ekeke, 2016; Young, 1993). Most school-based approaches have targeted obese children, with more success in primary school aged children (Parcel, Simons-Morton and Baranowski, 1988). Seidell (1998) suggested that more specific interventions targeted at the different factors influencing children's eating and physical activity behaviour (classroom education, food service, parents) may be needed in the tackling of obesity. Schools have the opportunity to teach young people about food and nutrition thereby inculcating the importance of a balanced diet for future health (Hamilton-Ekeke, Egumu, and Inengite, 2020). A health promoting school is one which enables students, staff, parents and the community it serves to work together towards a healthier life, school and society (Bowker, Crosswaite Hickman, McGuffin and Tudor-Smith, 1998). Health promoting school concept is viewed as providing a framework for a whole school approach to food and nutrition. This concept combines health education in the curriculum with the reinforcing effect of a supportive environment and ethos. Central to this - health education in the curriculum and supportive environment and ethos is 'how' curriculum content is implemented – teaching method, which should be underpinned by learning theories.

Stewart-Brown (2006) conducted a meta-review of more recent reviews of school-based interventions in relation to a range of health issues, notably healthy eating, physical activities, mental health and substance abuse. The study concluded that there was evidence of a positive impact of school-based interventions on the four health issues considered. Consequently, the review picked up on several methodological problems that have implications for the adequacy with which the health-promoting school has been, and might be, evaluated. One of these methodological problems is the impact of school on pupils' health. There are other sources of evidence on the impact of schools on pupil health, which are relevant to the health promoting school, but have not yet been incorporated into the evidence-base. One of these refers to studies that owe more to educational than health research, where the focus is on variation in pupil outcomes within school and between schools (West, 2006).

The theoretical position of Horne, Bowdery and Egerton (1998) on healthy eating for children combines the findings of contemporary work on learning and cognitive processes with the socio-cultural insights of Vygotsky and Mead. In their view, the convergence in humans of classical and operant conditioning processes with the acquisition of language, including the ability to respond to and use names, verbal propositions and rules, exerts a pervasive influence on human behaviour. In the context of food choice for instance, they maintain that once children are verbally adept, they no longer react to foods merely as particular objects with inherent qualities of taste, smell, appearance, etc., but respond to them as named classes of items and respond to the verbalisations that they themselves and others make about those named classes. Nutrition educators acknowledge that a wide variety of factors influence children's eating behaviour. Factors that could influence a child's food choices are: nutrition knowledge, physiological needs, body image, food preferences, parental practices, peers, media, social norms, fast foods and personal experiences (Parmenter, Waller and Wardle, 2000). The literature on eating behaviour and its relation to nutrition knowledge is contradictory. Some researchers have shown that nutrition knowledge is highly and positively related to the behaviour towards nutrition (Pirouzina, 2001; Suzuki and Rowdder, 2002). Other researchers, however, found little correlation between nutrition knowledge and actual choices of healthy food (Story and Resnick, 1986; Halverson, 1987) hence the aim of this review.

2. METHOD

The paper is a theoretical review that reviewed articles on health-promotion among children aged 10 – 12 years in terms of inculcating knowledge of balanced-diet and healthy choice of food, and also identified lapses in school-based intervention in the promotion of healthy eating and lifestyle. Health promoting school concept was also viewed as providing a framework for a whole-school-approach to food and nutrition. Three key themes emerged from the literature search for this paper and themes are:

- Dietary habits of school-aged children;
- Factors influencing children's choice of food;
- Health promoting school.

Each of the four key themes was critically reviewed in terms of methods of data collection, sample, validity and reliability of instruments employed and interpretation placed on data. Emphasis was placed on synthesising methods, samples and ways in which data are interpreted. At the end of each reviewed theme are two sub-sections titled 'overview of key issues' and 'key emerging questions' were arrived at. The former is a summary of the criticisms of the various articles reviewed under the particular sub-section, while the latter are questions arising from the reviewed articles. This method of research was also employed in the following research (Bröder et al 2019; Sorensen, Van den Broucke, Fullam, Doyle, Pelikan, Slonska, & Brand, 2012; Van Den Broucke, 2014).

3. FINDINGS / DISCUSSIONS

3.1. Dietary Habits of School-Aged Children

There is a growing body of evidence that suggests that the chronic disease conditions of later life, in particular coronary heart disease, Type 2 diabetes and hypertension, have their origin in childhood (Lieberman, 2004; Hamilton-Ekeke, 2018). Poor diet in children is associated with a variety of problems including poor physical and intellectual development. The findings of Turtle, Jones and Hickman, (1997) reported the daily consumption of sugary foods like chocolate, sweets and fizzy drinks. Daily consumption of fresh fruit declined for girls and older pupils, but even in younger children, girls ate more fresh fruits than boys. Boys overall appeared to eat diets with higher proportions of convenience foods, but were far more physically active than girls. These data together with those presented by Hackett *et al.* (1997) suggested that despite the increased provision of healthy nutrition information there has been little change in food consumption. External factors such as peer group pressure and food advertising can direct young people away from healthy food choices.

3.1.1. Children And Advertising

Children learn about food and nutrition at school but additional sources of information are apparent in the wider environment, at home and in shops through media advertising. It has been found that adverts for food are most common during times when children are most likely to be watching; and those periods are dominated by advertisements for foods which are high in fat, sugar and salt (Dickinson, 2000). Dickinson (2000) who found out that there were 1,186 advertisements for food; more than four food adverts for every hour of output on ITV and Channel 4 and indeed, adverts for fatty and sugary foods outnumbered adverts for other foods.

The content of advertising specifically directed towards children has been previously investigated (Galst 1980). The main themes of advertising during 'children's programmes' were for toys, children's breakfast cereals (often high in sugar) other foods and snacks and chocolate and sweets. Unfortunately, some of which are food products that if eaten in excess can be detrimental to health. Because of the concentration of children's advertising on food items, attempts have been made to empirically investigate the effect on children's food choice by manipulating specific advertising material. Gorn and Goldberg (1982) showed children, age 5-8 years, either a 30 minutes cartoon interspersed with advertisements for sugary snacks and drinks or the same cartoon interspersed with advertisements for orange juice and fruits. The children watched the programmes over a two-week period and their snack choices were monitored. The study demonstrated that food choices tended to reflect the product advertising to which they had been exposed.

Galst (1980) investigated the snack food choice of 65 children between the ages of three and seven. A 30 minutes cartoon programme was interspersed with different food commercials and a healthy eating advertisement. The children saw the programmes every day for four weeks with or without comments from an adult promoting healthy-eating. The most effective way of counterbalancing the children's inclination to choose sugary snacks was a combination of the healthy message and comments from an adult who watched the programme with the children.

Additional factors have been shown to counterbalance the effects of advertising:

- The age of the child: younger children are more susceptible than older ones (Young 1990);
- Repetition and level of exposure: younger children find recognition of a familiar character in advertisements pleasurable; in older children increasing exposure has a negative effect (Young 1990);
- Parental mediation and discussion. Goldberg, Gorn and Gibson (1987) found that higher levels parental education and social class militated against the effects of television viewing and

advertising. The evidence suggested that parents who are less well educated co-view more television with their children, and the extent of children-parent interaction subsequent to that exposure was less than for college educated parents.

Dickinson (2000) argued that television messages on food are not overwhelmingly 'unhealthy' compared to television adverts on food, as branded food products of course, dominate advertising. He was able to come to this conclusion by comparing the balance of different food groups on television food messages with the recommended balance of foods given in the *Balance of Good Health*. Dickinson also found that television presents a very confused, and on the whole contradictory, set of images about food and eating. What television tells us about food does not constitute ordered messages; it is, instead, a collection of disordered messages and because of the contradictory nature of television messages about food and eating, young people were able to find support and justification for a variety of conflicting diets and eating patterns, healthy and less healthy. The arguments so far support the role that television advertising has in providing information about food and influencing choice of food. Unfortunately, the information provided does not favour healthy eating and the 'Balance of Good Health' categorisation of food groups have been used as a justification of television messages being 'healthy'.

- **Overview of Key Issues**

It is evident from the research studies that the dietary pattern of school children has not changed irrespective of the increased provision of healthy nutrition information (e.g. 5 A Day). Children tend to consume fewer classes of food in their choice combination and also tend to consume the 'same classes' of food most of the time. The macronutrient classes of food (carbohydrate, protein and fat), when consumed in excess, can be detrimental to health. The precursor of some chronic diseases starts in childhood and this is the time when dietary habits start to be formed.

- **Key Emerging Questions**

A number of key questions regarding dietary habits of school-aged children require further research. In terms of the influence of nutrition education received at school, answers to the following questions need to be sought:

- Can classroom teaching of healthy eating influence children's choice of food?
- Can children demonstrate understanding of the various classes of food?
- Can children demonstrate the principles underpinning healthy eating?
- What is the place of advertisements in the choice of children's food?
- How does peer-group influence choice of children's food?
- How can parents be involved in their children's awareness of healthy eating?

3.2. Factors Influencing Children Choice of Food

The second theme reviewed in this paper is factors influencing children choice of food, evidence abound to the fact that wrong choice of food which most probably is as a result of lack of knowledge in balanced diet and healthy eating in school age children leads to obesity (Catford, 2003; Carter and Swimburn, 2004). Dietary awareness of children is subject to a range of complex interacting forces. During the formative years of childhood (0-5 years), parents largely influence the food choice of their offspring (Hamilton-Ekeke and Thomas, 2007). As childhood progresses, parental influence decreases in strength and additional forces start to compete. Peer pressure, the media, and nutrition education may make an impression on children's attitudes and choice of food.

Eves, Corney, Kipps, Noble and Lumbers (1997), in their study, established the factors affecting meal choice of primary school pupils by presenting photographs of a range of foods typically offered to them in their school canteen; the most often selected by the children for their preferred meal were pizza, chips, baked beans and ice cream with chocolate sauce. The main reasons for selecting these meals were the 'taste', 'familiarity' and 'healthiness'. The main reason why individual foods were 'liked' or 'disliked' was taste. Other factors included texture and dislike of a particular ingredient (e.g. cheese). The study used a methodology similar to the 'stacking box' method published by Ahlstrom, Baird and Jonsson 1990. The food items involved in the study were high quality-foods that are typically offered in school canteens. All foods were obtained from a primary school in the study area

to ensure that the foods were representative. Children were presented with the food photographs (22 in total) in four groups, representing the main part of the meal (7 items), starch component (5 items), the vegetables (5 items) and the dessert (5 items). Children were asked to select one item from each group to make the meal that they would choose if offered the range of foods. The study took place amongst 123 primary school children (9-10 years old) in 14 schools. Each child was interviewed on a one-to-one basis. Methods were piloted prior to their final use and no changes were required, as children had no difficulties with the methods used. Instruments employed in the study were not validated.

Taste was also found to dominate the 'liked' breakfast choice of 10-16 years old school boys as investigated by Gummeson *et al.* (1996). Analysis of the meal items selected by the pupils indicated that the average percentage energy as fat in the selected meal was 44.2%, which is higher than the 42.8% recorded for meals taken from school canteens in the National Food Survey (1995). One way to determine the misconceptions or alternative conceptions held by students on balanced diet and healthy eating might be to look at the factors that dominate their choice of food. The result of Eves *et al.* (1997) indicated that the reasons that children like foods differ but taste was mentioned most often in relation to both liking and disliking particular items. This is consistent with the results of Gummeson *et al.* (1996) who also found taste to be important in children's food choices. Both results thus indicated that the choices likely to be made by primary and even secondary school children resulted in fat levels that exceed current dietary recommendations, and that healthiness is not the main criterion used by most children in their meal selections. This might be as a result of lack of knowledge of adequate and healthy diet. Ahlstrom, Baird and Jonsson (1990) proposed that satisfaction with school meals might be improved if the variety of food offered was increased but Eves *et al.* (1997) slightly contrasted this by stating that the provision of more choices will not necessarily improve the nutritional value of a meal, however, if the extra choices are not carefully selected. A number of publications have indicated that the meals that children choose at school are high in fat (French, Story and Jeffery, 2001; Carter and Swinburn, 2004; Hamilton-Ekeke and Thomas, 2005; Hamilton-Ekeke and Thomas, 2008; Hamilton-Ekeke, 2016), and that poor choices of meals can result in a poorly balanced diet. An understanding of balanced diet and healthy eating is needed if more healthy meal options that children will choose to eat will be promoted.

➢ Overview of Key Issues

It is evident from the research that healthiness was not the main reason of liking and choosing food. It is well known that the foundations for food choice are laid down in childhood. Poor dietary habits learned in childhood may persist into adult life. The dietary awareness of children is subject to a range of complex interacting forces. The factors, which influence children's food choices, are not well understood. Therefore to bring about changes in eating patterns it is necessary to have some understanding of how dietary habits are formed in early childhood and the extent to which these can be modified. It has been found (Eves *et al*., 1997) that it is easier to encourage healthy meal choices in primary schools, where choices are more constrained, and important to develop healthy eating practices at early age that will then be carried into later life.

The main emphasis of health and nutrition education has been on the role of diet in the prevention of disease in later life. However, young people have little perception of the future and therefore see little relevance of disease prevention. This makes the task of health and nutrition education more difficult. The reviewed studies show the continued preference of young people for snack items high in fat and sugar. Young people must be motivated to take responsibility for their own diets. To achieve this emphasis must be placed on the more immediate benefits to them. Nutritional requirements needed to maintain a healthy body alone have proved an inadequate mechanism in changing food consumption behaviour. It must therefore be recognised that factors other than knowledge and information play a more important role in food choice. For children these factors include parents, advertising and peers.

➢ Key Emerging Questions

In order to promote 'healthiness' as a reason for choice of food of school-aged children, the following questions need to be addressed:

- 'What are the determinants of children's food preferences and rejections?'
- 'How can the school environment create barriers for health behaviours?'

- 'How can the school environment and ethos promote healthy behaviours?'
- 'What are the ways in which the school food environment can be improved?'
- 'How is the curriculum content on healthy eating implemented by the schoolteachers?'

3.3. Health Promoting Schools

Catford (2003 p.3) asserted that 'in promoting healthy weight we need to make a giant leap forward and act creatively and boldly, planners need to take a leaf from other public health strategies such as tobacco, road accidents and infectious diseases to see that education needs to under pin rather than lead action'. Schools are considered appropriate settings for health promotion for children, since the school may provide an environment for improving health, self-esteem, behaviours and life skills (Simone, Samuel, Richard and Aubrey, 2003). Schools can reach almost all children and adolescents during their first two decades in life and are ideal settings for influencing health (Hamilton-Ekeke, 2007).

A model for health promotion in schools, known as Health Promoting Schools (HPS), emerged from discussion during the 1980s under the auspices of the World Health Organisation (WHO). HPS was defined as a school constantly strengthening its capacity as a healthy setting for living, learning and working (WHO, 1998). The activities developed in the formal curriculum should be reinforced in all other elements that involve the school as a health promoting institution. It encompasses the informal curriculum, the hidden curriculum, the pastoral system developed by the school, the parallel curriculum and the general environment of the school. One example of a whole-school approach to food and nutrition has been the formation of a School Nutrition Action Group (SNAG). Such a group brings together individuals from within the school and the wider community, such as teaching and non-teaching staff, pupils, PTAs and representatives from relevant local support agencies. The general objectives of SNAG include:

- Review the curriculum provision;
- Examine conflicting health messages;
- Explore the relationship between diet and health;
- Examine the provision (including healthy options) and consumption of food throughout the school day;
- Provide good nutrition for pupils;
- Produce a school nutrition policy, which will make a positive contribution to health of pupils.

The question, which remains daunting, is: how knowledgeable are the different stakeholders that make up the SNAG membership of the principles of adequate diet and healthy eating. This is because it takes an adequate knowledge of the concept of balanced diet to function in a committee with such an enormous task as steering the cause of healthy eating. Thomas Benton, Keirle and Pearsall (1998) used seven qualifiers to judge schools that can qualify/pass as a HPS, the qualifiers are:

1. Involve pupils, parents, teachers and outside agencies in the development of health related policies and their implementation;
2. Ensure that every school policy is directed at every school member not just pupils;
3. Adopt an holistic approach, in that every school member including pupils, teachers, governors and support staff are involved in partnership;
4. Provide an opportunity for all staff to attend health-related in-service training on a regular basis;
5. Enhance links with families of pupils and with other professionals in the local community;
6. Be seen to practise what they preach, and for this to happen every school member needs to become a role model;
7. Appoint a health education co-ordinator (Thomas *et al.*, 1998 p.129).

- **Overview of Key Issues**

Pupils, and particularly secondary/post-primary pupils, have a range of sources of food during the school day. Many schools have food vendors and tuck-shops. Parents may provide snacks and packed

lunches, while fast food vans selling snacks often park close to school gates, and local newsagents and fast food shops are other alternative sources of food. Thus, the challenge of a whole-school approach to food and nutrition is one not only of educating pupils to make more healthy choices but also to ensure that food availability throughout the school day encourages them to exercise these choices. The concept of health promoting school involves three main strands: curriculum provision, school ethos and environment and family and community involvement. There is certainly a need to involve the whole school community as Thomas *et al.* (1998) suggested.

➢ **Key Emerging Questions**

- 'To what extent are pupils involved in the implementation of healthy eating policies in the school?'
- 'Do all stakeholders have an understanding of the concept of 'health promoting school'?'
- 'Is in-service training provided involving all adults in the school to explore their contribution to the initiative?'
- 'Does the school have a healthy school steering group involving teachers, non-teachers, governors, parents, pupils and community to oversee its development?'

4. CONCLUSION

Summarily, children's awareness of food and diet is influenced by a wide variety of interrelated factors including culture, socio-economic factors, parental influence, peer-group pressure, the media and nutrition education received at school. The continued preference of young people for foods high in fat and sugar suggests that the sensory quality of the food takes high priority in determining food selection. These factors are also modified by an individual's social, economic, cultural and educational background. Thus, in the long term, if health and nutrition education is to succeed the role of such factors in food choice and the establishment of food habits need to be more fully investigated and understood.

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Spreading across Boundaries: Coronavirus and Computer Virus

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Abstract: *With the new coronavirus spreading from person to person (including from people without symptoms), reaching four continents and every island nation, and traveling faster than SARS, driving it out of existence is looking increasingly unlikely. Actually, the same might be (and has been) said about the state of computer viruses and malware. Everything's going to be different, on the other side of this – whether this is our body health or computer health. What, really, are the similarities and differences between the effects of that one word – virus – on human biological systems and our digital computing systems? This essay addresses issues that we should be aware of.*

1. INTRODUCTION

Do you remember seeing the landing of the space module on the Moon on July 20, 1969? Or perhaps, given the relative youth of this audience, maybe you read about it or saw it on YouTube. Let me review the Lunar Landing Mission with you just for a moment. It was Apollo 11 - the first manned mission to land on the Moon. If things were to go according to plan, the astronauts were going to do a little shopping and return. (And they did.) But before those first steps by Neil Armstrong and Buzz Aldrin, we all saw this.

That's when it hit me. This was anthropomorphism in the space race. Sure, we attribute human traits to non-human entities, like dogs, cats, walking/talking/smiling paper clips, for instance. But now I saw how the technology of the Lunar Excursion Module was designed. It was based on my foot, lower leg (fibula and tibia), knee (medial/lateral condyle and patella) and my upper leg (femur) plus all the muscles and vessels holding them together. The LEM was acting like my body does when I jump down from a chair to the floor. My leg doesn't cave or break, it bends to absorb the shock (those g's). So, when the LEM sensors (on the bottom of the pods) touched the Moon and power was cut and the module landed, it landed softly and safely. The LEM, metal parts, was designed to act like my body.

Figure1. *https://www.nasa.gov/content/former-astronauts-recall-historic-first-moon-landing*

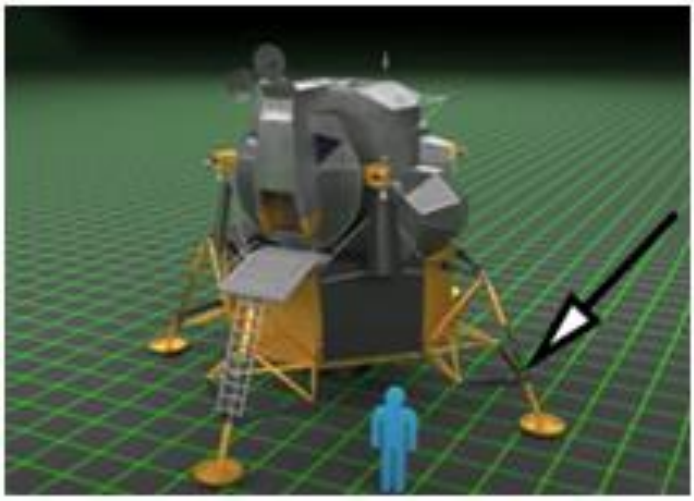


Figure2. *Computer generated landing pod. Arrow pointing at bendable arm.*

If God made man is His image, we make stuff – all kinds of stuff – in ours. We design and engineer based upon how our body acts and reacts. So when computer viruses were first engineered, they emulated the way viruses act in our body, taking advantage of vulnerabilities. And they still do.

Case in point, of course, is COVID-19. And because of COVID-19, everyone has had a forced primer on Virology 101 and not just the basics of viruses but how a virus unfolds. And this goes both ways. Now it's so much easier to talk about what medical research is finding because of our reliance on computer terms and technology.

So how do viruses work, viruses like the novel coronavirus (whose accurate name is SARS-CoV-2, severe acute respiratory syndrome, corona virus, version 2.

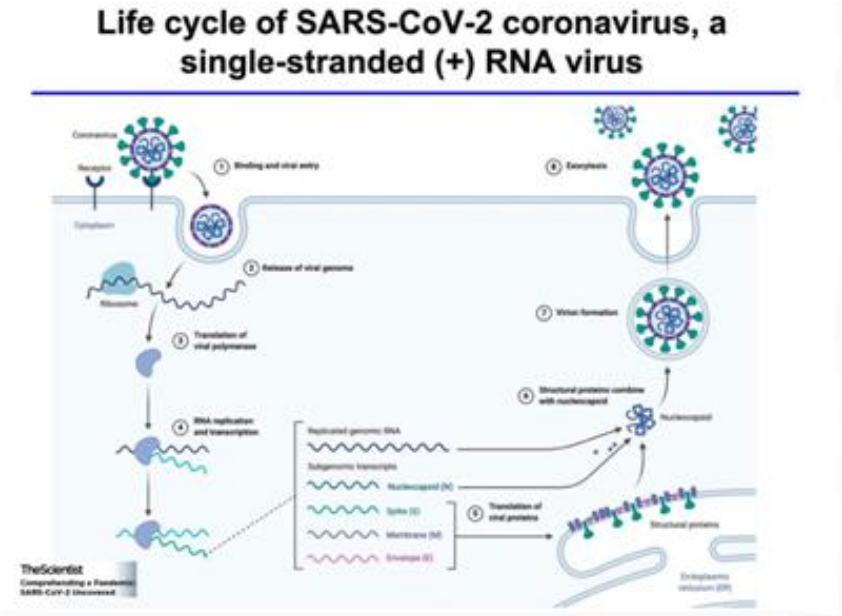


Figure3. *From "Comprehending a Pandemic: SARS-CoV-2 Uncovered" https://www.themscientist.com/sponsored-webinars/sars-cov-2-webinar-67527*

Viruses are very simple structures, made of up of just a few very basic biological molecules. They have some genetic material, and that encodes their various proteins that they need to be a virus, to make a structure of a virus. That genetic material can either be DNA or RNA. And apart from the genetic material, all they really have is then a coat of protein and lipids surrounding the genetic material. They're very simple and very small particles.

And they're incredibly abundant in nature, so for example in one drop of sea water there's probably about 10 million viral particles. So really, really abundant. And new ones are being discovered all the time (there are lots of viruses we still don't know about that exist out there).

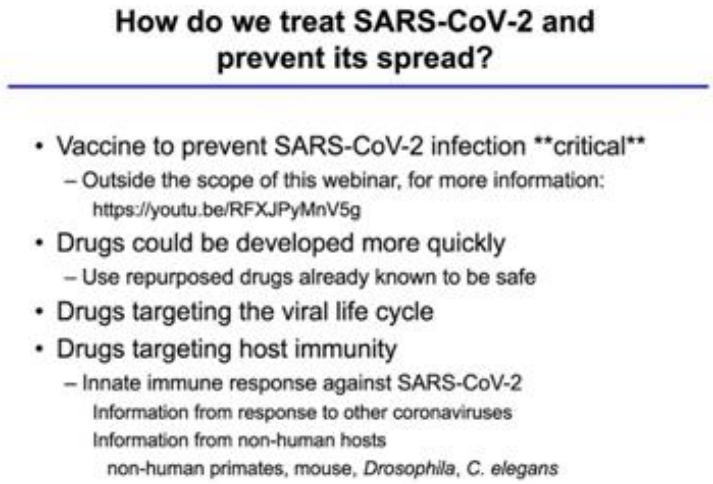
Both DNA and RNA are genetic material - in other words, they have the ability to contain information. In our bodies, RNA is the molecule that brings the information from the DNA to the machines in our cells that make proteins. You can actually encode information either in DNA or RNA. In this case, the SARS-CoV-2 - is an RNA virus.

The sequencing of RNA defines molecular biology today the way that DNA did twenty years ago. Our DNA is shared by every cell in our body, and yet the difference in appearance and function is caused by DNA strands which have been changed into molecules of single-stranded RNA. And these RNA strands are the blueprints for proteins, the molecular machines that do most of a cell's work. Complex and very low-level.

By comparison,colds and flus are diseases that are caused by specific viruses, milder coronaviruses, that cause the common cold in humans. Flu is caused by the influenza virus, probably originating in ducks or birds and jumping to humans a long time ago. Measles is a very common viral infection. So, too, Herpes, Hepatitis C, and the more exotic ones like the Ebola and Zika virus.

Viruses have to get inside our bodies because they need a cell to be able to replicate and to produce more virus particles, so viruses are a bit like molecular parasites. You might remember from your biology in school that a parasite is an organism that co-exists with another organism, and if it's an obligate parasite it means it needs that other organisms to survive. And viruses need a cell to survive in. Once they're inside the body, they have to get inside a cell, and for some viruses that's very easy because they can just be sucked in by the cell in different ways.

Viruses have to bind to a very specific receptor on a cell. This in fact is really interesting because this then defines why some viruses can infect certain people. In the case of SARS-CoV-2, there's a protein on human cells called ACE2 that it binds to. That's the receptor it uses to get inside cells, so if SARS-CoV-2 was not able to bind to ACE2 on the surface of our cells it wouldn't be a problem at all. Even in terms of a whole population, one reason that some people might be more susceptible to this virus than others, for example older people versus children, might have to do with how much of that receptor they actually express on their cells.



Once the virus sticks to the outside of a cell, using one of these receptors, it then gets taken inside the cell, and then what it does is it hijacks the cell's machinery and uses the cell's machinery to replicate itself. You see, our cells have all sorts of proteins inside them that are used to replicate our own cells, and to produce new cells, and the virus hijacks all that machinery and uses it. The term that is often used here is that there can be "viral factories" in the inside of our cells. And if viral factories get produced, then the virus can very rapidly produce multiple copies of its genetic information and can assemble new viral capsids, as they're called. What next happens is a dizzying array. Viral particles pop out of infected cells and in a matter of days, one cell can actually produce millions of viral particles.

Now this makes it seem that viruses are alive, because they need to be in a body, or if they need a host as such, could we consider them to be alive? Actually, there are loads of articles written over the years discussing the science and even the philosophy behind this. How do we define life, and basically, are viruses actually alive? I'm not going to deal with it all here, but I like what Edward

Rybicki (1990, U of Cape Town) said: “viruses are 'organisms at the edge of life.' They're sort of alive. Some researchers define life as the ability to reproduce oneself, but then viruses can only reproduce if they're inside a host cell. So the host cell could be a human cell, but they need to be inside a cell to replicate. In the end, it depends on how you define life, but personally, I like the idea that viruses are ‘organisms at the edge of life’.

And while both viruses and bacteria cause disease (we call them pathogens), how the body fights them can be quite different. And one big difference is size. On average (and viruses vary a lot), a virus can easily be one hundredth the size of a bacterial cell.

Another difference between viruses and bacteria is cell structure; I’ve already described how viruses are very simple - they've just got protein, lipids, and genetic material. Bacteria are much more complicated and much harder to understand actually. But this discussion is not about bacteria.

How is SARS-Cov-2 stopped? Antibodies or vaccines.

What are antibodies? They're proteins first of all. They're a key type of weapon that our immune system has in order to fight intruders, and they bind very specifically and very tightly to their target molecule. The target molecule they bind to is usually a foreign molecule, so our immune system is able to discriminate between molecules it sees all the time, normal molecules that circulate in our body, and molecules that shouldn't be there - foreign invaders such as viruses.

Our immune system can generate antibodies to foreign materials and that's why if you have certain antibodies in your system it’s actually a sign that you've been exposed to those foreign materials. How do antibodies work? They bind. They bind very tightly to their target molecules on viruses. The antibodies that are most interesting currently are called neutralizing antibodies, called that because they can neutralize the pathogen or the invader.

Antibodies can be generated in lots of different ways. They can come from natural immunity, implying that you've been exposed to SARS-CoV-2. They can also come from being exposed to a very similar virus - like MERS (Middle East Respiratory Syndrome 2012 SA) or actually SARS (Severe Acute Respiratory Syndrome 2003 China). If you've been exposed to those viruses in the past, your body has made antibodies, measurable antibodies, that may/or may not be able to neutralize this virus.

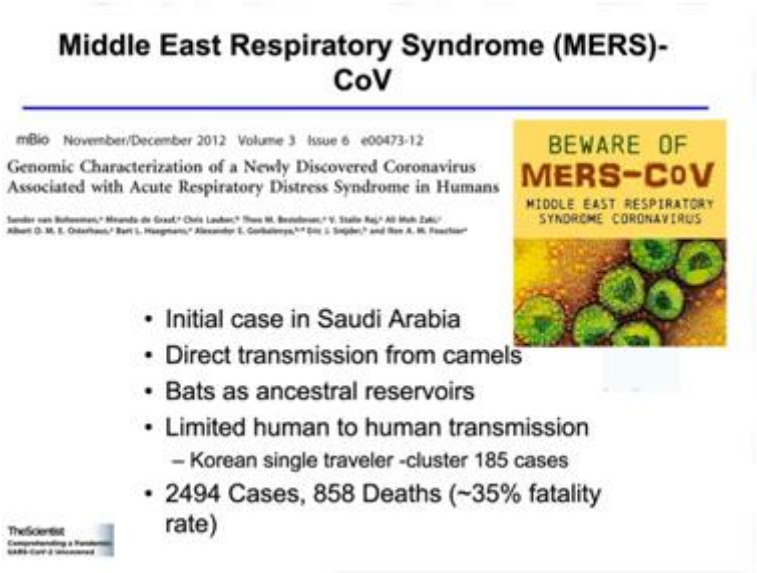


Figure4. *From "Comprehending a Pandemic: SARS-CoV-2 Uncovered" https://www.the-scientist.com/sponsored-webinars/sars-cov-2-webinar-67527*

Antibodies are the things that we try to elicit from the body during a vaccine, so one of the main ways that vaccines work against viruses is by generating antibodies that will neutralize the virus. And also, in fact, there's been interesting trials where people have taken serum from patients that have recovered from Covid-19, and given that serum to others that are very ill, and that's had a protective effect and that's because there are neutralizing antibodies in that convalescent serum, as it's called, and that can actually protect people or help them to fight the virus when they're seriously ill.

INTERNATIONAL A5

Mysterious Respiratory Illness Afflicts Hundreds in Asia

By LAWRENCE K. ALTMAN and KEITH BRADSHER

Figure5. *https://www.nytimes.com/2003/03/15/world/mysterious-respiratory-illness-afflicts-hundreds-globally.html*

Vaccines are different; they start as a foreign or induced agent with a safe pathogen, or maybe part of a pathogen, that isn't very dangerous to humans. Vaccines are given to try to elicit an immune response against a more dangerous, similar pathogen. A vaccine is given to someone to wake up their immune system to be able to subsequently attack the real virus or the real bacteria.

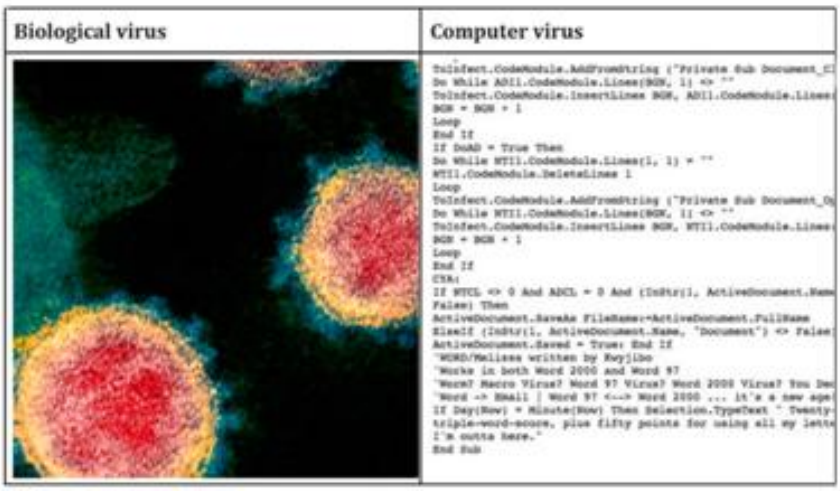
Antibodies are produced by the body to neutralize the virus. Vaccines are given to generate those antibodies.

Time - of course, it takes, typically, a good amount of time to develop a vaccine. I checked this week and there are over 130 different vaccines in development for SARS-CoV-2, so there are lots and lots of possibilities that some vaccine, hopefully, will work. But, of course, there is no guarantee. HIV has been around at least since 1910 and there is still no vaccine. So many different strategies are being tried in the hunt to develop and effective vaccine.

Computer viruses, as complex as they might at first seem to us computer users, are actually rather rudimentary compared to the biological complexities of a virus like SARS-CoV-2.

So what is a Computer Virus?

A computer virus is non-biological malicious code. It exists to spread from host to host by itself, without the user's knowledge, and to perform malicious actions. It imposes harm to a computer by corrupting system files; by manipulating, destroying or sharing data; or by affecting the computer hardware, itself. The reasons for designing computer viruses are complex, but most often, there is a form of financial exchange/reward involved in some way. Viruses can attack vulnerabilities by gaining administrative controls, at which point sensitive or confidential information is compromised, and information often shared. A computer virus tricks hardware and software, just has the SARS-Cov-2 tricks our cells.



In preInternet days, a computer virus would spread through removable media. Now, save for USB sticks primarily, removable media is rare. The computer virus payload comes via internet traffic, downloads, infected files (jpg, png, gif, and mp4), and the most popular, in email attachments. In other words, a virus spreads while the user is viewing an infected file, visiting an infected website, opening the attachment in the email, or clicking on an executable file. Besides that, of course, connecting with an already infected removable storage device (such as a USB drive) also spreads the infection.

Like its biological cousin, there are primarily two ways by which a computer virus operates; the first type starts replicating itself as soon as it lands on the computer; the second type remains dormant until it is triggered. Since computers don't come with antibodies, we add those antibodies in the form of (1) antivirus, protective software and (2) robust operating systems. These two need to be loaded and updated, frequently. With protection (antivirus code), computer viruses will spread and attack systems.

Today we have to steer clear of all such malware:

- Boot Sector Virus
- Direct Action Virus
- Resident Virus
- Multipartite Virus
- Polymorphic Virus
- Overwrite Virus
- Space filler Virus
- File Infector Virus

But like our contemporary biological viruses, complex computer viruses were not always the case. In our cell-based viruses, SARS marked a significant turning point for virology in 2003. On the computer, the Michelangelo virus (so named after the famous It Renaissance painter/ sculpture/ architect/poet) was the first public malware program.

Figure6. *Michelangelo's God Creating Adam from the Sistine Chapel ceiling in the Vatican, 1508-1512*

It was called the Michelangelo virus because it was set to 'go off' on March 6, the traditional birth date of the Renaissance artist. By all standards a rather rudimentary piece of code, this boot sector was dormant until the specific date of March 6. Then, any computer infected with it would have the startup sectors of its floppy disk and master book record of the hard disk totally overwritten, damaging the disk and rendering it as unusable and the data unrecoverable.

That virus also came in waves, too. The first wave was in anticipation - February 1992. I was teaching at a small college in Iowa and wrote a simple program to remove the Michelangelo virus from a floppy or hard drive. We were flooded that month with requests. I cancelled classes and my students went into production to create safe disks that would remove the Michelangelo virus, if a user's system was infected. We gave it away, gratis. There were lines of people coming out of our lab, patiently waiting for the 'fix'. We got national, even international attention at that time. And though we didn't charge for the simple fix, one of my more entrepreneurial students took an empty coffee can and

wrote “Tips” on the side. We ate our fill of pizza for a month straight. After March 6 came and went, and the danger subsided, we all went back to our normal teaching jobs. Until November of 1992, when a variant of the Michelangelo surfaced. This was the first major hyped computer virus program.

While it was estimated that over 5 million computers were probably infected (a large number 28 years ago), the actual impact was much less, about c. 20k.What the Michelangelo virus did, like the SARS-Cov-2 has done today, is usher in the birth and meteoric rise of various antivirus/medical vaccine companies. And while the Michelangelo virus—along with a majority of boot sector viruses—have come and gone, it retains a special place in computer info history as the first virus to bring malware awareness into the spotlight. And for many across the world, I suspect the same came be said about SARS-Cov-2. (By the way, the Michelangelo virus still activates every March 6 for older, previously infected and not cleaned computers.)

Going forward

	Biological Virus	**Computer Virus**
Parasitism	Replicates only inside the cells of a living organism using their resources.	Replicates by copying itself into other computer programs.
Invisible Phase	Replicates inside an organism for a while without any symptoms; known as the incubation period.	Can be programmed to cause harm only after a certain event, such as the launch of an app.
Mutation	Can produce copies with mutations that may become resistant to antibodies and drugs.	Can change the code in its copies to avoid detection by antivirus software.
Self-Defense	Can attack and/or compromise the immune system to protect itself.	Can block antivirus software to protect itself.

In this essay, ‘virus’ has been defined in two disparate ways – on one hand, biologically-based, and on the other, computer-based. At least there is a separation between the two, and we don’t have to worry about computer viruses entering our biological realm.

But, no, to assume that would be wrong. As a matter of fact, in May 2020, Dr. Mark Gasson (from the Cybernetics Research Group at the University of Reading) became the first human known to be infected by a computer virus. The virus, infecting a chip implanted in Gasson's hand, was tracked from his hand to lab computers at the University. And from there, the computer infection could have spread to other computers, but did not. As you might suspect, all this was intentional, in an experiment to see how simple RFID (radio-frequency identification) chips like those used for tracking our credit cards and lorries-in-transit can host and spread technological diseases.

Figure7. *September 4, 2019. https://www.gaia.com/article/forget-the-flu-mark-gasson-fights-infection-from-computer-virus*

To fight SARS-Cov-2, we take precautions (wear a mask, keep our distance and wash our hands). In the future, as Gasson and his colleagues demonstrated, a similar degree of hygiene and awareness may be necessary to keep the devices in our bodies clean as well. After all, a Denial-of-Service attack on your Mom's pacemaker could have very detrimental effects.

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Professor Alan Garfield, is Chair of the Digital Art and Design Department at the University of Dubuque, in Dubuque, Iowa USA. He has also served as Director of the Bisignano Art Gallery since 2008. His formal education is eclectic: BA, University of Iowa; MA, State University of New York-Binghamton; Postgraduate work Wadham College, Oxford. His interests, as measured by recent publications, included 2D and 3D animation algorithms, images in contemporary politics, 19th century French philosophies, Holocaust studies, and Beat Generation poetry. He teaches in Iowa; he lives in Ireland.

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Group Dynamics and Student Cognitive Engagement in Class Tasks in Institutions of Higher Learning. – An Integrative Review

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Abstract: *Lecturers in institutions of higher learning struggle to engage their students cognitively in class tasks. A lot of literature on strategies that enhance students' cognitive engagement include group work, however, some students do not benefit much from this strategy. The main question of this study was: How do group dynamics influence students' cognitive engagement during group work? The objectives of the study were: (1) to establish group dynamics that enhance cognitive engagement. (2) To identify group dynamics that prohibit student's cognitive engagement. (3) To establish proper management of group dynamics for cognitive engagement in institutions of higher learning. The study was an integrative review using online data bases such as JSTOR, ScieVerse Scopus EBSCO, SAGE Journal, Wiley Online between 2010 to 2020. Results of the study presented the influence of group dynamics on student's cognitive engagement in class tasks. Knowledge about positive and negative group dynamics when planning meaningful intellectual interactions in class tasks is relevant to teachers, lecturers, teacher trainers and curriculum designers. They should manage group dynamics well for effective cognitive engagement.*

Key terms: *Group Dynamics, Cognitive Engagement, Dysfunctional groups, Institutions of Higher Learning, Students, Lecturers*

1. BACKGROUND

Students' cognitive engagement is an important element in the learning process as it enables them to actively participate in learning and facilitates understanding of the material at hand (1). Students increase their level of cognitive engagement when given freedom to select and manage their own learning(2). This therefore calls for lecturers to constantly strive for techniques that enhance active participation in cognitive tasks because they are aware that cognitive engagement is essential to academic success(3)

Cognitive engagement, as defined, involves seeking, interpreting, analyzing, and summarizing information; critiquing and reasoning through various opinions and arguments; and making decisions. Extended engagement in cognitive activities, especially those that require higher

order-thinking skills, is believed to produce useful learning(4).This implies that it can only be achieved when students persistently work on their intellectual tasks in groups.(5)posit that when students are in groups they investigate tasks collaboratively and eventually reach a solution.

(6)in their study about group work activities that engage students highlighted a number of activities that teachers can use to maximize students' interaction during group work. They included; creating something new like a written piece, investigating a question followed by reporting and critiquing among others.

This study is supported by the engagement theory described by(5)which emphasizes the importance of group tasks in enhancing students' cognitive engagement. In this case, students are organized in groups and given tasks to come up with solutions in a collaborative way. The theory is composed of three major concepts, that is, Relate – Create –Donate, whereby "Relate" suggests that cognitive engagement is most effective when students share knowledge in a group, listen to each other while

observing social skills, "Create" implies that students develop solutions and agree on them, "Donate" means that solutions eventually contribute to the body of knowledge.

Group dynamics are described as psychological processes that occur within groups and how they influence the functioning of intellectual interactions among group members and between groups (7). Such processes include communication, leadership, cooperation, competition and so on.

Successful cognitive engagement depends on the success of group work, however, there are a number of undesirable behaviors that may prohibit its effectiveness(8). Working in groups and engaging in discussions could lead to either high or low feelings of autonomy, depending on the group dynamics. For instance, if there are members who are dominating the interaction, some maybe less engaged cognitively as opposed to a group that works well together (9). They also suggest that the level of autonomy is a characteristic to an activity or task and largely the degree to which students engage cognitively with that activity or task. This study consolidates literature on group dynamics that promote effective cognitive engagement among students in class tasks.

Although group work has a number of benefits, some studies indicate that it has got some shortcomings that teachers need to be aware of as they may affect students' engagement cognitively. For instance,(6)listed such shortcomings as, social loafing, disputes, individualized grading, students bemoaning among others. Teachers need to be aware of such group dynamics and how to manage them in order to have constant cognitive engagement among students in group tasks. The study also explores literature on such group dynamics that inhibit students' cognitive engagement in class tasks.

Several studies indicate that there is need to get familiar with proper management of group dynamics in group work in order to maximize interactions among group members(10). The role of techniques for enhancing group dynamics, resolving conflicts within groups for effective group work has also been highlighted in the study by (11).Despite all these studies there seem to be questions among teachers on how to manage dysfunctional groups(8). This study also analyzes literature on strategies for managing group dynamics for effective cognitive engagement.

2. METHODOLOGY

In this study, an integrative literature review was carried out to answer the following questions:

(1) What group dynamics enhance students' cognitive engagement during group work?

(2) What group dynamics affect students' cognitive engagement during group work?

(3) How can group dynamics be managed for effective cognitive engagement during group work?

The purpose of this integrative literature review was to establish the influence of group dynamics on students' cognitive engagement during group tasks in institutions of higher learning. The databases used were online such as JSTOR, EBSCO, SAGE Journal and Wiley Online. These databases were considered to have a complete collection of psychological interventions in the field of education.

2.1. Inclusion Criteria for this Study was as Follows:

Studies containing information about the group dynamics and / or the topic of group behaviours.

Studies with institutions of higher learning / equivalent to students as the subject. Studies reporting the results of evaluations of group dynamics that promote and those that prohibit cognitive engagement among students in class tasks. Studies reporting evaluations of proper management of group dynamics for effective students' cognitive engagement, Studies containing the following keywords: Group dynamics, cognitive engagement students, institutions of higher learning. The search was done using the search words listed in Table 1, while the combination of keywords is listed in Table 2.

Table1. *Variation in key words*

Keyword(s)	Variation of keywords
Group dynamics	Group behaviour
Cognitive engagement	Intellectual or mental involvement
Students	Students in institutions of higher learning
Lecturers	instructors in institutions of higher learning
Higher learning	Professional training

ii. BOOLEAN search combination

No	***Boolean* search combination**
1	Group dynamics AND cognitive engagement OR mental engagement OR intellectual engagement AND university student OR collegian OR college man
2	Group behaviour AND cognitive engagement OR mental engagement OR intellectual engagement AND university student OR collegian OR college man
3	Group influence AND training OR instruction OR tutoring AND student teacher OR university student

The integrative review employed a qualitative analysis using a topical method. Information was drawn from the articles using topics in line with the study objectives. The topics included the following:

(1) Group dynamics that enhance students' cognitive engagement among students during group work.

(2) Group dynamics that prohibit students' cognitive engagement during group work.

(3) Management of group dynamics for effective students' cognitive engagement during group work.

All used an integrative process as advanced by(12) to retrieve and filter literature and to undertake validity assessment, with reference to appropriate review guidelines. A detailed account of results for each objective was given after examination and synthesis.

3. RESULTS AND DATA ANALYSIS

The integrative literature review utilised 7 articles which were selected from data bases that included JSTOR, EBSCO, SAGE Journal, Wiley Online. The articles selected for the study were those published between 2010 to 2020.

Title	**Year**	**Author**	**Positive Group dynamics**	**Negative group dynamics**	**Proper management of group dynamics**
The influence of group dynamics to students' creativity in business management class.	2019	Liliana Dewi	-The characteristics of the leader and group members	- Problematic leadership	- Group dynamics can be improved by developing profiles such as innovation; ability to implement strategy with programs, evaluation; initiative; desire for responsibility. -The teacher can deliver lessons with the help of group leaders
Do They Have to Like It to Learn from It? Students' Experiences, Group Dynamics, and Learning Outcomes in Group Research	2019,	Renee A. Monson1	-Good leadership -Balanced group gender Presence of one or more high achieving students -Group size -Good relationship among group members	- Problematic leadership. -Free riding or social loafing. -Negative relationships among students -size of the group	-Active ongoing support by the instructor

Projects					
Effect of group dynamics on performance of first year medical students	2020	ChandrikaTeli1,*,NileshKate2			-Proper time management -Task responsibility -Regular feedback by the teacher -Regular feedback by peers -Good communication skills -monitoring by the teacher
Student perception of group dynamics predicts individual performance: Comfort and equity matter	2017	Elli J. Theobald1, Sarah L. Eddy2, Daniel Z. Grunspan, Benjamin L. Wiggins1, &Alison J. Crowe1	-comfort -working with a friend. -equity	-Dominating in a group	-Establishing group norms to increase comfort -having many opportunities to perform group work so that students can get to know each other well to increase comfort in a group -Allowing students to self-select into groups so that they can choose to work with friends if they wish. -allowing social connections within groups -the group activity should be complex to allow interdependence -the instructor/ group leader should allow social interactions within a group
Group Dynamics and Behavior	2019	Hüseyin Gençer	-members' a to the group. -adherence to group norms	- "social loafing or "free riding". -weak leadership.	-formation of group norms by the leaders
When groups don't work: Insights	2018	Yunjeong Chang & Peggy Brickman	-signing group contracts. - assigning roles -equity	- absenteeism	

from students					
Facilitation of collaborative learning: what works?	2010	Chinthaka Balasooriya, Sophie di Corpo& Nicholas J Hawkins		-dominant students -apathetic students	-allocation of expert roles -speaking to students individually -modeling expected behavior -allocating time for reflection at the end of each session -increasing motivation in small groups

3.1. Group Dynamics that Enhance Students' Cognitive Engagement

For effective cognitive engagement in group work among students in institutions of higher learning, a number of positive group dynamics were found. They included the following:

Characteristics of the group leader. Group leader characteristics were cited to be one of the positive group dynamics that can enhance group performance in terms of cognitive engagement. From the systematic review, 2 of the 7 journals indicated that group leader's traits have a positive influence in the direction of a group. In the study by (7), it was found out that group leader traits such as locus of control, communication, and self-efficacy positively influenced engagement among group members during a group task.(13) in his study: Group Dynamics and Behavior also indicated that leaders who follow group norms assure their members with confidence. He concluded that such leaders are always fair to every member of their groups.

Group composition. 1 of the 7 journals of the systematic review also indicated that group composition in terms of gender influence cognitive engagement during group tasks. In the study by(14)It was also found out that gender balance among group members especially in topics that were gendered created equal participation. Examples of such topics included; examining the effects of a recent sexual assault case and the impact of an abortion among women. Gender balance positively correlated with group achievement an indication of cognitive engagement.

Presence of one or more high achieving students. In the review it was also found that members of mixed ability in a group significantly influence cognitive engagement among group members. For example, in a study by (14), it was found out that groups that had mixed ability students during task execution performed better than their counterparts.

Good relationship among group member. 2 of the 7 journals in this systematic review reported good relationship among group members as one of the positive group dynamics that promote meaningful interactions among students in group tasks. This was found out by(15) in their study; Student perception of group dynamics predicts individual performance: Comfort and equity matter. Good relationships are important in a way that they encourage free participation and respect for one another's point of view.

Comfort. Research conducted by(15)indicated that comfort of students in groups that they are assigned to is very important as far as cognitive engagement in tasks is concerned. The study revealed that comfort was strongly positively correlated with students' performance as it provides student with freedom to participate or engage in the discussion with ease. Group members also feel secure to share ideas in groups where they are comfortable. They found out that students whose groups reported working with a friend scored higher on the post test. This was also an indication that meaningful interactions took place in that particular group.

Equity. The study by(15) indicated that groups that reported equal chances of participation performed quite better than their counterparts. The study also suggested that in order to increase equity, the group task should be highly structured to enable every member to participate, for instance, it should create a desire for every member to participate.

Group size. Small groups were found to be a positive group dynamic as it was associated with vigorous mental interactions among its members. In the study by(14) it was found out that small groups of at least 1 to 7 engage in the exercise more than larger groups. This is because there are higher chances of each member to participate than in larger groups.

Adherence to group norms. Adherence to a group is characterized by members' desire to belong to a particular group(13).This group dynamic enables members to keep together and promotes cohesiveness among group members. Group norms are established by the group leader for purposes of binding the group together. However, the study showed that sometimes group members need to defy some group norms as they may slow down the performance of a group. It was also found out that leaders who follow group norms assure their members with confidence. Such leaders are always fair to every member of their group.

3.2. Group Dynamics that Prohibit Students' Cognitive Engagement

Dominant students. Research by(15)reported that groups that complained of dominators during engagement did not perform well. They were noted with less cognitive engagement among majority of its members. Dominators do not give chance to other members to contribute hence rendering them redundant.(8)also added that such students are either disruptive or highly enthusiastic (out spoken).

Problematic leadership. Most studies report problematic leadership as one of the negative group dynamics.(14), in her study found out that problematic leadership reduced participation among some members in groups whose leaders failed to control. This was also found out in the study by (7).

Free riding or social loafing. This was discovered in group assignments whose topics were gendered, such as, abortion and also in large groups (14). Large groups of more than five lead to less participation by some members in a group. In the study by (13), social loafing was also noted and it was concluded that individuals might opt to free-ride especially when a group is big.(7), also found out that free riding was one of their negative experiences among some students during the research project task in their study.(8) Also noted that such students may be quiet or disinterested due to lack of confidence and were termed as *apathetic* students.

Intergroup conflicts. Study findings from (13)indicate intergroup conflicts as a negative group dynamic. They established that intergroup conflicts are caused by competitive environments especially when one group is doing better that the other. This leads to less engagement in groups as it reduces attention of members on the task given.

Absenteeism In the study; *When groups don't work: Insights from students* by (16) it was found out that some group members dodge or absent themselves leaving the task for others to do.

3.3. Strategies for Managing Group Dynamics

In this integrative review, studies highlighted various strategies that instructors can utilize to manage group dynamics for effective cognitive engagement.

In the study by (14), instructors are advised to avoid constructing groups with a very large number as this limits participation and may lead to free riding. A group not beyond five members was recommended for positive results. A big group may also find it difficult to find time to meet due to diversity of schedules.

It was also suggested that instructors should avoid highly challenging topics that may create social loafing. They should give continuous guidance to students during group work which may also encourage cooperation and motivation among group members leading to meaning full participation. Instructors could do this by appraising members for the work being done or giving a mark to work done.

(15)in their study also suggested that instructors should endeavor to promote students comfort in groups as it was found to be a predictor of students' performance. They noted that it is one way of providing students with 'safety' for free expression of their ideas. They proposed several strategies that increase students' safety as; identifying group norms, regular group work in order for students to familiarize with each other, allowing social connections within groups, allowing students to choose groups in which they will be comfortable and so on,

In addition to the above, they suggest that students should be assigned roles in groups so that every member can actively participate. It was also suggested that instructors should use prompts such as; explain your point, take turns to answer, what do you mean? and so on.

Allocation of roles to group members was one of the strategies to be employed in managing group dynamics. In the study by(17), it was suggested that distribution of tasks and feedback improve engagement among group members. They also noted that establishing group norms was very important as far as time management is concerned.

The group leader should allow social interactions within a group. In addition, instructors are argued to promote cooperation among intergroup in order to avoid conflicts (13). Clear instructions that guide the group task should be well spelt during a debriefing.

(8)also suggest that facilitators should use buddy system where students vary in strengths. This may help them to work together productively. They also suggest that students should be allocated time for reflection about the content at the end of the session. However, it would become tiresome if it is frequently used. Students with exceptional behavior should be spoken to individually and it should be done as soon as possible to prevent the behavior from escalating. Facilitators should also increase motivation in the small groups by use of feedbacks.

4. CONCLUSION

Cognitive engagement among students in group tasks can be effective with the knowledge of group dynamics and their management. Group dynamics such as group leader characteristics (innovation, locus of control, self-efficacy), group size, adherence to group norms and so on enhance students' cognitive engagement in group tasks. On the contrary, social loafing or free riding, intergroups conflicts, domineering are some of the group dynamics that may affect cognitive engagement during group work. For positive results, lecturers need to manage group behavior well as they utilize group work strategy.

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Developing an Environmental Education programme to address factors behind weak Community Participation in Wildlife Resource Management in Mumbwa and Lupande Game Management areas in Zambia

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Abstract: *This study presents an Environmental Education (EE) programme that would aid in addressing factors behind weak community participation in wildlife resource management in Mumbwa and Lupande Game Management Areas (GMAs) in Zambia. The programme is based on the demographic profile of people living in the two GMAs which include ethnicity, sex and education. A total of 349 respondents from Lupande (173) and Mumbwa (176) and 12 key informants who include chiefs (7) and ZAWA officials (5) were interviewed. Structured interviews were analysed using SPSS software while informal interviews with key informants were analysed thematically. The study found that lack of sensitisation activities led to the weak community participation in the two GMAs. As an intervention programme, the study found that EE programmes would enhance community participation in wildlife resource management in the two study areas.*

Key words: *Community participation; environmental education; game management area; wildlife management; Zambia.*

1. INTRODUCTION

The advocacy for the increase in community participation in natural resource management started in 1980. At that time, several international agencies such as the Department for International Development (DFID), United States Agency for International Development (USAID) and United Nations (UN), promoted the advocacy for the improved participation of the local community in natural resource management (Ferna'ndez, 2010). This was because the effective involvement of resource users in the management of their resources was perceived to enhance the quality and durability of environmental decision making (Reed, 2008; Rowe and Frewer, 2000). The importance of public participation in natural resource management has also been recognised by several international agreements such as Earth Summit (Luyet, *et al.*2012). Scholars such as Mashinya, (2007) and Mubita (2011) also noted that public participation in natural resource management has led to a sense of ownership and responsibility. Several studies conducted on of public participation in environmental programmes such as forest management (Buttoud and unusova 2002; Luyet*et al.*, 2012), ecosystem management (Luyet, *et al* 2012) and wildlife management (Milupi *et al* 2017a; 2017b) have shown that public participation is a vital component of management system for achieving sustainability in natural resource management.

In Zambia, community participation in wildlife resource management is enshrined in the Zambia wildlife act of 1998 and 2015. The mode of participation is through local institutions called Community Resources Boards (CRBs) that are established under geographical chiefdom boundaries.Wildlife is one of the major natural resources that Zambia possesses. The formation of CRBs gave the local people the latitude to actively participate in and benefit from wildlife resource management. A total of 74 CRBs have been established throughout Zambia (GRZ 2014). Despite these efforts by the Zambian Government, community participation in wildlife resource management is still weak and has led to the loss of biodiversity in some parts in the country (MTENR, 2007; GRZ, 2014; Milupi *et al.* 2019). The reasons behind weak community participation in wildlife resource

management in the GMAs in addition to inadequate benefits to local people is the lack of Environmental Education emphasis in the primary objectives (table 1) of the Zambia Wildlife Authority an institution mandated to manage wildlife resources in the country.

The Zambian National Policy on Environment states that EE and awareness needed to be promoted through formal and non-formal education, by all government institutions, Non-Governmental Organisations (NGOs) including the private sector (Government of the Republic of Zambia Environmental Policy, 2007, p23). Primary objectives of ZAWA however do not include community sensitisation through EE (table 1).

Table1. *Zambia Wildlife Authority Primary Objectives (Zambia Wildlife Act of 1998)*

Primary objectives of ZAWA	▪ Protection and conservation of wildlife in Zambia and to improve the quality of the life among communities in the wildlife parks. ▪ To maintain the sustainability of biodiversity in the national parks and GMAs. ▪ To ensure an increase in wildlife resources ▪ To improve wildlife resource management to a level which will secure sustainable flow of benefits from the resources; and ▪ To considerably improve the wildlife resource base investment in co-operation with the private sector and local communities.

Source: *Zambia Wildlife Act, 1998*

In order to enhance the weak community participation experienced in Zambia, this study aims at establishing an Environmental Education programme in ZAWA and CRBs in particular so as to improve community participation and the unsustainable use of wildlife resources in Mumbwa and Lupande GMAs using case study data from the two GMAs.

1.1. Study Areas

The study areas were Mumbwa and Lupande GMAs from Central and the Eastern provinces of Zambia respectively. Their selection was based on good performances in the collection of revenue by GMAs (MTA, 2018).

Mumbwa GMA (Figure 1) is located in Mumbwa district. It covers an area of approximately 3,370 square kilometres. It was proclaimed a GMA in 1972. The GMA lies between longitude 250 58' to 260 30' E and latitude 140 55' to 150 18' S and shares a boundary with the Kafue National Park (KNP) in the north (Figure 1). It is defined as a prime hunting area where highly valued trophy species such as buffalo (*Syncerus caffer)*), lion (*Panthera leo)* and leopard (*Panthera pardus)* are abundant (ZAWA, 2004). In terms of revenue generation, the GMA is ranked fifth of 21 GMAs where trophy hunting occurs (Lewis and Alpert, 1997). This makes it an important revenue generator for both the local communities and Zambia Wildlife Authority (ZAWA) who each obtain 50 per cent of the revenue from hunting. The human population of the Mumbwa GMA was estimated to be 33 500 in 2012 (UNDP, 2012). Mumbwa GMA community comprises subjects in the three chiefdoms of Chibuluma, Kabulwebulwe, and Mulendema who form the wildlife management authority for Mumbwa GMA. Major threats and pressures affecting Mumbwa GMA include poaching and human encroachment (MTENR, 2007; Watson*et al.* 2014). Others are charcoal production, illegal fishing when there is a ban on fishing and increased agricultural activities.

Lupande GMA (Figure 1) is located in Eastern province of Zambia in the Luangwa valley. The GMA is 120 kilometres west of the provincial headquarters at the town of Chipata. Lupande GMA is in Mambwe. Geographically the GMA lies between 12 51’ and 13 25’ S and 31 47’ and 32 27’ E. (Figure 1). The GMA has a total area of 4,840 square kilometres. It is bordered by South Luangwa National Park (9,050 square kilometres) on the west, Chipata - Petauke district boundary in the south and Chipata - Lundazi district boundary on the north and East. The total population of Lupande GMA is estimated to be 68,918 people (CSO, 2012). Lupande GMA has six chiefdoms namely Kakumbi, Mkhanya, Nsefu, Jumbe, Malama and Msoro.

The annual rainfall of the area is about 800 millimetres (Ndhlovu, 1991). Lupande GMA experiences two seasons and these are the dry season in May to October and the wet season from November to April). Dominant vegetation in Lupande GMA includes woodlands such as Miombo (*Brachystegia, Isoberlinia*, and *Julbernardia* species), Mupane *(Borassus aethiopus)* and Munga *(Acacia albida)*. The majority of the people of Lupande are subsistence farmers who grow crops such as maize (*Zea mays)*, cotton (*Gossypium hirsutum)*, millet *(Eleusine* species*)*, sorghum (*Vulgare* species*),* beans (*Phaseolus vulgaris)*, pumpkins (*Curcubita maxima)* and sweet potatoes (*Ipomoea batatas)*(Nyirenda,*et al.*, 2013). Other crops grown in the area include cassava (*Manhot* species), groundnuts (*Arachis hypogea)* and rice (*Oryza sativa)*(Nyirenda*et al.*,2013).

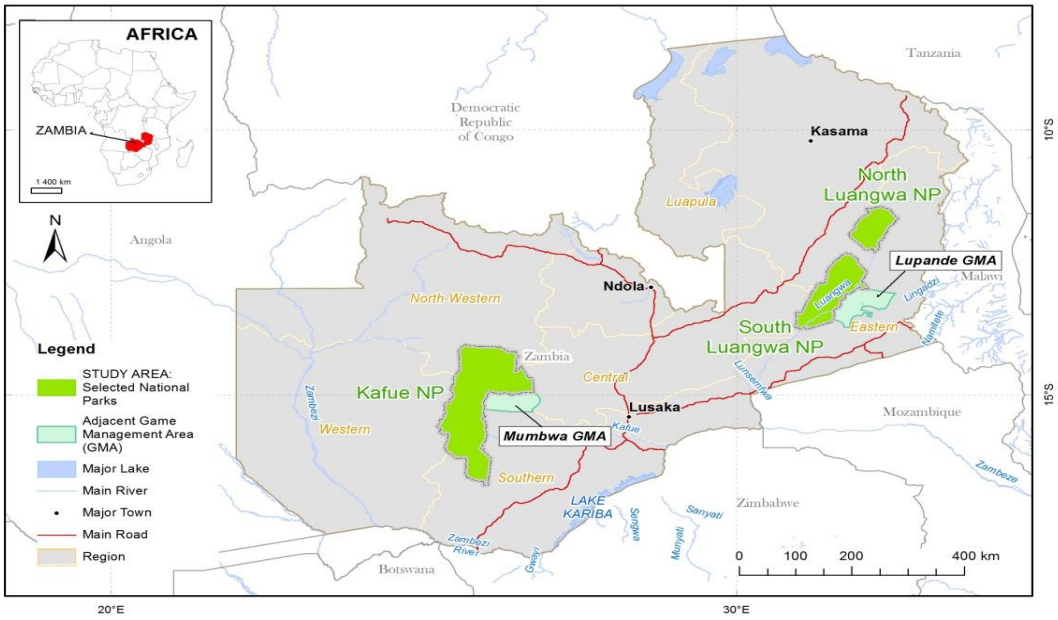

Figure2. *Map of Zambia showing the location of National parks and Game Management Areas.*

2. METHODOLOGY

2.1. Data Collection

The three methods employed for data collection were a desk study of relevant legislation and regulations, structured interviews with 349 randomly selected villagers in the study area and semi-structured interviews with 12 purposively selected key informants (seven chiefs and five ZAWA officials).

2.2. Desk study

Legislation and regulations pertaining to wildlife conservation in Zambia were reviewed to provide an overview of community participation in various CBNRM programmes and how EE enhanced community participation**.** Some of the legislation examined included Zambia Environmental Policy2007, Zambia wildlife Act of 1998 and 2015**,** national policy on environment 2007, published journal papers related to frameworks in social ecological systems and management of wildlife and ZAWA reports.

Furthermore the aspects likely to lead to effective community participation in wildlife resources were highlighted during this review. These included gender balance, lack of involvement in decision making process and lack of sensitisation activities. These documents provided current background information on the use of environmental education to protect natural resources.

2.3. Structured Interviews

Questionnaires were provided to 349 local people who were randomly selected from Mumbwa and Lupande GMAs. These comprised 176 from Mumbwa and 173 from Lupande. Three chiefdoms,

Kabulwebulwe, Mulendema and Chibuluma, were covered by Mumbwa GMA. However, in Lupande GMA, only four chiefdoms of six were considered: Kakumbi, Mkhanya, Nsefu and Jumbe. The households were selected randomly from a list obtained from traditional authorities in each of the two GMAs. Every fifth household was selected and if no respondent was found in the fifth household the next one would be selected. The interviews were then conducted with the heads of the sampled households, who could be male or female. The households were interviewed on local community participation, empowerment, conflict resolution mechanism, gender balance, equity, conservation sensitisation and conservation of biodiversity.

2.4. Semi-structured key informant interviews

Information on experiences of community-based natural resources in the two study areas was collected by interviewing key informants from ZAWA and traditional leaders. The ZAWA officials were interviewed in English, while the traditional chiefs were interviewed in their respective local languages that included Kaonde, Lamba, Kunda and Chewa.

3. RESULTS

3.1. Gender of Respondents

Most respondents interviewed in the two GMAs were men (Figure 3). In Mumbwa GMA for example, female respondents interviewed were only 36.9% n=65) while men respondents were 63.1% n=111). In Lupande GMA, (41.6% n=72) respondents interviewed were females while men were 58.4% n= 101) as shown in Figure 2

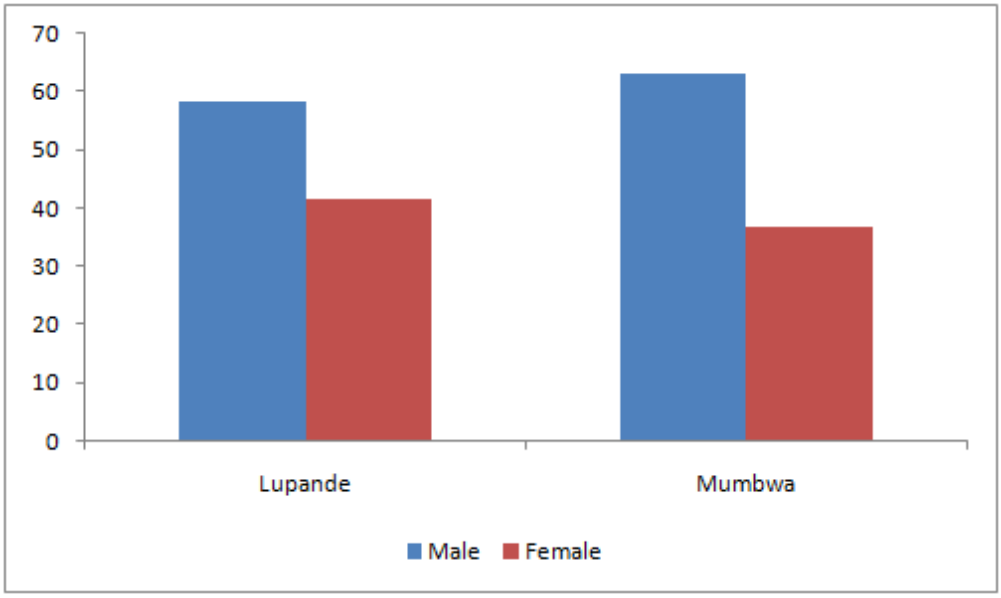

Figure2. *Gender of respondents*

Further, in Lupande and Mumbwa GMAs, women were less involved in wildlife management. This was because 80% of responses in Mumbwa GMA said fewer women were involved while in Lupapnde GMA, 69% of respondents confirmed that fewer women were involved in wildlife management. Responses from key informants from the two GMAs also confirmed little participation of women in wildlife resource management. In the three chiefdoms found in Mumbwa GMA, for example, there were few women (10%) employed as village scouts and in Lupande GMA only 17% of women were employed in the four CRBs that were visited.

3.2. Age

The highest number of respondents from Lupande GMA (20.2% n= 35) were those who were aged 40 – 44 years, followed by those aged 30 -34 years (15.6% n= 27). The fewest respondents were in the group aged 18 -19 years (4% n= 7) (Figure 3).

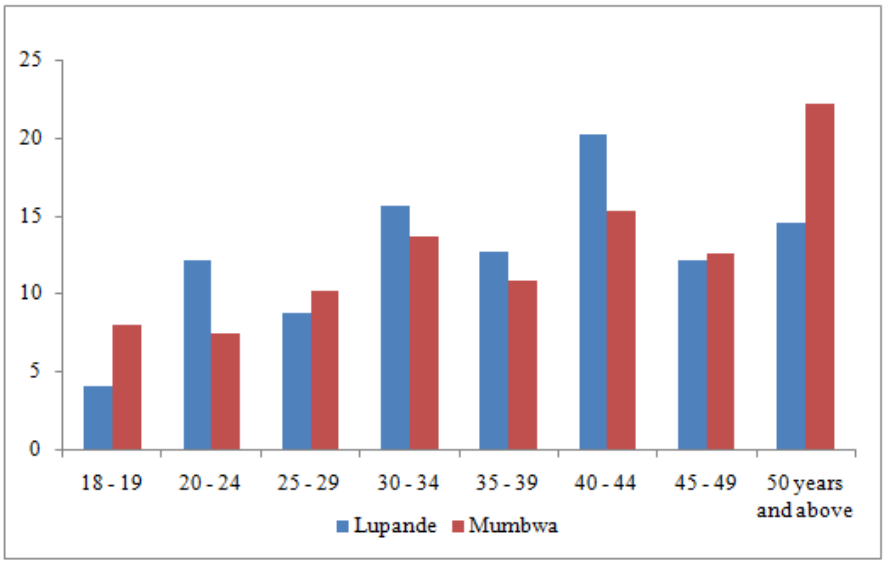

Figure3. *Age distribution of respondents*

3.3. Education

Twenty one point four percent (n=37) of respondents from Lupande and (21.6% n=38) from Mumbwa GMA had a secondary education while (9.8% n=17) and (5.7% n=10) from Lupande and Mumbwa GMAs respectively had no formal education (Figure 4).

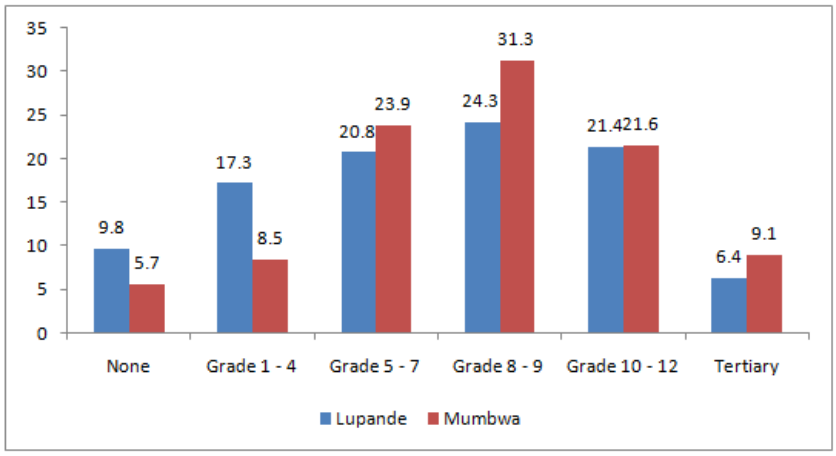

Figure4. *Education level of respondents*

3.4. Ethnicity

The majority of respondents in Lupande GMA were the Kunda speaking people (72.8 % n= 126) while, in Mumbwa GMA the Ila (30.1% n=53) and the Lozi (21.0 % n=37) speaking people were the majority (Figure 5).

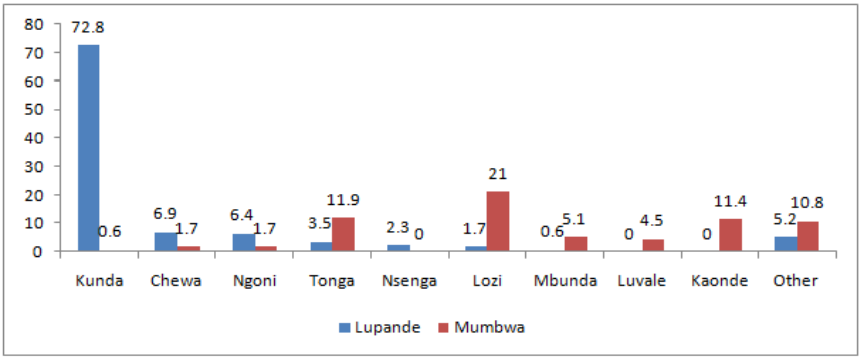

Figure5. *Ethnicity of respondents*

3.5. Community Involvement in Decision Making Process

Most respondents (83%) in Mumbwa were not involved in decision making processes regarding wildlife resource management while in Lupande GMAs 64% believed they were not involved in decision making process. Only few respondents from Mumbwa (17%) and Lupande (36%) were involved in wildlife management programmes through being employed as village scouts in the Community Resource Boards (CRBs) in the GMAs. Their role was to help ZAWA in monitoring and enforcing the law by arresting poachers.

3.6. Sensitisation Activities

The study showed that there was lack of sensitisation activities in the two GMAs. In Mumbwa GMA, for example, there was a low level (13%) observed in the GMA and in Lupande GMA only 39% of sensitisation activities were noted in the area (Figure 6). Mostly these activities were conducted by non-governmental organizations such as Community Markets for Conservation (COMACO), Luangwa Conservation Management (LCM), South Luangwa Conservation Management (SLCM), and World Wide Fund for Nature (WWF). ZAWA was not very active in community sensitisation as their role was mostly seen to enforce the law and punish the offenders.

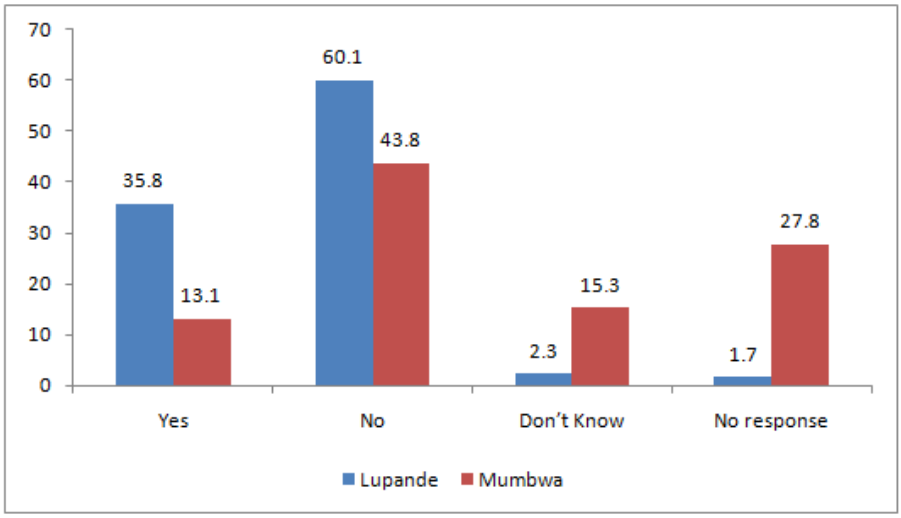

Figure6. *Evidence of sensitisation activities*

4. DISCUSSION

Gender: The study showed that there were more men than women in the two study areas. Despite the smaller number of women in both GMAs, both women and men were willing to be interviewed and therefore should be included in the EE programmes. This was because sex as observed by Liefländer, *et al*. (2012) and Milupi (2008) is influenced by environmental attitudes through environmental education.

Age group: The age group in both study areas indicated that youths were the majority of people who lived in the two GMAs. This signal was important for EE programmes as reviewed by Liefländer and Bogner, 2014 who observed that the younger the person is, the more connectedness he or she will have with nature and would therefore be more receptive to EE programmes.

Educational profile: The educational profile of respondents from the two GMAs clearly indicates that EE programmes could help in making the respondents understand the importance of sustainable use of wildlife resources. This is because the profile shows the diversity of educational levels from none to college level indicating different understanding levels of environmental issues. Conducting EE programmes in the two GMAs would therefore promote community participation and in the process improve the weak community participation currently prevailing in the two GMAs. This is because EE programmes target both the educated and those without education in increasing and enhancing public awareness and participation on environmental conservation. Mubita (2011) in his article titled 'Responding to disasters in tourism in the era of climate change in Zambia' also proposed that Education for Sustainable Development (ESD) should be in the context of tourism and natural

resources conservation in order to increase and enhance public awareness and participation. It is also interesting to note that most respondents from Lupande and Mumbwa GMAs have secondary and tertiary education. This level of education entails that they could be able to read and understand conservation messages and be able to relay them to the elderly and those that do not have the necessary level of education. Furthermore, the use of posters and electronic media such as local radio stations or television could also be considered in EE programme as most respondents could read and write. Education and training for the environment was also proposed by Mubita *et.al.* (2020) as a major tool of advocating for change for environmental safety.

Ethnic groupings: The study further revealed a cross section of men and women from different ethnic grouping living in the two GMAs. Traditional norms of how to look after the environment differs from one ethnic group to another. Therefore, EE programmes should be carried out in different languages exhibited in the two study areas in order to cater for the many ethnic groups. This is important because people use elements of their culture to maintain their ecosystem (SPIMUN, 2014).The EE programmes in the two areas should therefore require background information in order to ensure appropriate design of the EE programmes which would enhance the local community's environmental attitudes (Lieflander and Bogner, 2014).

Community participation: The study showed that most respondents from both GMAs were not involved in making decision making regarding the management of wildlife resources. This indicates that there was inadequate community participation in wildlife resource management in the two GMAs. The introduction of EE programme in the two GMAs would therefore promote enhance community participation because as observed by Mubita *et.al.* (2020), Liefländer and Bogner 2014, education and public participation is one of the most effective tools for promoting public participation.

Sensitisation activities: The study showed lack of sensitisation activities taking place in the two GMAs. Lack of sensitisation activities is a recipe for illegal activities such as poaching. This is because the resource users lack important information that would promote understanding of the importance of sustainable utilisation of wildlife resources and further lead to behavioural change in the local resource users. Sensitisation through EE programme would encourage people to understand, appreciate and implement sustainable practices (Liefländer and Bogner, 2014; Mubita *et.al*. 2020). The EE programme in the area would therefore improve the weak community participation currently prevailing in the two areas. Community participation was also proposed by Mubita (2011) as a factor to improve tourism and wildlife management in the era of climate change in Zambia. This would not only promote active participation of the resource users in the management wildlife resources in the GMAs but would also enhance quality of environmental decision making Reed, (2008); Pumbert and Pretty (1994), Rowe and Frewer (2000) and also build sense of ownership in the resource users Mashinya, (2007).

Table2. *Themes for the proposed Environmental Education Programme for addressing weak community participation in wildlife management*

Themes	✓ Factors leading to weak community participation ✓ Environmental education to address factors behind weak community participation ✓ Environmental education to sensitise local community on the disadvantages weak community participation ✓ Environmental education to promote active participation Environmental education to consider demographic data during sensitisation programme ✓ Environmental education to consider the dynamic nature of cultural beliefs ✓ Environmental education to utilize the dynamic nature of demographic data

Source: *Adapted from field data, 2014*

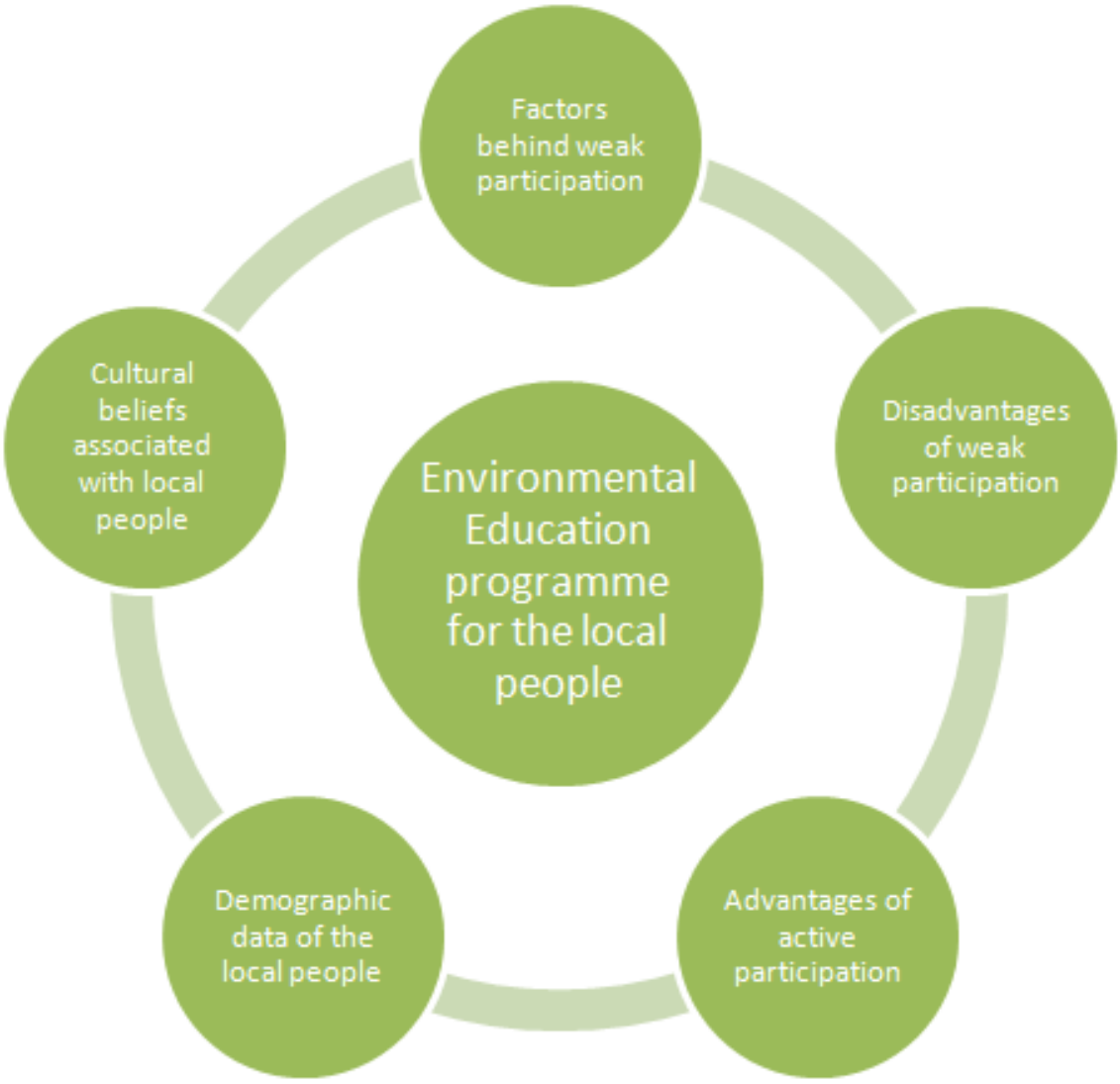

Figure8. *Proposed Environmental Education Programme*

Source: *Adapted from field data, 2014.*

5. CONCLUSION

The study revealed several demographic data which included gender, age, education, and ethnicity. The study further showed inadequate community participation and community sensitisation in the two areas. The proposed introduction of EE programmes in ZAWA and CRB institutions using dynamic nature of demographic and cultural norms exhibited in the two areas would enhance community participation and therefore mitigate the prevailing weak community participation in wildlife resource management in Mumbwa and Lupande GMAs.

RECOMMENDATIONS

- The study's findings reveal that Environmental Education is not one of the main objectives of ZAWA and CRBs. There is need for ZAWA to include EE among their main objectives.
- The study further indicated that sensitisation activities in the two areas were rarely conducted. ZAWA and CRBs therefore need to increase sensitisation activities in the two study areas in order to improve community participation in the two areas.
- The study also showed that the form of EE activities taking place in the GMAs did not consider demographic and cultural norms prevalent in the two areas. There is need for ZAWA to ensure that EE programmes taking place in the two areas should take into consideration the dynamic nature of demographic and cultural norms found in the two GMAs.

- The research findings also pointed out that community participation is weak in the two areas. ZAWA should therefore introduction EE programmes in the areas in order to promote active participation of the local community in the management of their resources.

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We would like to thank ZAWA for permitting us to conduct research in Lupande and Mumbwa Lupande GMAs. We also thank all the entire respondents from Mumbwa and Lupande GMAs for their support and corporation for their precious time during our field study to be a success.

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Usages Sociaux Des Rameaux Et Exploitation Durable De Raphia Sudanica Dans Le Sud-Est Du Benin

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Abstract: *The communities of southeastern Benin use the different organs of Raphiasudanica for social, medicinal, ritual, cultural, religious, etc. purposes. As a result, this species is subject to anthropic pressure and is at risk of extinction in this environment. The objective of this research is to describe the social uses of the branches of Raphiasudanica which influence its sustainable exploitation in the South-East of Benin. It adopted a qualitative approach and relied on in-depth interviews, group discussions, direct observations and documentary analysis. The symbolic interactionism of H. Blumer revisited by L. Lacaze is the theoretical model used for the analysis of the results. The results reveal that the branches of Raphiasudanica are used by local social groups for economic, religious, medicinal and security purposes. The users of these organs are not concerned about the way in which the branches are used in the environment. The degree of destruction of a tree species is a function of its value to local social groups in the vicinity or the multiplicity of its use by them. In Western Cameroon, raffia palm groves are the raw material of craftsmen and a whole civilization, which feeds on raffia wine and articles made from raffia palm groves, is gradually disappearing. The social uses of the twigs from this plant thus contribute to its progressive destruction because its exploitation is not such as to ensure its sustainability.*

Keywords: *Raphiasudanica, social uses, twigs, sustainable exploitation, Benin.*

1. INTRODUCTION

La dégradation ou du moins la disparition d'une espèce environnementale n'est pas toujours due àl'effet de fin de cycle de sa vie. Plusieurs espèces vivantes de l'ordre animal ou végétal ont disparu ou sont en voie de disparition en raison des effets anthropiques. Les pollutions environnementales de tout genre, les feux de végétations, la déforestation et plus encore les exploitations incontrôlées de ces espèces sont entre autres les causes majeures d'extinction des espèces animales et végétales.

En ce qui concerne les forêts, une revue générale de la littérature, une synthèse biographique spécifique et les avis d'experts ont permis d'identifier d'un point de vue théorique, les causes de la déforestation et la dégradation des forêts. Ces variables potentielles ont été regroupées en 9 sous-ensembles : l'agriculture, les infrastructures, l'exploitation forestière, les facteurs économiques, les axes de transport, les facteurs démographiques, les facteurs socioculturels, les facteurs institutionnels et les facteurs biophysiques (C. Ernst et *al.*, 2012). Ces constats mettent en exergue plusieurs raisons explicatives de la dégradation du couvert végétal etdont les sources sont directement associées aux activités humaines. Plusieurs institutions militant en faveur de l'environnement ont mis l'accent à mainte reprise sur l'impact négatif de la déforestation sur les ressources naturelles en général et sur le couvert végétal en particulier. Il n'est donc d'aucun doute que « la déforestation représente une sérieuse menace à la durabilité environnementale et met en péril les progrès accomplis vers l'éradication de la pauvreté et de la faim » (PNUD, 2013, p. 42).

En effet, le rapport de l'Homme à la nature,qu'on peut situer à la naissance de l'humanité,n'a fait qu'évoluer dans le temps et dans l'espace. L'espèce humaine a toujours usé de son intelligence pour exploiter les ressources naturelles qui l'entourent et cette remarque fonde l'interaction entre « nature et culture » qu'évoque P. Descola (2015). Les palmiers sauvages quoi que classés dans les produits forestiers non ligneux (PFNL), sont en proie au même titre que les autres espèces forestières. D'ailleurs, « les populations locales utilisent quotidiennement et en majorité des produits forestiers

non ligneux (PFNL) en vue de satisfaire leurs besoins »(Dongmo, n.d., p. 9). Les raphiales constituent la matière première des artisans ;on y extrait du vin de raphia, et des articles sont fabriqués à partir des organes tirés de ces raphiales, qui, il faut le souligné, disparaît progressivement (L. Meutchieye, 2012).On comprend donc que« les PFNL sont généralement utilisés pour compléter les régimes alimentaires et augmenter le revenu des ménages, notamment pendant des saisons particulières de l'année telles que les saisons sèches, et pour aider à répondre aux besoins médicinaux » (J. E. Michel Arnold et M. Ruiz Perez, 2001, p. 440).

Ces divers usages sociaux du *Raphia sudanica* ont un impact sur son exploitation durable. En effet, dans le sud-est du Bénin, les groupes sociaux locaux ont recours aux organes de cette espèce dans leurs pratiques quotidiennes. C'est le cas des usages sociaux des rameaux de cette espèce, qui sont utilisés à plusieurs fins et méritent que l'on s'y intéresse pour une appréhension de leur impact sur la conservation de l'espèce dans le Sud-Est du Bénin. Parce que, les usages sociaux prouvent parfois l'attachement des groupes sociaux à une ressource particulière et relève au passage les rapports sociaux qu'ils entretiennent avec la nature. Il y a donc lieu de se poser la question de savoir : quels sont les défis liés à l'exploitation durable des rameaux de *Raphia sudanica*? Cette préoccupation a donné une opportunité d'apporter des réponses scientifiques à travers la description des usages sociaux des rameaux de *Raphia sudanica* qui impactent son exploitation durable dans le Sud-Est du Bénin. Certes, les rameaux de cette espèce ne sont pas les seuls auxquels ont recours les groupes sociaux locaux, mais il convient de signaler que l'accent est particulièrement mis sur l'usage des rameaux de cette plante dans la présente recherche.

1.1. Matériel Et Méthodes

Le cadre de cette recherche couvre la partie méridionale du Bénin, précisément dans le Sud-Est qui couvre principalement deux départements, l'Ouémé et le Plateau (Figure 1). Ces départements comptent respectivement 05 communes (Kétou, Pobè, Adja-Ouèrè, Sakété et Ifangni) pour le Plateau, et 09 communes (Adjara, Akpro-Missérété, Avrankou,Adjohoun, Bonou, Dangbo, Sèmè-Kpodji, Aguégué et Porto-novo) pour l'Ouémé (INSAE, 2013).

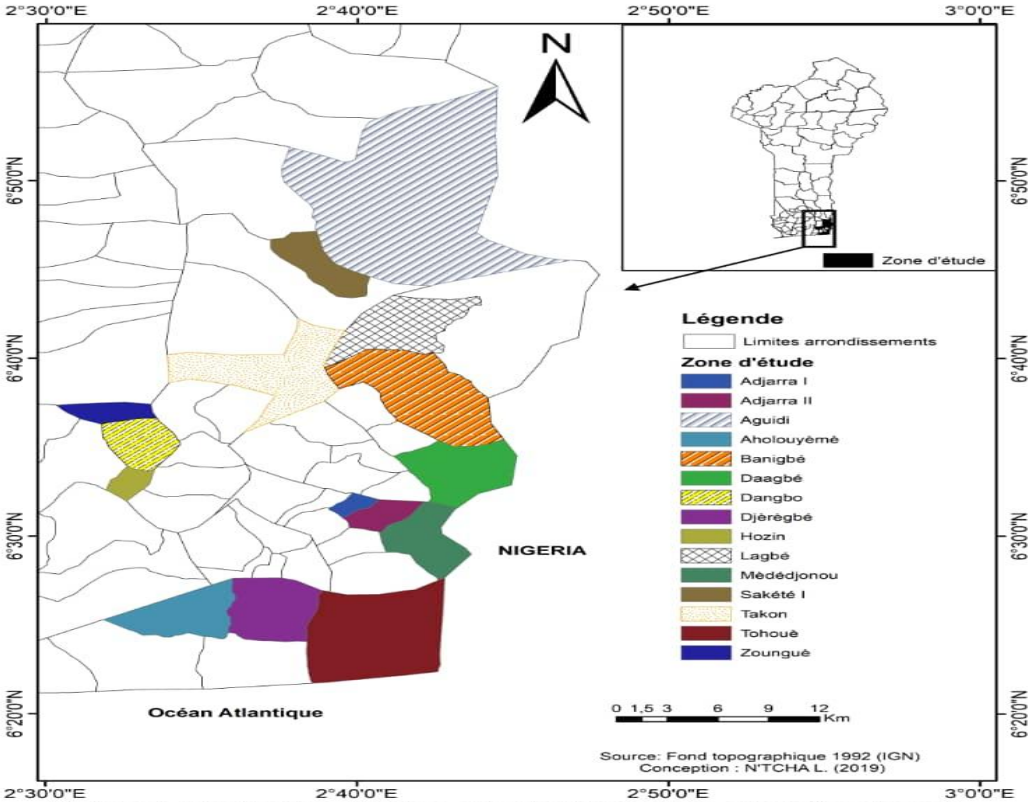

Figure 1 : Carte de situation géographique des arrondissements de collecte des données.

Source: *Tabé et N'Tcha, 2020*

Les 14 communes de ces départements n'ont pas été toutes enquêtées lors de la collecte des données de terrain. Les départements de l'Ouémé et du Plateau comptent respectivement neuf (09) et cinq (05)

communes ; ce qui fait, au total, quatorze (14) communes. La technique de choix raisonné a permis de retenir les localités dans lesquelles les données ont été collectées. Cinqcommunes, à raison de trois (03) dans le département de l'Ouémé et deux (02) dans le département du Plateau ont été retenues. C'est donc le tiers (1/3) représentatif des communes de chacun de ces départements par excès, qui a servi de zone de collecte des données des informations relatives au *Raphia sudanica*. Les Communes de Sèmè-Podji, d'Adjarra et de Dangbo ont été retenues dans le département de l'Ouémé et celles d'Ifangniet de Sakété dans le Plateau. Parce que, dans ces communes, on retrouve plus les exploitants de *Raphia sudanica*. Les critères qui ont orienté le choix des communes, des arrondissements, les quartiers de villes ou villages sont : la présence des bas-fonds qui regorgent de raphiales, des artisans qui travaillent les organes de l'espèce, des exploitants du vin de raphia et l'observation de toute autre forme d'usage des organes de *Raphia sudanica*. A cela il faut ajouter que les principaux groupes sociolinguistiques autochtones que sont : les Gun, les Tori, les Xwla et les Nago-Yoruba, vivent majoritairement dans les localités retenues.

En ce qui concerne le nombre d'acteurs interrogés par groupe cible, il a été déterminé à partir d'un échantillonnage basé sur la technique de choix raisonné. Le choix des groupes cibles approchés s'est opéré de façon raisonnée sur la base des informations recherchées. Par conséquent, à partir de la technique de choix raisonné, neuf (9) groupes cibles composés de : dignitaires religieux, sages et notables, tradi-thérapeutes, artisans, les femmes, pêcheurs, conservateurs de musée, exploitant de vin de *Raphia sudanica*et représentants des institutions gouvernementales ou non gouvernementales.

Les dignitaires religieux ont fourni les informations sur l'exploitation et les usages sociaux des rameaux lors de certainsrituelsreligieux. Les sages et notables ont révélé l'utilité des rameaux de l'espèce, l'évolution de leurs usages à travers le tempsetles valeurs et normes que représentent les rameaux de *Raphia sudanica* pour les groupes sociaux locaux. Les tradi-thérapeutes ont ressorti les vertus thérapeutiques des rameaux de cette plante et les circonstances dans lesquelles ils recourent à eux. Quant aux artisans, ils ont expliqué pourquoi les rameaux sont de plus en plus sollicités dans le milieu artisanal et les enjeux de la gestion durable de cette espèce dans leur milieu. Les pêcheurs ont évoqué l'intérêt de l'usage des rameaux de cette plante pour la pêche. Enfin, les représentants des institutions gouvernementales et non gouvernementales ont donné des précisions quant aux actions menées dans le cadre de la préservation du couvert végétal dans ces départements (Ouémé et Plateau), les résultats de ces actions, ainsi que les difficultés auxquelles est confrontée l'application des textes relatifs à l'exploitation des ressources forestières.

Cette technique a été choisie en raison de la nature des données collectées, mais aussi du fait que seule une catégorie d'acteurs répondant aux critères prédéfinis a été interrogée. Les critères de choix des interlocuteurs sont : l'âge, le sexe, la durée de vie de l'individu dans le milieu,l'appartenance à un groupe sociolinguistique du milieu. Pour l'âge, trois catégories ont été définies suivant le principe utilisé par A. E. Assogbadjo*et al.* (2012) pour les études ethnobotaniques. Il s'agit des jeunes (âge < 30 ans), des adultes (âge compris entre 30 et 60 ans) et des vieux (âge > 60 ans). Ces différentes tranches d'âge couvrent toutes les catégories d'individus d'un groupe social (enfants, adultes et personnes du troisième âge), qui n'ont pas toujours les mêmes rapports avec le milieu naturel (A. E. Assogbadjo*et al.*,2012).

Au total, 27 interlocuteurs ont été approchés et cette taille de l'échantillon a été arrêtée suivant le principe d'atteinte du seuil de saturation des informations. Les techniques de collecte des données mobilisées sont l'analyse documentaire à partir d'une fiche de lecture, l'entretien individuel approfondi et de groupe opérationnalisés avec des guides d'entretien, l'observation directe au moyen d'une grille d'observation. L'analyse de contenu a permis de faire le tri thématique des données. Les résultats issus du traitement des données collectées ont été analysés suivant la théorie de l'interactionnisme symbolique de Blumerrevisité par L. Lacaze (2013).

2. RESULTATS

Le traitement des données a révélé plusieurs usages sociaux des rameaux de *Raphia sudanica*. Ces différents usages ont été catégorisés suivant les fins auxquelles ils sont destinés. De ce fait, on observe les usages des rameaux à des fins économiques, thérapeutiques, magico-religieuses et sécuritaires.

2.1. Usages Sociaux Des Rameaux a Des Fins Economiques

Les rameaux de *Raphia sudanica* sont utilisés par les artisans pour la fabrication de plusieurs objets destinés à la commercialisation. Les artisans usent des rameaux de diverses manières pour la

confection de ces objets. Par conséquent, les rameaux interviennent dans la fabrication des sacs, des nattes, des balayes, des cordes, des toits, des vêtements, des accoutrements de divinités, des objets décoratifs.

En dehors des accoutrements de divinités que l'on retrouve exclusivement dans les couvents, les autres objets fabriqués avec les rameaux ou extraits des rameaux de *Raphia sudanica*sont commercialisés à domicile, dans les marchés locaux et accessibles à tous les usagers. En effet, plusieurs types de nattes sont tressés avec les fibres issues des rameaux de cette plante.

Il faut préciser que les femmes s'intéressent particulièrement aux organes de *Raphia sudanica*en général et à ses rameaux en particulier, pour entretenir leurs activités génératrices de revenus. En effet, environ 37,64% des artisans approchés de ces localités sont des femmes vannières, tresseuses de cordes et de pailles, fabricantes du vin de raphia, connue sous le nom de « *dɛɦán* »[1](en langue locale *Gun*) pour ne citer que ces activités-là. Elles y sont très actives dans ces activités qui leur permettent de s'affirmer financièrement et même de faire des épargnes. Une artisane déclare que « les organes de raphia offrent aux femmes de notre localité, l'opportunité de se rendre autonome financièrement, de contribuer à la vie économique de son foyer et d'épargner pour d'autres besoins éventuels » (Propos de : AH, Adjarra, 08/06/2019). Ce verbatim montre l'impact des usages sociaux de cette plante sur la vie économique des groupes sociaux locaux, mais aussi l'opportunité d'autonomisation qu'elle offre aux femmes du Sud-Est du Bénin. La planche suivante présente les activités génératrices de revenus exercées par les femmes grâce aux organes de *Raphia sudanica*.

Planche1. *Usages de Raphia sudanicadans les activités génératrices de revenus des femmes*

Source. *Cliché N'Tcha, 2019*

Le verbatim suivant, tiré du discours d'un enquêté stipule que : « la natte « kpãgnã » sur laquelle les rois s'assaillent, est une natte tressée à partir des rameaux et de leurs fibres. Ce sont les rameaux de *Raphia sudanica* et leurs fibres qui permettent de la fabriquer » (Propos de : HL, Kétonou le 08/06/2019). Ce verbatim soutient l'usage des rameaux de cette espèce dans la fabrication des nattes qu'elles soient ordinaires ou sacrées. La photo ci-dessous présente les fibres issues des rameaux auxquelles ont recours les artisans au besoin pour compléter la fabrication des objets.

[1] Boisson connue sous le nom de "sodabi" mais fabriquée à partir du vin extrait de *Raphia sudanica*à ne pas confondre avec le "sodabi" obtenue à partir du vin issu du palmier à huile, le « dé*ɦán* ».

Photo. *Fibres extraites des rameaux de Raphia sudanica*

Source. *Cliché N'Tcha, 2019*

En dehors des nattes,il y a les balais appelés « xakun »qui sontobtenus à partir de l'extraction des brindilles des rameaux *Raphia sudanica*. Unancien pêcheur situe l'usage des rameaux et de leurs fibres à une période lointaine à travers ces propos:

> « Nous utilisonsles rameaux et leurs fibres pour faire des filets à cause de leur résistance. Les filets qu'on utilise pour pêcher certains types de poissons. On tisse ces filets et on les positionne au bord de la rivière avant de mettre les anneaux. Comme il n'y avait pas de ficelles en textiles, c'est avec les rameaux de raphia et leurs fibres que les gens capturaient les poissons et comme les blancs ont amené les ficelles maintenant, c'est pourquoi on ne les voit plus trop utiliser les rameaux et leurs fibres » (Propos de : TZ, Tori-Agonsa le 09/06/2019).

Ces propos d'un ancien pêcheur devenu un haut dignitaire religieux permet de comprendre les multiples recours des rameaux de *Raphia sudanica* par les groupes sociaux locaux. En effet, les rameaux de l'espèce et leurs fibres une fois séchés sont très résistants comme cordes. C'est pourquoi, les communautés recourent à ces organes pour la confection des objets qui en requiert l'usage. C'est ce qui explique qu'on dénombre plus d'une cinquantaine d'objets fabriqués à partir des organes de cette espèce végétale dont au moins une quinzaine comportant les rameaux et/ou leurs fibres. Mais, outre ces usages des rameaux de raphia et de leurs fibres pour la conception de certains objets commercialisés, ces organes de l'espèce sont aussi utilisés dans les pratiques magico-religieux.

2.2. Usages des rameaux de *Raphia sudanica* à des fins magico-religieuses

Plusieurs concepts font appel aux rameaux dans la tradition chrétienne : Carême, Croix, Dimanche des rameaux, Liturgie, Passion, Rameaux, Semaine Sainte.Mais, "Rameaux"est un mot quelque peu savant pour évoquer une branche d'arbre mais qui d'entrée de jeu provoque des associations (dimanche des rameaux, bénédiction des rameaux, procession des rameaux, rameaux bénits…).

> « On emploie plus couramment le mot « palmes » pour désigner les rameaux, mais sans trop le réaliser, on fait alors référence aux rameaux de palmier dans ce cas. Ne dit-on pas en latin « Dominica in Palmis », alors que les anglophones ont leur « Palm Sunday ». L'évangéliste Matthieu fait allusion à des « branches d'arbres », Marc à de la « verdure » et que Luc ignore le détail, Jean évoque explicitement des « rameaux de palmiers »tenus en main pour accompagner les cris de joie l'entrée triomphale de Jésus à Jérusalem. Vue la mention explicite de « palmes » dans l'évangile de Jean, leur usage s'est largement imposé. Certes, les retrouver dans les pays plus nordiques n'est pas sans exotisme mais n'est-ce pas propre à évoquer le souvenir du pays de Jésus. Un rituel chrétien suggère que la croix de procession soit décorée car il ne faut pas la négliger ni surtout l'oublier particulièrement en ce dimanche. Le rituel rappelle d'ailleurs qu'on trouve « en tête le ministre portant la croix ornée d'un rameau ». Idéalement, comme le suggère la « Présentation Générale du Missel Romain », cette croix de procession est celle qui, en principe, se retrouve en permanence à proximité de l'autel (Propos de : PD, Adjarra le 09/06/2019).

Au Bénin, dans les communes du Sud-Est où les palmiers raphia sont plus abondants et facilement accessibles, les fidèles chrétiens ont plus recours aux rameaux de *Raphia sudanica* pour répondre aux besoins rituels périodiquement. Il convient de faire remarquer que suivant le lieu, l'espèce végétale d'où sont extraits les rameaux diffère ; et pour cause les perceptions des plantes par les groupes sociaux locaux qui ont recours à elles et la disponibilité des palmiers.

Enfin, il faut mettre un accent sur la distribution des rameaux qui sont souvent offerts par les paroisses. Des bénévoles fractionnent les palmes et les présentent aux participants lors de l'accueil. Un geste qui requiert un soin particulier parce qu'il crée un lien entre la communauté et la maison du fait qu'une fois la célébration terminée, on aime en rapporter chez soi et les conserver l'année durant. Dans un beau geste catéchétique, on peut à l'occasion s'y référer.

Par ailleurs, les rameaux de *Raphiasudanica* sont utilisés par les groupes sociaux locaux du Sud-Est du Bénin à des fins magico-religieuses. A ce propos, un haut dignitaire religieux rapporte que :

> « Les rameaux de raphia sont utilisés pour protéger les bouteilles dans lesquelles se trouvent certaines recettes magiques. Certaines bouteilles sont protégées par les rameux séchés et travaillés pour que personne ne puisse voir ni détruire leur contenu à travers les bouteilles. Celle qui est là, on l'appelle « adjagodoε» » (Propos de : TZ, Tori-Agonsa le 09/06/2019).

Il ressort de ces propos que certaines personnes utilisent les rameaux de *Raphia sudanica* sur la base des croyances qu'ils ont quant aux vertus de cet organe de l'espèce. La photo ci-dessous est celle d'une bouteille à potion magique protégée par les rameaux séchés et travaillés à cet effet.

Photo. *Bouteille à potion magique couverte de rameaux de Raphia sudanica*

Source. *Cliché N'Tcha, 2019*

Ce sont d'ailleurs ces croyances aux vertus magiques des rameaux de cette plante qui font que plusieurs objets confectionnés à partir de ces organes sont utilisé à des fins magico-religieuses. Un tradi-praticien ajoute à propos de ces croyances religieuses que :

> « Il y a un sac appelé« adókpoó » ou « chakoto » fabriqué avec les rameaux de raphia, que les vieux utilisent. C'est dans ce sac que ces vieux rangent leurs recettes magiques. Les rameaux de raphia possèdent une puissance infranchissable qui empêche les ennemis d'atteindre spirituellement la personne qui met ses recettes magiques de protection dans ce sac. C'est pourquoi il est défendu à quiconque de toucher à ce type de sac sans l'autorisation de son propriétaire, surtout quand il s'agit d'une personne de sexe féminin (notamment en menstruations). Cela permet de préserver leurs vertus protectrices » (Propos de : FT, ToriAgonsale09/06/2019).

Ces différents discours permettent de se rendent compte que les croyances des groupes sociaux locaux aux forces spirituelles des rameaux,et par-delà, que tous les organes de *Raphia sudanica*, occupent une place de choix dans leur vision du monde. C'est en témoignage du respect et à la reconnaissance de l'étendue de la puissance de la divinité « Zãngbɛtó » que les adeptes de cette divinité recourent aux rameaux de l'espèce pour fabriquer la case servant lors de la sortie de la divinité. Par conséquent, les adeptes de la divinité « Zãngbɛtó » utilisent les feuilles, rameaux et fibres de cette espèce pour fabriquer la case qui lui permet d'apparaître en publique. L'affirmation de cet interlocuteur va plus dans le détail.

> « On exploite les rameaux, on extrait les fibres « odɛ », ce que les femmes utilisent pour tresser les nattes ; on enlève maintenant les brindilles et le reste appelé « dɛxuixa » permet de fabriquer la case de Zãngbɛtó » (Propos de : FT, ToriAgonsa le 09/06/2019).

Cette affirmation est soutenue par celle d'un adepte de « Zãngbɛtó» qui apprend que :

> « C'est les feuilles ou les rameaux « dɛxuixa » et leurs fibres qu'on utilise pour construire la case de « Zãngbɛtó ». C'est le « djôwanou » de nos aïeux ; c'est ça les gens avaient utilisé pour faire peur à un roi et il a arrêté la guerre. C'est à cause de ça que le roi Toffa est venu à Porto-Novo. Ce sont nos grands-parents qui nous ont raconté l'histoire. C'est la fibre et le « dɛxuixa »qu'on utilise pour fabriquer les cases de cette divinité » (Propos de : TA, ToriAgonsa le 09/06/2019).

Le choix des organes de *Raphia sudanica* pour la fabrication des cases de la divinité n'a pas été fait de façon hasardeuse. En réalité, les groupes sociaux locaux considère cette plante comme étant la plus résistante de toutes, et donc relevant de l'ordre divin. C'est pourquoi ces organes sont choisis pour montrer la place accordée à la divinité par ces adeptes. La photo suivante est celle d'une case de la divinité « Zãngbɛtó».

Photo. *Cage de la divinité Zãngbɛtó*

Source. *Cliché N'Tcha, 2019*

C'est dans cette case que la divinité apparaît en publique pour manifester son pouvoir et sa puissance lors des cérémonies, en produisant des choses magiques pour montrer l'étendue de la force spirituelle.

Les usages sociaux ressortis dans ce travail ne sont pas exhaustifs. Il y a des pratiques faisant appel aux rameaux de *Raphia sudanica* qui ne sont pas apparus ici, mais qui démontre de la multiplicité des usages sociaux de cette espèce par les groupes sociolinguistiques du Sud-Est du Bénin. En ce qui concerne les croyances en la force spirituelle des organes de cette plante, elles ne sont pas exclusivement observables chez les adeptes des divinités qui ont des rapports directs avec l'espèce mais ces croyances s'étendent jusqu'aux membres des groupes sociaux locaux.

En effet, les rameaux véhiculent des messages selon leur emplacement dans l'environnement humain. Les membres des groupes sociaux locaux ont connaissent du code langagier véhiculé par la présence des rameaux de *Raphia sudanica*à un endroit précis. C'est pourquoi, certaines personnes usent de ces rameaux pour sécuriser leurs biens matériels dans ces localités. La présence d'un rameau séché de

raphia attaché à l'entrée d'un champ, signale l'interdiction d'accès à ce dernier et le contrevenant risque de subir les conséquences émises par son propriétaire auprès de la divinité représentée par ce rameau.

Ainsi, il est courant de voir dans ces localités, les rameaux de *Raphia sudanica* sur les ailes des volailles, les cous desbétails, dans les bassines de céréales et d'autres biens matériels marquant de ce fait la sacralité de ceux-ci. Un chef culte explique que :

> « Si par exemple quelqu'un vole nos biens chaque fois et se montre tout puissant, si on met un rameau ou sa fibre sur quelque chose et la personne prend, même s'il va au Vatican, il va revenir nous rendre compte et c'est forcé » (Propos de : KA, Dangbo le 24/06/2019).

Les rameaux de *Raphia sudanica* participent à la sacralisation des biens dans les localités du Sud-Est du Bénin et les membres des groupes sociaux locaux respectent ces normes et valeurs endogènes qui participent au maintien de l'ordre social dans le milieu.

2.3. Usages des rameaux de *Raphia sudanica* à des fins thérapeutiques

Les rameaux de *Raphia sudanica*sont utilisés lors des purifications des individus et dans les recettes destinées à la guérison de certaines maladies. Les rameaux sont connus pour être utilisés par les fidèles du christianisme céleste lors des cérémonies de purification des fidèles pour les débarrasser de leur impureté. Un fidèle de cette confession religieuse explique le choix porté sur les rameaux comme éléments constitutif utilisé lors de ce rituel.

> « Le choix des rameaux de raphia remonte à la célébration du christ lors de son entrée dans la ville de Jérusalem et la fête des rameaux fait référence à ce moment. Ailleurs, les gens n'utilisent pas forcément les rameaux de raphia ni de palmier, mais ceux des plantes qu'ils ont sous la main et qui représente une plante pure à leurs yeux en fonction des réalités de leur milieu. Chez nous le raphia est considéré comme une plante pure et c'est à cause de leur virginité que l'on trouve aux rameaux de cette plante, que l'on a recours à elle lors de cette fête des rameaux pour purifier les fidèles de l'église» (Propos de : RK, Djrègbé le 08/06/2019).

Cette explication fournie par un fidèle de l'église du christianisme céleste renseigne sur les fondements qui sont à la base de l'utilisation des rameaux lors de la purification des fidèles de cette église. Mais, cette forme de purification n'est pas utilisée qu'à l'église, les thérapeutes traditionnels utilisent aussi les rameaux de cette espèce lors des purifications qu'ils opèrent sur les membres des défunt(e)s dont la survenance de la mort nécessite une purification des autres membres de leurs familles encore en vie. La purification des objets avec lesquels ces défunt(e)s ont été en contact, est souvent faite pour éviter que le malheur ne continu de décimer la famille pour une faute commise par le ou la défunt(e). Les rameaux sont utilisés pour asperger l'eau destinée à cet effet sur les personnes concernées, les objets et dans les chambres de la personne décédée.

Par ailleurs, les rameaux de raphiasont utilisés pour soigner l'ulcère gastrique ou ceux qui ont une température élevée dans leur ventre. Ils sont sollicités aussi dans la recette qui permet de guérir les maux d'yeux notamment « les petites boules qui restent sur les yeux et empêchent parfois de voir de loin » selon les propos de : KA, Dangbo le 24/06/2019. Le filtrat des rameaux de *Raphia sudanica*permet de lutter contre la tensionartériellechez les personnes qui en souffrent. Il est aussi rapporté que :

> « Lorsque quelqu'un dort sur son cou et ressent des douleurs au niveau du cou, on donne les fibres de raphia à une personne gauchère qui prend le soin de les tresser. Ensuite, on attache cette tresse des fibres au cou du malade. Le mal va partir » (Entretien réalisé en ouémè, IDKDénankpo le 12/06/2019).

Les usages sociaux des rameaux de cette plante à des fins thérapeutiques sont multiples et diverses. Les groupes sociaux locaux nourrissent des croyances autour de l'espèce qui orientent leurs comportements vis-à-vis de ses organes. C'est donc sur cette base que sont collectés et utilisés les rameaux de *Raphia sudanica*dans les différentes localités du Sud-Est Bénin.

3. DISCUSSION

Les usages sociaux des rameaux de *Raphia sudanica*ont un impact sur sa conservation dans les localités du Sud-est Bénin. En effet, tels que utilisés par les groupes sociaux locaux, aucun contrôle n'est effectué autour de la collecte des organes de l'espèce pour une exploitation durable. En effet, les activités anthropiques constituent l'un des défis les plus importants auxquels est confrontée la conservation des ressources naturelles. Les populations s'accroissent plus vite et deviennent nombreuses que les ressources peuvent en supporter. Les initiatives communautaires sont envisagées pour alléger les effets de la dégradation de l'environnement comme le fait remarquer M. Mahdi (2012), mais ces efforts sont loin des dommages créés. En ce qui concerne les ressources forestières, aucune espèce végétale n'est en marge de la sollicitation de l'Homme. Si l'on regarde dans le passé, l'on voit que quelques familles de plantes ont joué un rôle prédominant en tant que source de matières premières à la fois comestibles et non comestibles. Dans le monde entier, trois familles de plantes se démarquent en terme d'utilité, tant par le passé qu'aujourd'hui: la famille des graminées (Gramineae), la famille des légumineuses (Leguminosae) et la famille des palmiers (Palmae). Si la zone géographique considérée est restreinte aux régions tropicales, l'importance de la famille des palmiers est encore plus flagrante (Johnson, 2010).Cela situe les usages des palmiers à une période lointaine et permet de rejoindre cette affirmation deM. OuassaKouaro (2011) selon laquelle « l'utilisation des différentes parties de l'arbre démontre le rôle essentiel qu'il tient dans la vie des groupes sociaux » (M. OuassaKouaro, 2011, p. 61).

Les rameaux de *Raphia sudanica* font parties des organes de l'espèce les plus utilisés par les groupes sociaux locaux. D'ailleurs, les rameaux de palmiers ont souvent fait partie des composantes les plus importantes intervenant dans les rituels sacrés des religions. Ainsi, si dans le Nord-ouest du Bénin, les ressources ligneuses représentent un levier du développement économique comme le soutiennent M. OuassaKouaro et O. N. Tchoroué (2015), dans d'autres contrées ce sont les ressources forestières non ligneuses qui jouent ce rôle. Au Sud-Est du Bénin, *Raphia sudanica* est une ressource naturelle qui tient une place de choix dans la vie de plusieurs groupes sociaux locaux et le maintien de l'accès à cette ressource est d'autant plus important qu'il y ait lieu de se préoccuper de sa conservation. Car, confrontés aux impératifs du quotidien, les membres de ces groupes sociaux n'ont parfois d'autres choix que d'innover avec les ressources disponibles pour subvenir à leurs besoins. Les usages sociaux des espèces végétales sont en perpétuels augmentation.

En dehors des usages sociaux de rameaux de *Raphia sudanica* par les groupes sociaux locauxqui ont été décrits dans ce travail, il importe de faire remarquer que cette plante participent aussi à l'entretien de plusieurs activités surtout génératrices de revenus dans le Sud-Est du Bénin. De fait, elle constitue pour 38% des acteurs approchés une matière première parce que toute leur activité est basée sur ses organes. Ce fait est loin d'être un fait nouveau car son importance a été déjà démontrée par les travaux de F. Meutchieye (2012) à l'Ouest du Cameroun. Il est donc important d'accompagner les usages sociaux des ressources naturelles par des mesures de conservation adéquates pour s'assurer de leur pérennité et celle des activités qui en dépendent.

4. CONCLUSION

Cette recherche s'est intéressée à la description des usages sociaux des rameaux de *Raphia sudanica*dans le Sud-Est du Bénin. Elle a adopté une démarche qualitative en s'appuyant sur l'analyse des données documentaires, des entretiens approfondis réalisés avec les groupes cibles et des observations directes faites sur le terrain. L'on retient de cette recherche que l'usage des rameaux de *Raphia sudanica* par les groupes sociaux locaux du Sud-Est du Bénin ne s'éloigne pas des formes d'usages sociaux des rameaux observées dans les autres contrées du monde. Les usages sociaux des organes de cette espèce sont multiples : les hommes comme les femmes ont recours aux organes de cette espèce pour leurs activités artisanales (pêche, vannerie, tressage, fabrication de vin…), les tradi-thérapeutes pour guérir des maladies et éviter la survenance du mal ou de la mort chez certains patients, les religieux pour les rituels de purification.

Au Bénin, nombreux sont les milieux dans lesquels les palmiers sont les plantes dont les rameaux servent de constituants pour l'exécution de ce rituel. Dans le Sud-Est du Bénin, où la recherche a été menée, les palmiers sauvages, notamment les raphias sont majoritairement les plantes qui peuplent les forêts de ce milieu. Par conséquent, les groupes sociaux locaux recourent à elles pour des usages destinés à des fins multiples et diversifiés. Les rameaux de *Raphia sudanica* sont utilisés dans les activités destinées à des fins économiques. Les artisans ont recours à eux pour des transformations afin de compléter les œuvres à commercialiser. Cet aspect de l'usage des rameaux de cette espèce végétale n'est pas le seul observable dans ce milieu, car ils sont aussi utilisés à des fin magico-religieux par les mêmes groupes sociaux riverains. Ainsi, retrouve-t-on les rameaux ou leurs extraits dans les pratiques religieuses, témoignant de ce fait des croyances religieuses qui se nourrissent autour de cette espèce, de ses organes et plus précisément des rameaux qui en sont issus. Les groupes sociaux locaux exploitent *Raphia sudanica*à des fins thérapeutiques également. Car, les vertus de cette plante s'étendent au domaine médicinal. Qu'elles soient considérées comme pratiques magico-religieuses ou pratiques traditionnelles de la médecine, ce qui est remarquable dans le contexte actuel, c'est que les groupes sociaux qui ont à faire à cette plante croient et utilisent ses rameaux pour guérir des maladies ou se débarrasser du mal.

Ces divers usages sociaux des rameaux dans le Sud-Est du Bénin ne sont pas sans conséquences sur son exploitation. L'usage des organes d'une plante sous-tend leur collecte et donc son exploitation, qui n'est pas toujours contrôlée et gérée rationnellement par les groupes sociaux riverains pour en assurer sa durabilité dans le milieu. Les populations s'accroissent continuellement et par-là les demandes de produits confectionnés à base de rameaux de *Raphia sudanica*. De plus, les pratiques sociales, culturelles, religieuses et thérapeutiques pour lesquelles les rameaux de l'espèce sont sollicités ne font qu'augmenter l'ampleur des prélèvements des organes de l'espèce, montrant ainsi la pression à laquelle elle est soumise dans le milieu. Les exploitations de cette forme ne sont pas toujours mises en exergue pour stimuler des réflexions projetant les actions anthropiques présentes à des effets probables sur le couvert végétal dans le long terme. Car si *Raphia sudanica*est compté encore parmi les espèces végétales du Sud-Est du Bénin, il est certain que sa population n'est plus la même aujourd'hui qu'elle ne l'a été par le passé et augure de sa disparition certaine si des politiques publiques ne mènent pas des actions pour son exploitation durable au vu des possibilités qu'il offre dans la sécurité alimentaire et la survie des communautés dans une démarche inclusive.

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Study and mitigation of epistemological obstacles in the technological disciplines of higher education in Madagascar: Case of industrial technical drawing

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Abstract: *In this paper, we provide an element of response, from a conceptual and material point of view, to the problem encountered in the teaching-learning of technical drawing at the École Normale Supérieure pour l'Enseignement Technique - ENSET of the Antsiranana University in Madagascar.*

After analyzing and discussing the results of measurements taken during field observations, we adjusted the teaching-learning system, through reference, theoretical and conceptual frameworks adapted and adopted following the literature review.

With this work, we present a new way of apprehending the learning object, in the new era through computer science which is part of socio-emotional mediation, and which will meet certain criteria of attraction social, modernization and creation inducing a stable scientific culture of the population involved.

Keywords: *training of trainers, technical education, techno-didactics, technical drawing, educational modernization*

1. INTRODUCTION

In the past five years, ENSET has experienced a drop in the number of student teachers in the mechanical engineering department, the subject of a question in teaching practice supposedly uncertain and unsuitable for the present era. Our ambition is to invest in the search for certain elements blocking the teaching-learning of technological sciences, the case of technical drawing, which is the basis of all industrial and civil engineering construction work on which students approach less and the reason a strong presence of lexical and syntactic errors in the recommended tasks. ENSET is the only supplier of trainer-technicians in Madagascar, even the Indian Ocean, and the gradual loss of players in the mechanical engineering sector would generate an imbalance in production which would also lead to severe shortages of teaching staff in training establishments users of the ENSET product (vocational training centers, technical and general colleges, ...).

In reference to Guy Brousseau [10] who showed that a didactic contract does only work with reciprocity determining the commitment between the teacher and the taught in their organizations. Our ambition is to deal with the problem from this perspective in order to better solidify the bilateral relationship between teachers and learners from the point of view of their commitments in the teaching-learning sequences. During the evolution of the history of technical drawing, many authors have invested in graphic representation: shape, size, position… [29,47,49] and as well as the description of the semic variables (signifier and signified) which reflects the technological aspect of the semiotic instrument [38]. Until the end of the 20th century, the authors work focused on writing and reading errors contributing to the development of the theory and practice of the technical drawing discipline over time.

However, we are in the 21st century, the materials and methods should be related to time. Currently, the collective practice of trainers remains traditionally and resistance to change can lead to various questions: how and how long does it really take, are institutions and communities ready, how and by what means? We are not able to discredit the conventional aspect of the teaching of technical drawing, but rather to take another look at the coherence of the combination of the digital aspect which is articulated with the virtual fact and that of conventional through a tool that seems more appropriate to the contemporary world. Davinia [15] stressed that training should meet the industrial need of its time, train workers and technicians qualified in their development leading to extensions and progressive job offers to the wish of the school also. It is time to review the more meaningful, adapted, and productive knowledge from a social point of view and the relevance of the program in the disciplines we want to promote. World has changed and this change forces us to followits reflect in all directions or activities that we would like to develop.

Many collaborators pointed out during the exchanges two main causes related to the context: lack of technology in teaching-learning, and the irrelevance of technical communication language caused by the insufficient scientific level of certain trainers in corrupt profit, when recruiting civil servants (disruption of formal knowledge caused by a political impact), examples: language difference between collinear and parallel; orthogonal and perpendicular; ambiguity between frontal plane and standing plane, even other projection planes; confusion in the sense of perspective (axonometric, isometric ...) and many others. These errors come in various forms and they also generate obstacles, since the informal knowledge acquired will take the place of a justified acquisition or good information in the memory of the recipients (learners).

With regard to these incidents, we propose a conceptual framework for the presentation of a virtual space object which will certainly meet the collective expectation from the point of view of transformation of a space object in a two-dimensional graphic space and will also provide the actors a descriptive reflection of the function of each system element inducing good mastery at the technological and geometric levels.

The virtual systems developed in animation modes (kinematic, dynamic, and exploded) are transformed into a video file, then distributed in the learner's mails. Subsequently, the parts forming the system in question are also sent in three-dimensional rendering mode before the learning sequences. The teacher becomes a moderator in front of the learners who are in the re-freezing phase and are committed to the development of their spatial capacities and, in this pragmatic and playful aspect, a socio-emotional climate inducing a co-construction of spatial thought of the population herself. The presentation of a spatial object directly in the graphic space (two-dimensional) seems less explanatory, except for those who have already been initiated in the previous classes, not only in the layout of views according to American or European standards, but also to the scale of semantic variables of the semiotic instrument (fig.1).

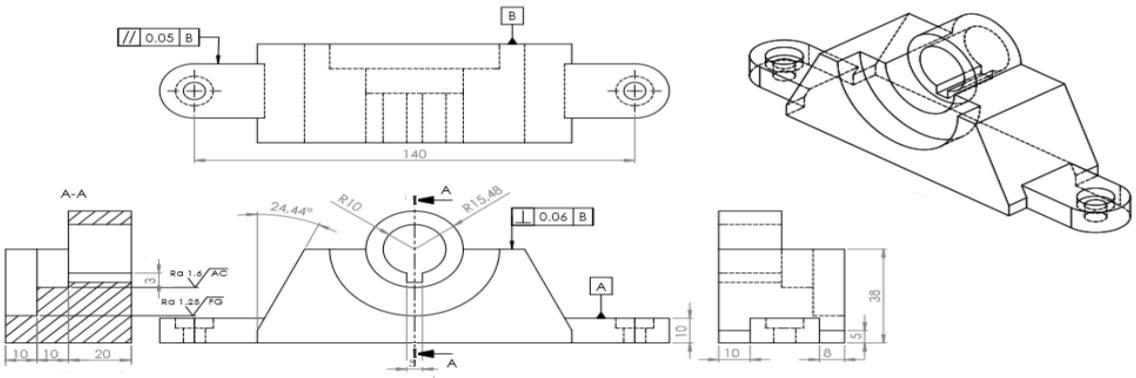


Figure1. *Graphic representation of an object: definition drawing of a finished product starting from a perspective, a part called stand*

Source: *Laboratoire de Mécanique et de Métrologie LMM, ENSET, Antsiranana University, Madagascar*

The conventional aspect of learning to draw is based on the knowledge of the graphic arrangements of the views of an object or from the available views to a reality or perspectives. However, the ambition of the new concept is to provide an introductory sequence in the presentation of the learning object,

giving more meaning to the content through prior knowledge of the object and its role in the whole of its system other than of usual, for increasing the autonomy degree, confidence and insurance of the pupils during the requested tasks.

The approach is based on a demonstration of an animated and / or exploded system so that students can see the global and detailed description of the system and see one by one the parts that compose it. After that, the workpiece is marked and taken alone on the interface in rendering mode to see the exact description of the learning object. On reaching this point, a multitude of curiosities developing a socio-constructivist environment in the population and in this process that we can hope to overcome the diversity of obstacles linked to the category of errors [2].

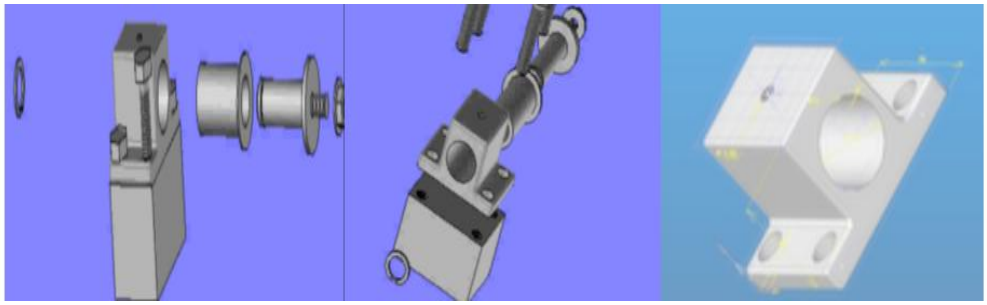


Figure2. *Spatial representation model of virtual object starting from the whole, a part called bearing*

Source: *Laboratoire de Mécanique et de Métrologie LMM, ENSET, Antsiranana University, Madagascar.*

The virtual or real presentation of an object in perspective (cavalier or axonometric) (fig. 2), represents the subject more in its technological aspect and in this almost concrete reality conveys the flow of exchange between students towards a thought convention common for objective purposes and the purpose of this work.

2. STATE OF PLAY

Our field of study is the pedagogical basis or common core (1st year) of the ENSET, which is home to the population conditioning the functionality of other institutions in the educational fields (vocational training centers, technical and general high schools, higher technology institutes,…). At the end of the 2016/2017 academic year, the class size n = 241 and this had been increased during the 2017/2018 academic year and it reached 266. In the lack of infrastructure, the council School scientist has divided the pedagogical basis into two groups (Gr1: group 1 and Gr2: group 2). The two groups have three subgroups respectively, so we have six subgroups in total (Gr11, Gr12, Gr13, Gr21, Gr22 and Gr23).

The table opposite shows the enrollment of each group and subgroup of the population in the last two university years.

Table1. *Workforce in the groups and subgroups of the pedagogical basis at the ENSET (a): academic year 2016/2017; (b): academic year 2017/2018.*

Groups	GR1			GR2			Groups	GR1			GR2		
Subgroups	Gr 11	Gr 12	Gr 13	Gr 21	Gr 22	Gr 23	Subgroups	Gr 11	Gr 12	Gr 13	Gr 21	Gr 22	Gr 23
Numbers / subgroups	40	40	40	41	40	40	Numbers/ subgroups	45	45	44	44	44	44
Total (n)	241						Total (n)	266					

(a) **(b)**

Source: *Main secretariat of ENSET, Antsiranana University, Madagascar.*

ENSET has four teachers who insure technical drawing. We analyzed the syllabus and the relationship with the academic and ministerial reference, in order to better focus on the teacher-student framework and action and to consider a contribution that could bring not only a curriculum innovation, but also a modeling of the concept of teaching scientist in the new era.

3. THEORETICAL FRAMEWORK

Technological didactics does not yet seem to have emerged in the context of active research, particularly in the field of technical and professional education. However, professional training is

developing, and this generally remains in empiricism, and the technicality of the art of transfer remains in second position.However,if we really want to encourage the appropriation of the scientific concept, it is necessary that the trainers master the theories and foundations of the art of teaching so that they can invest in their sequence a technological design approach to initiate a link between science and technology [47].

In the conquest of the causes of obstacles in the teaching of technological sciences, reviews of related work on which pedagogical, didactic and epistemological theories and practices are based is necessary in order to illuminate the conceptual framework. From the point of view of a broader conception of drawing, it is advisable to approach the three conceptual fields (technology, space and code or semic variables) to the magnitudes of technological significance [40]. In the geometric analysis process, the graphical aspect intervenes, and the problem is not only spatial, but it is also based on semic variables favoring the description of all geometric specifications of the object in semiotic instruments.

Bessot[8] evoked in her treatise on the geometry and trade of the building, the tasks in constructions depend on the reading of plan and this indicates than the technicians should have certain knowledge in mathematics, in particular Euclidean and descriptive geometries. The author also requested that the teaching of drawing be carried out in the workshops.

Within the framework of the transposition of geometrical knowledge, Rabardel[40] took up the proposal of Fassina[49], which is articulated on a reinterpretation of the results by referring to Piagetian works on the representation of spatial object. The author concluded with two strategies (figurative and operative) and reconfirms these conceptual aspects leading to discernment and identification of the production of the object by the subject. The author also requested the use of the semiotic dimension influencing the geometric and technical characteristics of the object in order to give more clarification on the representations the semic variables (signifier and signified) of the instrument in its technological aspects.

Technical drawing is an art of imagination, of thought and represents a universal aspect from the technological and scientific point of view. It is from drawing than experimental work can be set up: exploration, presumption, and construction, as Chaachoua [12] said. In this point of view, the author confirmed the existence of double function of the drawing in the resolution of the plane geometry problem by quoting Bkouche [9]. If we are interested in pragmatic aspects in the logical object representation context, Baldy and Chatillon [7] treated a problem of a real object as an educational model to compare the drawing of volume in perspective, the authors observed than the learners badly exploited the presence of the material in their activity. If the representation of the object appears in a semi-concrete, logical or virtual way, errors are less frequent and will be translated into representative skills according to the demand or the objectives to be achieved. Perception is also supported by the configuration of the spatial aspects of a space object [37,42]. Regarding this perception, Davinia [15] contributed to this perspective by using a digital representation environment to make her activity more fun and attractive.

Since 1984, some authors have proposed studying the role of a computer environment linked to the geometric construction profession [6,12]. It is a computer transposition, a spatial and computerized geometrical model favoring the widening of the fields of interpretation and its relationship with drawing, on the one hand, and of analyzing the construction problems of the computer environment, on the other hand, in order to better respond to the coexistence of certain criteria related to the computer environments and construction problems. It is requested to consider the perfection of the interface from the point of view of the internal universe when choosing the learning simulator, otherwise this choice could cause another obstacle related to the content or the interface.

In professional life, technical drawing presents many bases for conceptions, if the term conception is mentioned, this could be articulated in its derivatives (modeling, simulation, optimization…), as Tourpe (2004) said citing Ludi (1989) than drawing is a tool in various design operations, in all disciplines dealing with the construction and representation of space. The status of computer-aided drawing in construction is not intended to change or replace the conventional appearance of the instrument, however, it acts as an auxiliary. In addition, the use of computer-aided design (CAD) also offers a systemic representation of an object before birth. CAD will not only be able to transform the three-dimensional object into a flat graph or vice versa, but it will also be the subject of powerful

simulation, parametric calculations and even manage massive data in a whole of the compiled system. It is less frequent before the computer-aided drawing for financial reasons and the extent of the storage capacity requested from the compiler. However, computer-aided designtransposes evolutionary technology into the world of design with many players (designers, engineers, architects, etc.) in their trades [43].

We describe the power of a CAD simulator since the envisaged model is articulated in the virtual concept of spatial object in order to provide an element of response to the context of epistemological obstacle which slows down the transfer of cognitive data. The object of this model is to find an element carrying knowledge from one or more perspective views (cavalier or axonometric) of an object and its role in the whole of its system. We emphasize than the use of the simulator is not for the purpose of teaching CAD to learners, but for modeling the educational grain through a didactic tool so the object treated is more pragmatic.

With reference to the conceptual framework, Davinia was doing a more innovative experience in teaching technical drawing. Its purpose is to provide an additional tool for students in learning technical drawing in compulsory school. The author has created a learning sequence in a computer room so than learners are directly involved in the notion of spatial vision and mental construction of a volume, with the aim of approaching their learning through another tool that seems more suited to the contemporary world. He proposed an e-action model in the learning sequences in order to create a more playful, recreational and socio-emotional environment, taking advantage of the stage or phase of accumulation of learners with various tendencies: watching, thinking, manipulating, exploring, identifying, transform, build, create, suggest… during the recommended activities or tasks.

Many authors testify to the relevance of a meaningful and declarative task to learners in order to better remain in contextual didactic practice. At present, it seems than learners are asking for another methodological perspective, of pedagogical innovation in teaching and learning science and technology to make activities more recreational and socio-emotional [22,34,44]. Given the interests brought by technology in training, some authors suggest than the contribution to a situation can be triggered by collective work and maintained by cooperative learning. The works carried out by Lacasse and Barma[24], corroborate this perception which is in the conquest of integration of technology anchored on the practice and realization of the hands on type in learning and evaluation situations integrating work in class-workshop in science education. The teaching profession requires a perception of engineering in itself and its form changes a priori from one situation to another. The practitioner should be a little genius and designer of his own theory in his actions [30,32]. So, a practicing teacher should be both a technician and an artist in his organizations. Teaching should be supported according to the situation, activity, context, culture, and many other factors [25,48], and for each question, a specific study proves necessary [14].

Regarding these reference frameworks, Davinia's approach seems more obvious and could provide an element of response to our remarks. This model also seems transferable across certain related disciplines, in both digital and conventional content so that learners can see more of the overall shape of the learning object, know its environment, its function and its transdisciplinary utility.

4. METHODOLOGY

With reference to the Piagetian and Vygotskian models in the interventions and mediations, our ambition is to render the regulatory function in the sense of communication and representation. The conceptual framework of the work is based on the perfection of the teacher in their profession in terms of efficiency inducing a significant effect in its production through research and practice in the field. This media conception often intervenes in the action research model in order to find a link for the conclusion of research in education and in educational activities. Usually, researchers often identify problems relevant to their projects and propose solutions that suit their models, but often recognized as inadequate and rejected by teachers in the field [20]. Many authors have dealt this linkage problem [1,3,11,18,] and they have suggested than actors in the field should be informed and supported to understand problematic research incidents related to educational practice. They also recommended the solutions proposed by researchers should also be tested in the field.

From a typological point of view, Lenoir [28] cited the classifications of research which supports the conceptual arguments brought by other authors [19, 26, 46] to discern theseresearches scientifically.

In this context, Van der Maren raised fourteen types of research from the classification point of view, with some or more criteria. However, each type of research requires not only reviews or analyzes of methodological processes, but also depends on the research questions, situation and intended ends of the research project. Considering the typological scope of the research, after the literature reviews, our recognition is based on action research, because of its collaborative aspect towards researchers and practitioners in the field. Lenoir et *al.* (2008) mentioned two types of action research (functionalist intervention research and action research with political stakes). Both types could be adopted, but it takes enormous time, because the change is radical. In this article, we first deal with the case of functionalist intervention which relies incessantly on a pragmatic action in the hope of having a more significant change in the learning system.

In reference to action research,Lewin [31] evoked support for transformation with the effects of variable forms of social action, and John Dewey pointed out the insufficient link between researchers and practitioners in the field. Many authors have cited the history of major moments in the evolution of action research [17,23] from 1946 to date [21]. However, the goal always converges towards collaboration between researchers and practitioners in the field. In this perspective, researchers become practitioners and practitioners become researchers and in this fraternal, scientific, and socio-cultural appearance in the interest of a common objective than action research really brings about research action.

The methodological process of this work is based on two approaches, with the aim of referring to the mixed research method. The first is based on reflections and exchanges between the technicians responsible for the discipline: technical drawing, and also a certain number of learners, like a holistic inductive approach with the aim of having qualitative data (ideas during exchanges) which materialize the situation in the direct understanding of the phenomena and marking an index of will and cooperation between the actors involved. After the discussions (Madagascar-Canada), the main lines of the ideas brought out can be summed up in the following five axes: relevance of the course; insufficient practices; need to modernize activities; use of technology in teaching-learning; and updates of trainers knowledge. In the light of the technological emergence, our ambition is to find a material of conception and development of thought adapted to the contemporary era. After reviewing the ideas emerged during the discussions, the most striking and iterative are modernization and the use of technology in activities.

The second approach is based on a hypothetical deductive model in the interest having quantitative data. We have a logbook, for monitoring elements (individuals) in samples during the intervention process (production, acquisition, time allocated…), and the names of students will be kept anonymous to preserve their person right.

Samples were taken before, during and after the testing of the new device which is based on the accuracy of its prospective aspect which is based especially on observable facts inducing theories during learning by means of computer science and that the computer is no longer new hardware, but an auxiliary tool for mediating all disciplines.

These data are controlled measures of the performance of the individual during activities according to two variables (scores and production time). The measurements were made in three phases, the first concerns a sample in event the activity remained in its conventional aspect. The second is a measure of a temporal media nature anchored on an abundance of tasks and support for learners towards justified knowledge (adjustment of theorems, laws of projections, ...). Finally, the last is the data collection phase after the effective integration of the new concept which is based on a Vygotskian model through the digital technology, the objective of which is to provide an element of response both didactic and pedagogical certainly inducing a collective reflection towards the program and the education policy of the country.

Exchanges with internal and external actors reveal a meditative urgency between the relevance of the program and the accompanying technology. As a testimony to the sustained conceptual efficiency, researchers in the department of studies on teaching and learning of the Faculty of Education Sciences of Laval University in Canada, confirmed that the science and technology should no longer be separated to keep mutuality between them during its evolution.

The implementation of the new concept sparked our ambition to use the simulators available in the ENSET mechanics and metrology laboratory. Among them, Topsolid occupies less memory space and simpler to use provided with a combination of many predefined tools in design option.

From the point of view of measurement-evaluation-decision, its application is rarely found universal, but depends on the situations, the criteria or scales of judgments vary from one case to another depending on the objective purpose of the work. However, measurement and evaluation still play an important role in decision-making through its justification characters [41]. The data were processed and tested using a statistical tool to confirm the techno-didactic, methodological, and conceptual performance of the device. Currently, many methods exist from the point of view of statistical processing, but the choice is always imposed on the quality of the data and the situation studied.

Fluctuations in the values taken can lead to divergence and these values no longer follow a distribution of the normal law. However, hypothesis tests offer dimensions of parametric comparisons or not parametric. With regard to existing treatment models, the Mann-Whitney method can meet our needs, from the point of view of treatment independently of parametric variables, but only relies on the notion of ranks and signs like Wilcoxon's , hence the name: Mann-Whitney-Wilcoxon test.

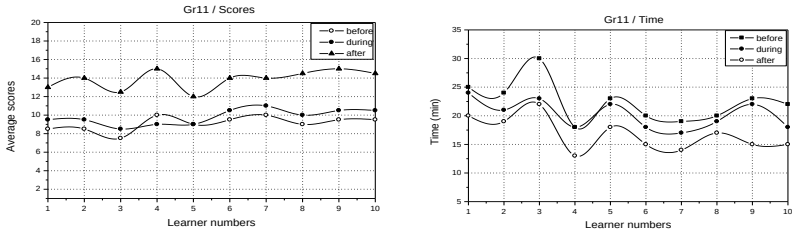
To follow up on the methodological process, the hardware (processing tool) adopted is the XLstat software, due to its simplicity, flexibility and power of the algorithm. The environment of the tool consequently meets the scientific criteria requested and the representative curves before, during and after the testing of the device will be presented and discussed in the following paragraph.

5. Results And Discussion

In this presentation, the data exchanged with the responsibles is retained as an element of confirmation of the presumed assumption of departure. These data represent a multitude of expressions and which can be summarized in five main axes as we have already pointed out previously, and these resulting ideas remain as a confirmation beacon of the initial hypothesis, on the one hand, and a real demand of the situation, on the other hand. However, the quantitative data are obtained by direct observation of the learners in a learning situation and they represent the evolution in the marks and times of execution or production of each activity.

In general, the variation curves behave like continuous sinusoidal progressive and sometimes regressive functions. In these results, the word "before" in the measures indicates the conventional mode or aspect of the educational approach used in the activities to which all the sub-groups are concerned before the testing of the new device. The word "during" indicates the value of time after the first measurement and followed by a certain mediation (overabundance of tasks, adjustment of theorems or laws of projections, ...). This interval represents a transition phase which seems important, since it describes the presence of impulse or not of the variables and as well as the performance of the elements in the samples. In this part, we have not only adopted the conventional characteristic in all these forms, but we have also integrated a glut of tasks to confirm or not the insufficiency of the tasks in the sequences of learnings answering one of the problems. underlined during the exchanges In these figures or in the text, we find the word ‘’ after ’’, this word designates the position with which the pulsations of the variables are more confirmative after the application of the new learning device.

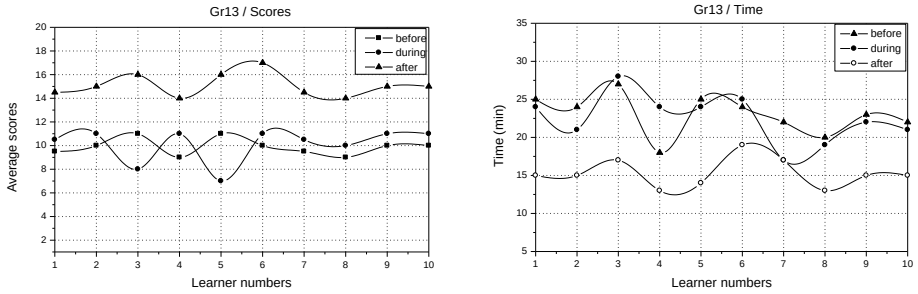
Before the implementation of the new concept, the function curves of the notes and times of Gr11 remain in the interval of] 8, 10 [, this indicates the conventional aspect of the approach or the overabundance of tasks in activities does not stabilize more the cognitive aspect of the knowledge taught (fig.3.a).



(a): notes according to the learner’snumbers; (b): time according to the learners' numbers.

Figure3. *Variations of the notes and production times of the elements of the subgroup Gr11*

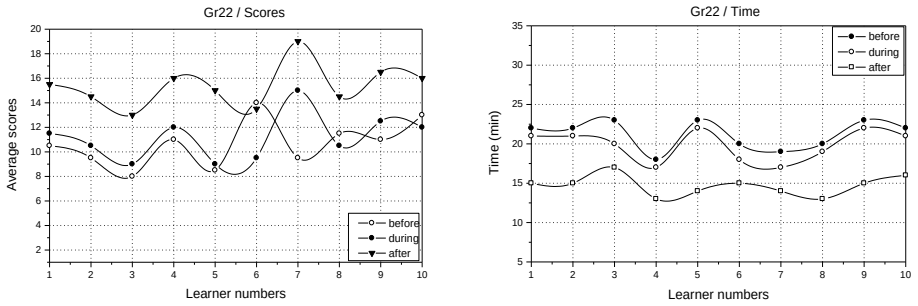
The note functions are presented differently from the time distributions of productions, but the difference between the two curves confirms the effect of the interventions during the second sampling phase. We would also like to confirm these observations through the distribution of these variables in another subgroup.



(a): notes according to the learner's numbers; (b): time according to the learners' numbers.

Figure4. *Variations of the notes and production times of the elements of the subgroup Gr13*

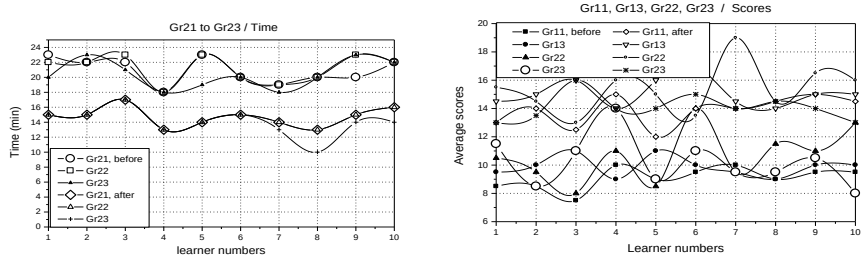
In Figure 4, the shapes of these curves are very close to those of the previous ones and the arrangement of the notes is in the range of] 7, 11 [, before and during the process. However, after the implementation of the new system, these values remain more significant (fig.4.a). The impulsive nature of the variable in the elements of the sample confirms the effectiveness of the tool and the scores are very efficient, the lower value is around 14 and the upper value is 17, taking into account a open interval. This observation is thus confirmed in the temporal evolutions of productions (fig.4.b).



(a): notes according to the learner's numbers; (b): time according to the learners' numbers.

Figure5. *Variations of the notes and production times of the elements of the subgroup Gr22*

Variation curves (notes and times) before and during the process sometimes present themselves in an alternative and tangential way and their meanings seem reluctant to keep or reject the initial hypothesis. Some of the elements are in optimal time, as in the case of pupils n ° 7 and n ° 4 in figure 1.b, but their notes dropped from 10 to 8 for n ° 7 and from 10 to 9 for n ° 4 (fig.3.a). Given these observations, the second sampling phase is of no interest from the point of view of student performance. However, the representative curves of the variables after testing the new approach showed a good difference in the observed sample (fig.5.a &5.b). The distributions of the notes are found in the intervals of] 12, 17], for group 1 (fig.4.a), against] 13, 19], to group 2 (fig.5.a). Thereafter, most of the elements are found below the average time (20 minutes) which is assumed to be an optimal time for each learning module (fig.6.a).



(a): time before and after, according to the learner's numbers, subgroups Gr21-22-23; (b): notes before and after, according to the numbers of the learners, sub-groups Gr11-13-22-23.

Figure6. *Evolution of time and notes of the elements in certain subgroups*

The concept regulates the progression of notes and the regression of production time and this contributes to 25% of the performance, both individual and collective.

Regarding these variables, is there a positive or negative correlation between the notes and production times of the elements? We know the distribution time is regressive compared to than of the notes, but this observation marks a performance over production time, and this can be interpreted as a progression over time and dependence between the variables. The progression over time does not necessarily imply a constant progression in the notes if the learner is still in a stage of unconscious competence, however, this part is the subject of another article since it is advised to move to another statistical dimension (correlation / association).

The representative curves of the variables on the third samples marked a performance in engineering training, temporality, and this would imply added value, which is often ranked higher in order or classification, quality. In view of these observations, the data obtained on the third samples seem more significant in all the samples. Our interest is to keep the method, since the results are confirmatory, but we still had to look at a statistical dimension on which the consistency of validity of a scientific decision-making rest. In this context, the selected theory and material have already been mentioned in the previous methodological process.

The Mann-Whitney-Wilcoxon test is ultimately used to compare the mean of the samples or variables [33]. However, it does not study the values of the variable, but the ranks of these values. In a Wilcoxon test, the null hypothesis states the rows mix homogeneously between the samples, but the alternative hypothesis is always based on a difference in position between the distributions of the variables in the samples tested.

We also adopt a level of significance $\alpha = 5\%$ in the calculations and this is classified in the unilateral tests. Thanks to XLstat, we no longer need to calculate the sum of the ranks, the Mann-Whitney test statistic U or a Gaussian approximation of the law of test statistic Z, but the predefined statistical models in the XLstat allow us to facilitate tasks, if the data is well organized in a spreadsheet. We took D = 2.0, the difference between the samples tested, with respect to the differentiated distribution of the alternative hypothesis. After the calculations, the mean value of the statistic p-value <0.0001 and if p-value $<\alpha$, the null hypothesis must be rejected and we keep the alternative hypothesis which supports the difference in position of the distribution of the variables between the samples (pre / post) of each sample of the population. Several data have been tested through this model and the results have confirmed the effectiveness and relevance of the numerical approach to socio-emotional behavior in learning technical drawing and that this seems transferable not only in the technological disciplines within the establishments of higher education, but also in basic education and post basic as well as in the technical and general educations.

6. CONCLUSION

This paper presents the results of the measurements in the context of an epistemological obstacle in the teaching-learning of technical drawing which curbs the affection inducing the learner's failure. In this context lies the reason the loss of choice towards the mechanical engineering sector of ENSET, Antsiranana University, Madagascar.

Technical drawing is a universal instrument, but its form changes a priori according to the fields in which it intervenes. In this work, we provide an element of answer to the obstacle questions and the material adapted to the population involved. Many authors have invested in the graphic transformations of a spatial object, decoding the semic variables of a semiotic instrument in its technical aspect or other exploratory perspective which is part of an epistemological current. However, these perceptions require an auxiliary element linked to time. We put an emphasis on time, since the material in question depends on its time. Regarding all the theories cited, this work refers to

a typology of action research in the hope of having a more solid link between researchers and practitioners in the field. From a methodological point of view, we have adopted two approaches: exchanges with technicians in the field, managers of certain teaching units, internal and external researchers and as well as a certain number of learners to get to know the main lines of causes and effects, to understand the direct reality of the situation studied and to have various expressions, highlighting the tools and methods than can contribute to the desired change. The second approach is based on the direct observation of the individual in a learning context, to verify his cognitive performance, to contribute to the construction of their knowledge and also to the development of their competence during activities according to the three modes opted.

The sample data are reorganized in a spreadsheet, and the representative curves of the variables were obtained with the Origin software. After obtaining the evolution curves of the variables, a hypothesis test between the data collected was carried out to highlight the scientific nature of the approach and thus prove the consistency of the prospective effect of the tool we would like to introduce.

In short, the educational innovation provided reflects not only the knowledge taught (nature, structure, properties, ...), but also a new perception and observation of the learner in the cognitive current [47] through the new era, and in the digital conviviality reflecting the contemporary world, in practices and organizations [15] which should prompt a reorientation of the national educational policy in force in the face of technological advances and its absence or delay in training, on the one hand, and multidisciplinary scientific productions than would contribute to institutional developments and to the teaching community, on the other hand.

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