

***Bystanders No More:  
Science assessment  
strategies for students with  
a profile of dyslexia.***

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*A Dissertation Presented to the Faculty of  
Education*

*in Partial Fulfilment of the Requirements for  
the Master of Science Education*

*at the University of Malta*

*May 2019*

*Principal Supervisor: Prof. Deborah Chetcuti*



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# ABSTRACT

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## **Bystanders No More:**

### **Science assessment strategies for students with a profile of dyslexia.**

This study aimed to explore the views and perceptions of Maltese educators – school leaders and teachers, students with a profile of dyslexia, a dyslexia expert and a MATSEC official – on ways of making science assessment strategies ‘fairer’ for students with a profile of dyslexia. I tried to understand what students with a dyslexic profile go through during assessment procedures and this was also studied from the science teachers’ perspectives. I also investigated the responses of school and MATSEC officials to a number of new assessment tasks introduced in my school in the course of this study.

A qualitative approach was used for the collection of data, using focus groups and interviews. A small case study involved the development and trialling of an assessment protocol that benefited from the input of two students with dyslexia, six science teachers and an expert on dyslexia. All the participants that took part in this study came from a Church secondary school in the Maltese Islands; with the exception of the dyslexia expert and the MATSEC official. This was also the school where the assessment protocol was trialled.

It was found, among others, that the inclusion of multiple assessments such as an oral component and more practical tasks in science school-based assessment improved the performance of the participant students with dyslexia and decreased their stress.

Marouska Cauchi      M.Ed in Science Education      May 2019

**DYSLEXIA**  
**SCIENCE**

**STUDENTS**  
**EDUCATION**

**ASSESSMENT**  
**FAIRNESS**

# STATEMENT OF AUTHENTICITY

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# **DEDICATION**

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**To my beloved ones**

*Mum, Dad and Ben*

**And to all students with a profile of dyslexia**

*"Sometimes, the most brilliant and intelligent minds do not shine in standardised tests because they do not have standardised minds"*

*D. Ravitch*

# ACKNOWLEDGEMENTS

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First of all, I am grateful to the almighty God for the good health and wellbeing that were necessary throughout this journey. Despite the personal difficulties I encountered in the last year of this M.Ed course, He gave me the strength to carry on and complete this thesis.

Secondly, I would like to express my gratitude to the school that featured in this study, the Church School Secretariat, Dr Rose Anne Cuschieri, CEO at the National Commission for Further and Higher Education (NCFE), and the Head of School who gave me all the required permissions and assistance to enable me to conduct the focus groups and individual interviews on the premises.

Thanks also to all the teachers, SMT members, the two student participants, the dyslexia expert and the MATSEC official who voluntarily spent their precious time to participate in this study. Without their contribution, this study would not have been possible.

I would like to express my deepest appreciation to my tutor, Prof. Deborah Chetcuti B.Ed. (Hons.), M.Ed. (McGill), Ph.D. (Nottingham) who, despite her hectic schedule, was always available, assiduous, patient and thorough while providing me with useful advice, motivation, immense knowledge and feedback throughout this study. I am indebted and grateful to her for being throughout her tutorship an inspiring model of devotion and ethical professionalism.

I take the opportunity to express my gratitude to all my family and close friends of mine. There are no words to express my sincere thanks to my parents for their continuous support

throughout my course. They always believed in my potential and helped till the end. I wish to record my sincere thanks to my dad for driving me to lectures during the first year of the course from Gozo to Malta and back, and to mum for always preparing delicious food and her wise words when needed.

Lastly, I am deeply grateful to my husband, Ben, who supported me throughout this venture through unceasing encouragement and attention. I could not have gone through this journey without him.

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# LIST OF ABBREVIATIONS

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**ADSC** - Access Disability Support Unit

**B. Ed** - Bachelor's of Education

**BDA** - British Dylexia Association

**CoPE** - Community of Professional Educators

**FREC** - Faculty Research of Education Committee

**IBL** - Inquiry Based Learning

**ICT** - Information and Communication Technology

**IWB** - Interactive Whiteboard

**LOF** - Learning Outcome Framework

**MATSEC/SEC** - Matriculation and Secondary Education  
Certificate

**NCF** - National Curriculum Framework

**PGCE** - The Postgraduate Certificate in Education

**SMT** - Senior Management Team

**UREC** - University Research Ethics Committee

# **CHAPTER ONE**

---

## ***Introduction***

## 1.1 Background of Study

*What cheered a young boy with a profile of dyslexia called Austin was that "Edison, Einstein and da Vinci were all dyslexic... dyslexic like me, he smiled" (Connolly, 2012, p. 5).*

The "painful struggle to complete what other students find a simple task can cause stress and emotional problems" to students with a profile of dyslexia (Donnelly, 2010, p. 19). This shows that students with a profile of dyslexia experience a great deal of stress and anxiety and thus they do not perform at their best in certain educational contexts.

Although a great deal has been written about fair assessment practices, very little research has been carried out regarding 'fairer' assessment practices for dyslexic students. An exploration of this topic brings up a wide range of complex issues. Tierney (2016) argues that "multiple strategies, revolving around the principle of transparency and the provision of opportunity to demonstrate learning, should be used to ensure fairer educational assessment for diverse learners" (p. 1). He states that:

...fairness is a moral virtue and a fundamental quality in educational assessment. Understanding of fairness in educational assessment has evolved with developments in learning theory and measurement, and it has increasingly been recognized as a necessary quality for inclusivity in education (p. 1).

Research by Chetcuti, Falzon and Camilleri (2016) recounts the experiences of teenagers in high-stakes examinations and makes one realize that it is an area that requires in-depth investigation. The implication is that teaching and assessment practices must be reviewed and tailored to meet the needs of

students with a profile of dyslexia. This will further enhance the inclusive and successful integration of diverse students in the classroom.

## **1.2 The aim and rationale of this study**

The aim of this study is to explore ways of making the assessment of science students with dyslexia 'fairer'. My interest in implementing 'fairer' science assessment practices emerged from various personal experiences. As a Physics and Mathematics teacher, I have often come across dyslexic students who were highly capable of grasping scientific and mathematical concepts but who were not able to express their skills and knowledge in traditional pencil-and-paper examinations. During discussions with other science teachers and in school observations during my B.Ed course, I also got the impression that teachers lacked a comprehensive knowledge of dyslexia, and in particular the gifts and talents that it may reveal.

I was also concerned that the assessment methods of science teachers were placing students with a profile of dyslexia at a disadvantage when compared to their peers. This disadvantage was causing students with a profile of dyslexia not to start off from the same point as other students when it came to assessment tasks. This strong desire to seek fairness in assessment motivated me to carry out this research study. I chose Physics as the subject area of investigation as it is my area of specialisation.

### **1.3 The research questions**

The term 'dyslexia' is by itself complex and one can look at it from many different levels and perspectives. Assessing all students with a 'one-size-fits-all' method does not take into consideration the various learning styles and abilities of students, including those with a profile of dyslexia. This concern gave rise to two research questions:

- What are the views of science teachers regarding dyslexia and the assessment of students with a profile of dyslexia?
- How can science teachers work together to develop assessment strategies that are 'fairer' and help dyslexic students show their true potential?

The study was carried out within the context of the school where I am currently (2019) a Physics and Mathematics teacher. It involved a joint effort by professionals who wished to implement change in assessment practices so that all students could flourish according to their ability and strengths.

### **1.4 The structure of the dissertation**

Following this Introduction, the second chapter will present a review of the literature in the field of dyslexia and how it impacts teaching and learning. The methodology of the study is described in Chapter Three. It outlines the various stages of the data collection and explains the rationale of the choices made. Chapter Four discusses the results of the data collection, and how the data was categorized into a number of principal themes which were used as points of reference in the analysis. These emergent themes were also discussed in light of the literature and my own reflections on the matter. The Conclusion (Chapter

Five) presents the final reflections, the implication of the results, the limitations of the study, and a number of recommendations for further studies in the field.

## **1.5 Conclusion**

This chapter has explained the background, aim and rationale of this study and specified the two research questions. It has also outlined the structure of this dissertation and briefly indicated the content of each chapter.

## **CHAPTER TWO**

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### ***Review of the Literature***

## 2.1 Defining Dyslexia: Setting the context

Dyslexia affects about 10% of the population (British Dyslexia Association, 2018), but it is only in recent years that educators and researchers have tried to define what it really means to have a profile of dyslexia. Indeed, the literature offers a variety of definitions. Donnelly (2000) states that the term dyslexia “comes from the Greek words dys (meaning ‘poor’) and lexis (meaning ‘word’ or ‘language’)” or what he describes as “word blindness” (p. 6). Dyslexia is usually portrayed as a “specific learning difficulty” (Gilchrist and Thompson, 1997, p.2) which might result in slow and inaccurate reading, untidy handwriting or bizarre and inconsistent spelling in an otherwise intelligent person” (University of Oxford, 2017, p.1).

The British Dyslexia Association (BDA) (2018) defines dyslexia as:

...a specific learning difficulty that mainly affects the development of literacy and language related skills. It is likely to be present at birth and to be life-long in its effects [...] It is characterised by difficulties with phonological processing, rapid naming, working memory, processing speed [...] and the automatic development of skills that may not match up to an individual’s other cognitive abilities (p. 1).

Traditional definitions of dyslexia focus on the difficulties faced by individuals with a dyslexic profile but more recent definitions move away from the association of dyslexia with something lacking in individuals.

In fact, new research using neuro-imaging suggests that the dyslexic brain co-ordinates, receives and processes information differently (Kirwan & Leather, 2011). Indeed, current definitions of dyslexia try to move beyond the difficulties and describe a number of positive skills associated with dyslexia.

These positive skills include lateral-thinking abilities, problem-solving, big-picture thinking, originality, creativity as well as an innate understanding of how things work and phenomenal visual-spatial skills (BDA, 2017).

## **2.2 Characteristics of a dyslexic profile**

Though different students with dyslexia experience a wide spectrum of different difficulties, challenges and talents, there are some characteristics which are common to all students with a profile of dyslexia.

### *2.2.1 Reading and writing difficulties*

Students with a profile of dyslexia exhibit a number of characteristics and identifying factors that may be present in varying degrees of severity. Undeniably, the most common characteristics associated with a dyslexic profile are the difficulties experienced in writing, memory, reading, spelling, movement, organisation, and speech development (Reid, 2005). Lyon, Shaywitz and Shaywitz (2003) describe students with a profile of dyslexia as having difficulties with:

...accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and provision of effective classroom instruction (p. 2).

In fact, one of the key factors that identifies students with a profile of dyslexia is their difficulty with recognising letters (Crisp, Johnson & Novakovic, 2012) that may appear to be blurred or mirror images of each other (Stein, 2001). This

results in students with a dyslexic profile skipping or misreading words which leads them to understand a text in a different way (Helenius, Tarkiainen, Cornelissen, Hansen, & Salmelin, 1999).

### *2.2.2 Difficulties with sequencing and numeracy*

In addition to difficulties with reading and writing, students with a profile of dyslexia can also exhibit difficulties in mathematics. They might have problems with “sequencing and remembering numbers, with dealing with the language of mathematics and with working out which way the numbers are facing” (Mortimore, 2008, p. 70).

### *2.2.3 Motor skills, connections and interactions*

Some students with a profile of dyslexia also exhibit problems with motor skills and co-ordination that might affect copying, co-ordination, listening, speed, visual accuracy and the implementation of instructions given by the teacher (Mortimore, 2008). Moreover, students with a profile of dyslexia have a tendency of being “clumsy and unco-ordinated and they may have trouble with handwriting, riding a bike, catching a ball or running” (Farrugia, 2017, p. 22).

### *2.2.4 Behavioural issues*

LoGiudice (2008) states that students with a profile of dyslexia can be “easily distracted/annoyed by noises and other things in the environment” (par. 2). They also tend to show certain

types of behaviour such as being easily frustrated or disheartened. In addition, they lack self-confidence and become self-conscious when talking to the whole class. Pertinently, LoGiudice (2008) states that students “may have difficulty getting thoughts out – pause frequently, speak in halting phrases or leave sentences incomplete” (par. 5).

### *2.2.5 Emotional traits*

The difficulties and challenges experienced by students with a profile of dyslexia, especially in a school environment, can leave emotional scars. In fact, the majority, but not all the students who have been identified as having a dyslexic profile, sometimes also show signs of low self-esteem, low self-confidence and anxiety (Passe, 2013). These emotional traits are higher in students with a profile of dyslexia than in normally developing children (Carroll & Iles, 2006). Moreover, they become more pronounced when students with a profile of dyslexia cannot cope with the academic pressures of schooling and they start to feel as if they are failures. The low self-esteem can be especially damaging and leads such students to being bullied or excluded from their peer groups (Glazzard, 2010).

### *2.2.6 Positive characteristics of a dyslexic profile*

As previously stated, dyslexia is no longer defined exclusively as a deficiency in individuals; such students also exhibit a number of positive talents and skills.

As argued by Davis and Braun (1997):

...usually when people hear the word *dyslexia* they think only of reading, writing, spelling and math problems a child is having in school. Some associate it only with word and letter reversals, some only with slow learners. Almost everyone considers it some form of a learning disability, but the learning disability is only one face of dyslexia... the mental function that causes dyslexia is a gift in the truest sense of the word: a natural ability, a talent. It is something special that enhances the individual (p.3).

Students with a profile of dyslexia are usually very curious and spontaneous. They use all of their senses and they utilise their brains creatively (Davis & Braun, 1997). Reid and Fawcett (2004) describe this creativity as "the ability to think in pictures" (p. 224). Such students can usually think outside the box, come up with ideas that are different to those of their peers, and can work on their own initiative. In fact, Reid et al. (2004) affirm that "dyslexic learners are often imaginative and creative lateral thinkers who develop original solutions to problems" (p. 224).

Additionally, such students usually do well in "science, technology or current affairs often with a general knowledge to match" (Reid et al., 2004, p. 224). In other words, such students are surrounded with innate strengths that many people do not know about.

In reality, the characteristics of a dyslexic profile are very complex and need to be understood within the personal and social profile of each individual student. A dyslexic profile carries with it the stigma of being a poor reader or a poor speller, but in reality it can also be a gift which, if recognised, can turn out to be something unique.

## **2.3 Learning Physics**

Davies (2014) states that “physics is about how things work, and why things happen the way they do (p. 4). In other words, it is the study of nature, matter and energy we are surrounded with. The study of Physics includes various subjects such as heat, electricity, magnetism, radiation, sound, and light as well as the exploration of the universe and the structure of atoms. Kaku (2012) argues that Physics plays an important role in people’s lives as it provides us with information about inventions.

Physics at school involves solving problems, practical hands-on experiments, as well as the use of mathematics to find a required quantity. In physics, strategies such as observation, investigation and the scientific method are incorporated to enhance and improve the cognitive development of students.

### *2.3.1 The Physics Curriculum*

The Physics curriculum in the Maltese educational system is designed to enhance students’ understanding of scientific characteristics through scientific knowledge and inquiry. It also aims to apply that processed knowledge by means of problem-solving activities and practising experimental skills. Moreover, it also enriches the positive attitudes towards science (MATSEC, 2014).

The current Maltese SEC Physics syllabus consists of eight themes, namely: On the move, Balancing Forces, The Nature of Waves, Staying Cool, Electricity in the Home, Magnets and Motors, Radiation and its Uses, and The Earth and the Universe (MATSEC, 2014). This syllabus is currently being revised in

light of the new *Learning Outcomes Framework* (LOF) system. However, this study is based on the current SEC Physics syllabus described above and which came out in 2012.

### *2.3.2 Challenges faced by students with a profile of dyslexia when learning physics*

Students with a profile of dyslexia experience many difficulties in the classroom environment. The Physics classroom is not an exception. As a subject, Physics entails some characteristics that make it difficult for students with a profile of dyslexia to keep up with. First of all, it entails the reading and writing of definitions, laws and theories. Secondly, such students tend to be distracted very easily and this makes it difficult for them to understand some concepts of the subject that require full attention and concentration.

Another challenge mentioned in the literature is the practical work in the laboratory. Laboratory and field work are an essential part of most STEM subjects; however, they can present many obstacles to students with dyslexia (Whitelegg & Conway, 2013). The reason is that students have to pay attention to what the teacher says, recall instructions, record results, and organise their time accordingly. Furthermore, dyslexic students tend to dislike writing practical reports (Stonehouse, 2008).

Behavioural and emotional characteristics play an important role in the Physics classroom. This is because one of the main tools that help one understand Physics and its concepts is to ask questions (Beatty, Gerace, Leonard, & Dufresne, 2006). As argued by the International Dyslexia Association (2017) students with a profile of dyslexia tend to feel shy or

incompetent in school subjects such as Physics. This lack of confidence can hinder them from asking questions when they need to.

Another challenge faced by students with a profile of dyslexia when learning Physics is the use of sequencing and numbering, especially in problems. Stonehouse (2008) argues that students with a profile of dyslexia have “a lack of the techniques to read and record complex mathematical notation” (p. 3). Problems may require the use of fraction keys on a calculator keypad and the use of numbers lists in tables of results. Students with a profile of dyslexia tend to mix up numbers, hence resulting in wrong solutions (Whitelegg & Conway, 2013).

On the other hand, in spite of their challenges, students with a dyslexic profile could excel in subjects that require problem-solving and inquiry-based skills like Physics (Cicerchia, 2017). While practical work can pose a number of challenges (as described above), such students can also excel in experimental work because they are creative, can think outside the box and are usually good problem solvers. Therefore, teachers should try to find a balance between activities that need to be carried out due to the nature of learning Physics, and activities that can support the success of students with a profile of dyslexia as they learn Physics.

## **2.4 Assessing students with a dyslexic profile**

Assessment plays a fundamental role in teaching and learning, since it is a key aspect of the educational process. It is a bridge which connects the teaching and learning process.

As Moss, Pullin, Gee, Haertel and Young (2008) aptly explain, assessment is:

...a powerful umbrella term that incorporates a diverse range of actions and processes. These include formal evaluations of children's learning (e.g. tests, teacher assessments, and examinations), as well as informal judgements, both tacit and explicit, that routinely occur in classroom interactions and in other educational settings (cited in Elwood & Lundy, 2010, p. 335).

Students may be assessed for many different purposes. The three main types of assessment in the Physics classroom are formative assessment, diagnostic assessment and summative assessment. Diagnostic assessment is used to provide information about students' conceptual understanding and to guide the teacher's pedagogy (Shepardson, 2001). Formative assessment, on the other hand, as described by Wiliam (2013), can be used to improve student achievement. Wiliam (2009) states that:

...an assessment functions formatively to the extent that evidence about student achievement elicited by the assessment is interpreted and used to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions that would have been taken in the absence of the evidence (p. 9).

Finally, the third type of assessment is summative. Information on student achievement is obtained at the end of a programme of study and is usually transformed into marks or grades. Summative assessment enables students to compare their performance with others as it looks back on their past learning (Harlen, 2007).

### *2.4.1 Diagnostic assessment*

The use of diagnostic assessment helps indicate the strengths and weaknesses of the students. It helps the teacher to prepare lessons with proper instructions to target his/her students directly (Leighton & Gierl, 2007). Snowling and Stackhouse (2006) confirm that diagnostic assessment makes students' individual needs prominent, thus allowing the teacher to adapt her teaching to produce maximum learning. In other words, diagnostic assessment plays an important part in assessing learning difficulties of individual students (Snowling & Stackhouse, 2006).

In the case of students with a profile of dyslexia, this diagnostic assessment can be done formally, for example, by visiting psychologists, or else day-to-day by the class teacher. Snowling and Stackhouse (2006) suggest that support with assessments from specialists of dyslexia or special needs coordinators should be sought by class teachers. Indeed, the same authors quote Rack and Hatcher (2003) who provide suggestions on how a student's strengths and weaknesses can be discovered through diagnostic testing and in-depth assessments.

### *2.4.2 Formative assessment*

William (2011) proposes five strategies that exploit formative assessment to the maximum in the classroom. First, students should become familiar with and understand how their achievements are evaluated. Secondly, the teacher must establish classroom instructions which permit the evaluation of these achievements. Thirdly, the teacher must provide

effective feedback that contains useful information on the tasks and enable students to work collaboratively with the teacher to find the solutions. The fourth strategy is for the students to work together and learn from each other's strengths and weaknesses through the use of open discussions in group work. Lastly, formative assessment should eventually enable students to master their own learning. It is effective because it boosts motivation and confidence in the students (William & Black, 2005).

In order to obtain information on student learning and provide them with feedback in order to help them to improve, teachers in the Physics classroom can use a number of different tools and tasks. These can range from the use of handouts, fill-in-the-blank activities, quizzes, notes, inquiry-based learning, and thinking problems, hands-on activities, portfolios, laboratory and practical work, think-pair-share, interactive whiteboard (IWB) activities, as well as homework (Briggs, 2018).

#### *2.4.2.1 Collecting evidence of student learning*

Reid (2005, pp. 77-78) elaborates on the notion of "differentiation" and on how to assess students with dyslexia in the classroom. He suggests assessing students through the use of different resources that include diagrams, notes and maps in place of note-writing, practising audio, and helping them acquire "key words". The emphasis is on the visual since dyslexic students are usually more visual than verbal (Reid & Green, 2007). In order to develop their competences, students with dyslexia should be assigned tasks involving investigation, making posters, brainstorming, videoing, oral presentations,

debating, songs and poems, and drawing pictures. Some other examples of assessment tools that can be used in the Physics classroom include using probes and questioning, oral assessment and practical assessment (Reid & Green, 2007).

#### *2.4.2.2 Using probes and questioning*

Westwood (2001) cites Cooper (2000) to propose a form of “dynamic assessment” by which the “teacher us[es] additional probes and prompts to discover what a child thinks, knows and can do” (2001, p.81). The teacher’s questions and prompts should be clear, short, concise and meaningful. Questions and probes can be used to check understanding of the content in a simple way that does not confuse students (Everding, 2018).

Moreover, in the Physics classroom, teachers should ask questions not to check what they do not know but to analyse and help them become critical thinkers on the content being covered or which they can arrive to. In fact, studies show that the way challenging questions are presented makes a difference for students with a profile of dyslexia (Crisp, Sweiry, Ahmed & Pollitt, 2008).

Gardner (2011) argues that individuals have different intelligences that include visual-spatial, naturalistic, musical-rhythmic, bodily-kinaesthetic, logical-mathematical, interpersonal, intrapersonal and verbal-linguistic. When students are taught in a way that matches their learning style they are more likely to increase their knowledge and skills.

Research (Soomro, 2016; Reid & Fawcett, 2004) suggests that all students benefit from an eclectic teaching approach. This approach involves the incorporation of language teaching

approaches and methodologies which are designed specifically according to the needs and abilities of the students. As such, when a Physics teacher makes use of an eclectic teaching approach, she or he is more likely to help students with a dyslexic profile overcome some of their challenges as students can make use of their creative and positive talents rather than focus on their learning difficulties (Reid et al, 2004). In fact, “both research and experience suggest that such students with dyslexia succeed when teaching is multi-sensory and uses all channels to reinforce learning” (Mortimore, 2008, p.98). Examples of ways in which multiple-intelligences can be addressed include using examples from the natural environment in order to nurture and relate information to the natural surroundings of the individual (Gardner, 2011). The teacher can also make use of songs (musical-rhythmic intelligence); games and problem-solving (logical-mathematical); pictures and video-clips (visual-spatial intelligence); and group work and pair work (inter- and intra-personal intelligence). The use of these various multi-sensory approaches encourages all students but especially students with a dyslexic profile to learn in a more positive and motivated manner since they tend to eliminate the predominant focus on reading and writing (Reid et al., 2004).

#### *2.4.3 Oral assessment*

Unfortunately, the use of oral assessment in science is rare (Huxham, Campbell & Westwood, 2012). Yet, there are many skills which oral assessment brings with it, such as communication, speaking, fluency, pronunciation and presentation skills (Koay, 2017).

There are various ways of including oral assessment in the Physics classroom (Cauchi & Musumeci, 2015). Students may be given the opportunity to explain their write-up of the experiments orally rather than only in writing. They can be asked to explain what they are doing during an experiment; be involved in PowerPoint and Prezi presentations, and be asked to present a model in front of their classmates.

Oral assessment gives students the chance to communicate their understanding through a different medium. It can enable students to communicate a deeper understanding of the concept (Huxham et al., 2012). Also, classwork or homework tasks can be described orally or on audio recordings by the student. The recordings enable credibility and validity of the assigned work (Muñoz, Álvarez, Casals, Gaviria, & Palacio, 2003).

The use of the oral medium in assessment can be of benefit to students with a profile of dyslexia. The reason is that sometimes students find it challenging to read and write the given questions, and find it easier to answer verbally (Waterfield & West 2006). However, there has been some criticism of the use of oral assessment with respect to students with a dyslexic profile. One of the disadvantages of oral assessment is the increase in the level of anxiety (Huxham et al., 2012). Such students tend to have high levels of stress and anxiety when compared to their peers and this hinders oral communication (Passe, 2007). However, Huxham et al. (2012) opine that “the reported anxiety might also simply reflect the relative lack of experience in oral compared with written assessments” (p. 132).

#### *2.4.4 Practical assessment*

Abrahams and Reiss (2015) state that there are many ways in which practical skills can be conducted in science subjects. These include doing a titration, reading from a metre ruler, and focusing on a light microscope. Indeed, the current MATSEC Physics syllabus gives practical assessment a degree of importance. In fact, students practise hands-on activities throughout the academic year. Cowie (2016) propose that as part of practical assessment students can be asked to construct a model.

Reid et al. (2004) found that due to the fact that practical assessment reduces the element of writing, students with a profile of dyslexia tend to perform better. Indeed, such students tend to excel in hands-on experiences (LoGiudice, 2008). In fact, practical assessments “are a great way to assess the apprentice’s full range of skills and form part of an effective synoptic assessment which clearly evidences the apprentice’s level of competence overall” (Chewter, 2018, para. 17). In addition, practical assessments are a powerful tool to assess psychomotor skills. They act as a bridge between theory and practice and thus enhance learning (Hkust, 2016).

Another useful method used during practical activities in the Physics classroom is inquiry-based learning (IBL).

The National Research Council (1996) defines inquiry as:

...a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyse, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry enquires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations (p. 23).

In other words, IBL activities enrich the classroom culture by developing students into open-minded human beings who are able to listen to each other, value and learn from their own mistakes. These activities give students ownership with the help of the use of dialogic activities and collaboration. They become more engaged in the lesson through their own exploration (Cowie & PRIMAS-team, 2010).

In light of these definitions, through inquiry-based activities students with a profile of dyslexia can be given the opportunity to show what they can excel in. These activities can create a successful and holistic experience. In fact, inquiry-based learning commonly entails allowing students to solve problems through experiments and hands-on activities which, according to Reid et al. (2004), are greatly favoured by students with a profile of dyslexia. It also allows them to discuss the content with their peers and talk about what they would have learned. Consequently, such an approach enables them to express their knowledge without having to expose their difficulties in writing. Moreover, IBL encourages curiosity and creativity that again play an important role in keeping a student with a profile of dyslexia, motivated and eager to learn (Reid et al., 2004).

#### 2.4.5 Giving feedback

The information gathered from various types of assessment processes can then be used formatively throughout the year to give students feedback and help them improve their learning. This is because feedback plays an important role in the assessment process. Wiliam (2014) argues that regular feedback can be used to help the teacher adjust teaching and learning strategies to help students identify their way forward. Similarly, Wiliam and Black (1998) state that “frequent assessment feedback helps” students “enhance their learning” (p. 3).

Progress reports help students reflect on and strive to improve their performances. This corroborates *A Vision for Science Education in Malta*: “assessment should take place alongside learning and provides students with continuous, qualitative feedback which allows them to grow and move forward in their learning” (Ministry of Education, Employment and Family, 2011, p. 14).

It is pertinent to point out that the element of feedback in formative assessment plays an important role in the teaching-learning process as well as in the relationship between students and teachers. Irons (2008) points out that “one of the key issues in the design of formative activities is to encourage dialogue between teachers and students, and between students” (p. 52). Feedback should also be given to help students be more acquainted with their own progress (Frey & Fisher, 2011). This argument is reinforced by research carried out by the International Dyslexia Association (2017) which emphasises the importance of feedback for students with a profile of dyslexia.

#### *2.4.6 Helping students become active learners*

Peer- and self-assessment as well as feedback provided by the teacher also helps students become active learners. They help students develop metacognitive abilities and their ability to judge, monitor and evaluate their own learning (Berry, 2008). Optimum achievement of the students is reached through the assessment of students on their 'progress' (Lavonen, 2007). This assessment of 'progress' can be achieved through true reflection, discussion with peers or when students are provided with continuous qualitative feedback.

Students can also assess the work of their peers through peer-assessment tasks. William and Black (1998) argue that one of the main strategies for effective teaching is to incorporate students in peer assessment. This form of assessment helps the students to evaluate each other's work (Berry, 2008). Newcastle University (2018) states that the use of peer assessments familiarises students with assessment criteria. It helps them identify their strengths, weaknesses and areas to improve (Meletiadou, 2016).

Another characteristic of formative assessment is self-assessment (William, 2014). This entails a whole process of reflection and practice in class. It helps students to become aware that being reflective about learning strategies and their results is not something odd. It also teaches the students to be self-critical and consequently questioning. Self-assessment enables students to develop the skill of metacognition (Sackstein, 2015). This also applies to students with a profile of dyslexia (International Dyslexia Association, 2017). However, some studies (Sineriz, 2018) suggest that assessing

the outcomes of learning may be difficult and students might find it difficult to assess themselves.

Overall, the advantages of self-assessment overcome its few critiques. Participation during self-assessment motivates students to act as critical thinkers during the process. Reid and Green (2007) regard self-assessment as a good instrument for students with dyslexia since they become aware of whether they have understood a given task. Studies (Kirwan & Leather, 2011) also show that when such an opportunity is given to students, the learning process of the students becomes more effective as they come to recognise their own range of skills.

## **2.5 Summative assessment**

Summative assessment evaluates a student's work at the end of the learning process and provides both the teacher and the student with indications of whether the topic was understood or not. Garrison and Ehringhaus (2013) assert that summative assessment is "a means to gauge, at a particular point in time, student learning relative to content standards" (p. 1). It enriches the validity of the task given but it also hinders some opportunities which formative assessment provides (Moss et al., 2008).

As reported by Garrison and Ehringhaus (2013), summative assessments have various forms, such as state assessment, benchmarks, end-of-unit or chapter tests, and end-of-term or semester examinations. Fautley and Savage (2008) argue that summative assessment can also be applied in day-to-day work in the class. They contend that the teacher applies many summative assessment techniques in his/her teaching.

Within the school and classroom context, summative assessment may be used to give a judgement about student learning but it can also be used formatively. Wiliam (2013) explains how summative assessment is used formatively once the teacher provides feedback on the allotted task and not just a grade that the students cannot relate to. In fact, according to Fautley and Savage (2008) “using summative assessment in a formative fashion means building on results from tests, tasks, achievements and assignments to affect future learning” (p. 67).

### *2.5.1 High-stakes examinations*

An example of summative assessment is the high-stakes examinations that all students have to sit for at the end of their secondary schooling. These examinations usually entail a written examination in preparation of which students need to study the whole syllabus and be able to answer all the set questions (Eggen & Stobart, 2012). These examinations are considered high-stakes because they exert direct effect on students, teachers and schools (Madaus, 1988).

High-stakes examinations affect students in terms of causing anxiety, the element of failure, low morale and other negative consequences (Temmerman, 2018). Unfortunately, one’s performance in a subject during all the years of secondary schooling may be judged in three to four hours of summative-oriented examinations. Some students develop certain skills and learn how to excel in high-stakes examinations. However, for most students – especially those with a profile of dyslexia – high-stakes examinations are a hurdle which prevents them from showing their true potential. Indeed, according to Elwood, Hopfenback and Baird (2015), high-stakes

examinations leave consequences both on students as well as on teachers. Therefore educators and examination boards who develop high-stakes examinations have the huge responsibility of ensuring fairness in what and how students are assessed.

### *2.5.2 The Physics SEC examination*

Within the Maltese context, the high-stakes examinations at the end of secondary schooling are the SEC examinations. These are prepared by the MATSEC examinations board. The Physics examination assesses candidates through two written papers each two hours long. An evaluation of practical work done over the years is also credited.

Paper One includes ten short questions, all of which students are required to answer. This paper carries 55% in the global mark. Candidates have two options for the second paper, either Paper 2A or Paper 2B. Questions in Paper 2A are more challenging than those of Paper 2B. The second paper consists of five compulsory questions, two of which test skills related to experiments. This second paper carries 45% in the global mark. Together with these two papers students have to present reports of practical experiments. These carry a weighting of 15% in the global mark, which add up to 115%. This is later worked out in terms of a final mark out of 100% (MATSEC, 2014, p. 3).

According to the MATSEC syllabus (2014), the papers consist of knowledge of and understanding concepts, problem solving, design and planning of experiments and practical assessment. It is evident that Physics high-stakes examinations in the Maltese context are not based on different types of assessments, given that they consist of two written

examinations and a number of reports of laboratory experiments. Indeed, the only school-based tasks in the whole process of this SEC end-of-course examination are the laboratory experiments, for which a small percentage is credited, not to mention also that most of the marks of this section of the paper are allotted to the report on these experiments. Consequently, this examination does not develop the skills and knowledge of candidates but only records achievement.

In light of this emphasis on written examinations in the Maltese school system, “parents of children with special needs believe that the ADSC [Access Disability Support Unit] and MATSEC Board [Matriculation and Secondary Education Certificate] can do more to help their children prove their true potential, obtain better examination results and proceed to tertiary education” (Farrugia, 2017, p. 49). Some parents stated that “greater use of ‘continuous assessment’ and ‘multiple-choice assessment’ methods would allow dyslexic candidates to demonstrate the real extent of their intellectual abilities and knowledge” (Farrugia, 2017, p. 34).

## **2.6 The impact of assessment on students with a profile of dyslexia**

As has been outlined in the previous sections, assessment is part and parcel of the teaching and learning process in the Physics classroom. Assessment practices, whether they are carried out in the classroom by the Physics teacher or whether they involve summative assessment at the end of secondary schooling (high-stakes examinations) can have an impact on the lives of students. In the classroom, assessment is usually

formative in nature and this allows all students including dyslexic students to improve their work and increase their learning.

High-stakes examinations, on the other hand, carry more importance as they affect life chances and opportunities (Elwood & Lundy, 2010). As argued by Elwood (2013), all students experience difficulties with high-stakes examinations; however, for students with a profile of dyslexia these challenges are magnified. Osborne (1999) reports that “dyslexic students performed significantly worse than non-dyslexic peers in written examinations” (p. 813). This weak performance might be linked to a number of factors, namely, the difficulties such students have with reading and writing (Peer & Reid, 2002) and the ways they access and process information also during examinations (Crisp et al., 2012). Kirwan and Leather (2011) found that dyslexic students struggle with showing what they know in their head and putting it down on an examination paper.

Lee and Makeham (2012) state that “examinations can be exceptionally stressful times for students, where they are placed in a formal and relatively unfamiliar environment and required to perform at their best” (p. 241). This additional anxiety can affect the achievement of dyslexic students who do not perform at their best. This ultimately means that high-stakes examinations leave an impact on the self-esteem of such students. Schultz (2013, cited in International Dyslexia Association, 2017), points out that “stress and anxiety increase when we’re in situations over which we have little or no control” (p. 5).

Students with a profile of dyslexia

do not fully understand the nature of their learning disability, and as a result, tend to blame themselves for their own difficulties [and] years of self-doubt and self-recrimination may erode a person's self-esteem, making them less able to tolerate the challenges (ibid.).

## **2.7 Making assessment practices 'fairer' for students with a profile of dyslexia**

One of the aims of educators and teachers in schools should be to ensure that students with a profile of dyslexia are given the opportunity to show what they know and what they can do. This is an issue of 'fairness' or 'equity'. Ensuring equity, however, does not mean equality (Klenowski, 2009). Students with a profile of dyslexia enter the assessment playing field at a disadvantage and life circumstances are not equal for them. Klenowski (2009) argues that "equity does not mean treating all students the same" (p. 84). Equity rather means ensuring that students are given 'fairer' opportunities.

Stobart (2005) argues that "we will never achieve fair assessment, but we can make it fairer" (p. 285). Moreover,

...assessments are the key artefacts that provide information that is used to make selections of children to the next level of education; some children adapt to these cultural artefacts more easily than others (either through their own agency and/or through the help of others) to provide good performances on assessments and thus to succeed at school. Therefore, we might argue that a 'one-size-fits-all' assessment system is not in all children's best interests and it is to this notion of inequality and discrimination that we now turn (Elwood and Lundy, 2010, p. 339).

### *2.7.1 Key strategies that can be used to make assessment 'fairer' for dyslexic students*

A number of strategies can be used to make assessment practices 'fairer' for students with a profile of dyslexia. These can be employed both in the classroom and school context as well as in high-stakes examinations.

#### *2.7.1.1 Using multiple modes of assessment*

The teacher should ensure that the assessment carried out in class is fair and valid for all by adopting a wide spectrum of assessment strategies. Flint and Johnson (2011) state that "assessment is viewed as fair when assessment is balanced and varied... fair assessment accounts for different people's learning styles and how they like to work" (p. 67). In this way, those who are disadvantaged by one assessment will have the opportunity to show their true self-worth in another type of assessment. Consequently, all the students will have a chance to show their potential (Linn, 1992).

It can be argued that the sole use of written tests as a form of assessment can hinder those students who are capable of showing their potential by other types of assessment. The implementation of fairer assessment is much more than that. It involves the interaction between the content and the method of assessment being chosen, the diversity of the students, and the validity of the assessment preferred (Stobart, 2005). Stobart (2005) implies that "fairness (equity) represents a complex qualitative judgement about the interactions of inputs, processes and outcomes" (p. 285).

In order to eliminate discrimination and address each individual, "assessment methods must match the purpose and context of the assessment, and students should have multiple opportunities to demonstrate learning outcomes" (Scott, Webber, Lupart, Aitken & Scott, 2014, p. 55).

Another effective strategy would be to include both hands-on and oral assessments in school-based assessment procedures to help students to develop certain skills that cannot be credited in exclusively written examinations. Huxham et al. (2012) suggest that the use of oracy has significantly positive results in students. They favour the use of oral assessment and refer to Karen Armstrong (2009) who describes how Socrates, too, had a low opinion of the written text, as according to him, it is dialogue which gives life and meaning.

Adopting different types of assessment practices shows respect towards the learner. Pettifor and Saklofske (2012, cited in Scott et al., 2014) assert that "underpinning fair and equitable assessment practices is the core value of respect for the dignity and well-being of all students being assessed" (p. 55). In all forms of assessment, students should have a "fair opportunity to show their knowledge, understanding and skills relating to the subject under assessment" (Crisp et al., 2012, p. 819).

### *2.7.1.2 The Use of technology*

Apart from helping students in general to associate their use of technology with more enjoyable learning, computers can also be of much help to students with a profile of dyslexia (Reid et al., 2004). The computer can be a tool that saves such students from having to shun work given by the teacher for

fear of being humiliated because of poor reading, writing and spelling. It also saves them a great deal of time allowing them to focus on the Physics rather than the language (Pollock, Waller & Politt, 2004).

Students with a profile of dyslexia are also very good with using computers themselves and, as suggested by Pollock et al. (2004), "a dyslexic pupil may have particular strengths with the visual-spatial skills required to manipulate computer graphics and data" (p. 177).

Other useful tools for Physics teachers are various resources such as the interactive whiteboard (IWB), videos and simulations. These tools are useful when teaching students with a dyslexic profile, because such students are usually very visual. As pointed out by Mortimore (2008), "visualisation is undoubtedly a powerful tool for learning and inspiration, which can be undervalued in some school systems." He argues that "it is also the preferred approach of many, but not all, students with dyslexia" (p. 201). Other tools, such as PowerPoint presentations, can also enhance their ability to communicate their ideas with others and discuss what they are learning, thanks to visual representations of concepts related to the subject.

There are numerous ways of including students with a profile of dyslexia in the Physics classroom. One should keep in mind that:

...for many highly intelligent dyslexic people, education is already fraught with difficulties. If matching style of delivery with learning style and helping students to develop compensatory strategies can enhance success, it seems less than sensible not to give it a try (Mortimore, 2008, p. 98).

Therefore, the incorporation of the above ideas in the Physics classroom surely helps and motivates students, especially those with a profile of dyslexia, to learn and eventually succeed.

### *2.7.1.3 Access arrangements in high-stakes examinations*

There are many ways of helping students with a profile of dyslexia when it comes to high-stakes examinations. These include the provision of extra time and a reader, the use of an appropriate font size and style, coloured paper, word processors, ICT, electronic examination papers, secluded venues and minimizing the penalisation of spelling mistakes (Farrugia, 2017). These factors make a significant difference to certain students and help those with a profile of dyslexia to start off from a non-disadvantaged position with respect to other students. According to Aitken (2012) and Venn (2012, cited in Scott et al., 2014), "it is critically important [that] accommodations are available to students with special needs" (p. 55).

However, one should not overlook the fact that providing certain incentives might not actually help students. Sometimes, students feel very uncomfortable and embarrassed to have a reader and asking them repeatedly to read. Lee and Makeham (2012) affirm that "it has been noted (SPACE Project 2009) that feelings of embarrassment are a significant barrier to students accepting special arrangements for assessment which may be offered to them" (p. 237). Research also shows that at times accommodations do not make a difference. In fact, arrangements by themselves are "unlikely to be helpful in overcoming the barriers faced" by students with a profile of dyslexia (Riddell & Weedon, 2006, p.

66). Still, the 'negative consequences' with respect to arrangements can be eliminated by allowing the use of modern technology such as computers and iPads.

## **2.8 Creating a positive learning environment for students with a profile of dyslexia**

Assessment practices have social repercussions (Elwood & Lundy, 2010). For this reason, teachers, school administrators and examiners should ensure that assessment policies are reviewed and updated. As argued by Reid et al. (2004), schools must "ensure that policy offers a holistic assessment of a child" (p. 332).

### *2.8.1 Reviewing school policy*

In general, the purpose of reviewing school policy is to ensure that students are being educated properly and in a positive, reasonable, protected and supportive environment. In the Maltese context each school, it being state, independent or church school, has its own unique school policy which creates a balance among the rights and responsibilities of each stakeholder. Each school policy has the sole aim to give value and respect to each member as well as acknowledge each other's abilities and talents. It also helps students to recognise and meet their own responsibilities. It enables good communication among stakeholders, who may be the senior management team, teachers, students and parents. A good school policy fosters a sense of belonging.

School policies are changed from time to time and this should be considered as a positive factor as it would be of benefit to students. Rabinowitz (2018) states that school policies change to restore and boost healthy attitudes while reducing or eliminating unhealthy behaviours. To acquire a caring environment in school, the new behaviours must accommodate all the stakeholders affected by the school policy. This can be reached by forming various councils in the school itself where all the stakeholders can share their opinions and beliefs with others (Ely, 1999).

Nonetheless, apart from striving to improve or change curricula and assessment practices in secondary schools, stakeholders should make the effort to adapt to continual changes taking place in the educational sector. Deutschman asks: "Would you rather change or die?" (2005, p. 53). School stakeholders should be eager to change, learn, motivate and share ideas and beliefs with others. Networks could also help school stakeholders to improve the quality of any changes that may be adopted. Normally, school policies are developed by school stakeholders and this also applies to Church schools in Malta. Changes in school policies must be followed and embraced by all the stakeholders.

### *2.8.2 Training teachers*

One of the most important factors in ensuring that students with a profile of dyslexia are taught and assessed 'fairly' is to ensure that the teachers have the skills and positive attitudes to be able to support dyslexic students. But the teachers themselves also need support in how to deal with such

students and help them reach their true potential (Snowling & Stackhouse, 2006).

Teachers are responsible for all the students in their classroom but sometimes teachers feel very frustrated when dealing with students with a profile of dyslexia. As pointed out by Riddell and Weedon (2006), teachers believe that they should help all students in their Physics classes but at the same time they know that the performance of students with a profile of dyslexia in class and in examinations is not a good reflection of their abilities.

Reid et al. (2004) suggest that professional development programmes can help teachers understand what it means to be dyslexic and enable them to acquire the skills to be able to modify their methods of instruction, resources and strategies. Ideally, as argued by Snowling and Stackhouse (2006), “teachers and teaching assistants should have access to training in dyslexia...there should be opportunities for training from dyslexia specialists from both within and outside the school, and teachers should update their own knowledge through personal reading,” (p. 258). The first step in any training should be to help teachers understand what it means to be dyslexic and to be able to recognise a student with a dyslexic profile in their classroom (Scott et al., 2014). The second step is to train teachers in various teaching and learning strategies that enable students with a profile of dyslexia to flourish.

### *2.8.3 Giving voice to students with a dyslexic profile*

If one is to create a positive learning environment for students with a profile of dyslexia, one should give them a voice. When

students are allowed to voice their views and ideas it will be the first step in their empowerment and a positive move towards change. This is because students should also regard themselves as a part of the change process. Undeniably, Fullan (2007) declares that "it doesn't take much imagination to realise that meaning is central to student success [...] All successful education ends up engaging the hearts and minds of students" (pp. 170-171). This means that students who manage to administer change will participate and immerse in the learning process and build a successful student-teacher connection that results in a positive learning environment.

Unfortunately, as pointed out by Cole (2005), students with a profile of dyslexia are usually considered to be failures in the traditional educational system and their accomplishments and efforts are not valued. The first step in enhancing learning and encouraging success and achievement is for teachers and school administrators to listen to such students (Aitken, 2012).

#### *2.8.4 Making change a reality*

The point of departure when dealing with change lies within the individuals themselves. This means that every stakeholder concerned, starting from the senior management team and ending with the students, has a certain degree of responsibility towards the incorporation of 'fairer' assessment policies, allowing for a more positive school climate.

One should therefore make every possible effort to be a positive contributor. Indeed, it is the responsibility of the school administration and its teachers to modify assessment strategies in order to cater for all individual learners, not only academically but also to help them thrive in the real world.

### *2.8.5 Conclusion*

This research has made evident the fact that learning differences are truly a reality which cannot and should not be avoided. If the school wants to be inclusive, it should cater for all types of abilities and intelligences as well as being a caring and positive environment.

It is with enthusiasm and motivation to explore this research ideas and facts through the use of focus groups, interviews and a case study. As a result, the methodology for this study shall be discussed in detail in the following chapter.

## **CHAPTER THREE**

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### ***Methodology***

### **3.1 Introduction**

This chapter describes the methodology used to explore ways in which assessment strategies for students with a profile of dyslexia can be improved. This was carried out in one of the Maltese Islands girls' church secondary schools. For the purpose of this study, the school will be called Saint Clemson secondary school. A qualitative approach to research was taken, since the study sought to focus in depth on working with teachers and students in order to develop a school assessment protocol to introduce 'fairer' assessment practices for such students.

### **3.2 Designing the study: A theoretical framework**

Once the research questions had been developed, the next step was to identify what data would best answer the research questions and what research tools would be the most effective in obtaining the data. The research design should be shaped by the questions raised as well as the desired outcome (Merriam, 1998). The research design therefore "describes a flexible set of guidelines that connect theoretical paradigms, first, to strategies of inquiry and second to methods of collecting empirical materials" (Denzin & Lincoln, 2011, p. 14). Choosing the most effective research method is the key to the success of data collection. The choice is dependent on many considerations and situations. Before the choice is made, other features of the research project must be known or decided. These include the nature of the information required and the time constraints.

Reading through the literature on research methodology, one realises that one needs to align oneself within a particular theoretical framework according to one's view of knowledge, how this knowledge could be obtained, and how it is related to truth (Griffiths, 1998). Since this study was about people's views of dyslexia, one comes to understand that most of the information collected would be value-laden (Griffiths, 1998) and that this study would be the result of shared understandings. The choice of a qualitative approach enabled the sharing of experiences with the chosen cohort and the acquisition of considerable information from each individual. It enabled the present researcher to enter a mini-world and explore the environment concerned in a detailed manner and from different perspectives.

### *3.2.1 A qualitative approach*

Rubin and Babbie (2010), among others, explain quantitative approaches of data collection. Such methods "emphasize the production of precise and generalizable statistical findings and are generally more appropriate to homothetic aims" (p. 67). On the other hand, qualitative research studies "emphasize the depth of understanding associated with idiographic concerns. They attempt to tap the deeper meanings of particular human experiences and are intended to generate theoretically richer observations that are not easily reduced to numbers" (Savela, 2017, p. 67). Whereas quantitative research "is inherently systematic, behaviour oriented, objective, and value free...qualitative research is always *avant garde*, meaning oriented, subjective, and biased" (Silbereisen & Chen, 2012, p. 577). Since the current study focuses on the in-depth views of teachers and students, school administrators and examination

board officials, a qualitative approach was determined to be more suitable. The study entailed working with both teachers and students and in a small group to give a more authentic narrative of their day-to-day lived experiences of dyslexia. Similar to Pitts and Miller-Day (2007), a qualitative study was deemed to be more authentic and credible.

To ensure this authenticity and credibility, various qualitative methods of data collection were chosen (described in the next section). As explained by Brown (2008), they enabled the extraction of all possible views of the participants and the rationale for their views and behaviour. Moreover, throughout the research process, “fidelity to real life, context, and situation-specificity, authenticity, comprehensiveness, detail [...] and meaningfulness to the respondents” (Cohen, Manion, & Morrison, 2011, p. 203) was maintained.

### *3.2.2 Trustworthiness of the research*

A dominant feature of any qualitative or quantitative research is validity. The target data of this study was based on the participants’ beliefs, attitudes, opinions, ideas and perceptions. Questions which were open-ended were asked and the participant teachers were free to answer and express their beliefs and opinions. The sample size of the cohort chosen was relatively small; a ‘slice’ was taken out of society and examined in depth, allowing for a full rounded means of feedback to be gained and for the chosen scenario to be investigated in its totality.

Various methods within the field of qualitative research were used, allowing for triangulation to take place. Carter, Bryant-Lukosius, DiCenso, Blythe and Neville (2014) explain that

“triangulation also has been viewed as a qualitative research strategy to test validity through the convergence of information from different sources” (p. 545). The issue of validity was also “addressed through the honesty, depth, richness and scope of the data achieved[...] and the disinterestedness or objectivity of the researcher” (Cohen, Manion & Morrison, 2007, p. 105). Thus, applying different methods for various data collections and using various cohorts for research purposes undoubtedly enriched the study as the data collected was varied and valid.

As only a small number of teachers and students participated in the study, the data is in no way generalisable to all teachers and all schools in the Maltese Islands. But, consistent with its aims, this study raises questions and provides insights into how teachers can work together to develop assessment practices for students with a profile of dyslexia.

### **3.3 Ethical considerations**

Due to the fact that the research study was conducted with school educators, permissions were required and ethical issues were addressed “from the early stages” (Oliver, 2010, p. 9) of the study. First, ethical clearance from the Faculty Research of Education Committee (FREC) and the University Research Ethics Committee (UREC) was obtained. The aim of the study, its procedure and target cohort were specified. The research proposal (Appendix 1) was sent to UREC for final approval but the acceptance by FREC was suffice. This ensured that the research took place “with appropriate ethical oversight” (George, 2016, p. 615), enabling the researcher to be trustworthy so as to produce an authentic study.

Following Resnik (2015), in order to establish ethical appropriateness, the objectives of the research study were built upon truth and knowledge. Indeed, all necessary information was imparted to those concerned, starting with the permission to conduct research in Church schools which was obtained from the Secretariat for Catholic Education (see Appendix 2), and further permissions from the Head of School (see Appendix 3).

Resnik (2015) declares that “since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness” (par. 8). He further states that there are many ethical principles and factors which may affect research. These include respect, legality, honesty, integrity, carefulness, openness, objectivity, responsibility, non-discrimination, confidentiality and competence.

Indeed, consent was obtained from several other stakeholders as well as the participants of this research. The consent given addressed three major factors, namely, capacity, voluntariness and privacy. Informed consent is a major ethical issue in conducting research. According to Miller, Birch, Mauthner, and Jessop (2012), “research handbooks and ethical guidelines emphasize that consent must be obtained prior to any research commencing”. In this study, each participant was made aware in clear terms what he or she was consenting to, as advised in the literature (ibid.). In actual fact, consent was obtained from the Senior Management Team (SMT), the teachers involved, parents/guardians, the students, the MATSEC official and the dyslexia expert prior to conducting the research.

Participants were informed that all data gathered would be anonymous and data collection would be carried out in a transparent and fair manner. They were asked to participate voluntarily in the study and they were informed that they could withdraw from the study at any stage without providing reasons or suffering any negative consequence. They were also assured that the recording of the interviews would be stored securely and destroyed six months after the completion of the study. In addition, also to ensure greater authenticity, the transcripts of the interviews were given to teachers, the SMT and the MATSEC official so that they could verify that what they had said had been reported as accurately as possible.

### **3.4 Gaining access**

The Church school where I operate was chosen as the site for data collection. This practical choice allowed enough time at my disposal to carry out the research. Since I was familiar with the premises and the staff it was easier to choose a site for the interviews. Moreover, a rapport had already been established between myself as the researcher and the participants, creating more trust and allowing the smoother running of the interviews. The Senior Management Team (SMT) was also much easier to reach. For reasons of confidentiality the pseudonym of Saint Clemson Secondary School is being used for the school.

The participants in the study were (1) a group of six teachers who taught Physics or other science subjects; (2) the Senior Management Team (SMT), namely, the Head of school and two Assistant Heads of School; (3) two fourteen year old students

with a profile of dyslexia; (4) a dyslexia expert and (5) an official from the MATSEC examinations board.

The teachers who taught science subjects – namely, Physics, Chemistry, Biology and Integrated Science – in the school were invited to participate in the study on a voluntary basis. Although they did not form a large group it was felt that they were genuinely interested in improving the educational assessment of students with a profile of dyslexia. The two fourteen year old students with a profile of dyslexia who participated in the study at the time attended one of my Physics classes. As I had also taught them also in previous years, they felt at ease throughout their participation.

In light of the ethical guidelines described in the previous section, permissions and approvals for the research to take place were obtained. The teachers and students involved in the study were approached through an Information Letter. A Consent Form was completed by each stakeholder before the research started. As the student participants were minors, their parents or guardians also had to confirm their consent (see Appendices 8 and 9).

A qualified dyslexia expert was asked to participate during one of the science teachers' interviews to advise on developing an assessment protocol to make assessment practices 'fairer' for students with a profile of dyslexia (see Appendix 6). The expert was experienced in working in academia as well as on a practical level with students. The MATSEC Board official was chosen on the strength of the expertise in science subjects (see Appendix 7).

### **3.5 The research process**

There are many methods and sources of data collection. These include questionnaires, surveys, observations, case studies, ethnographies, documents interviews, reports and focus groups (Pawar, 2004). In this study, the data collection methods were interviews, focus group interviews and a case study.

A timeline of the study and its progression can be seen in Table 1. The first stage of data collection that was carried out was a focus group interview with the science teachers. Their perspectives on dyslexia and their views and experiences of teaching and assessing students were explored.

Later I worked with the science teachers and a dyslexia expert on developing an assessment protocol that would make assessment practices 'fairer' for students with a profile of dyslexia. The science teachers worked together to come up with a number of assessment tasks for Physics, taking into consideration the needs of students with a dyslexic profile (see Appendix 13). The dyslexic students were also interviewed individually in order to discover their views about current school assessment practices, the challenges they found and what improvements they wanted to see in the assessment practices.

Once the tasks were designed, I tried them out with a Physics class that included the two students with a profile of dyslexia. The teachers and students were also interviewed in order to obtain their feedback on the assessment tasks. Eventually, the tasks and the related feedback were presented to the SMT, and the assessment strategies were reviewed in light of the feedback obtained. Consequently, a new assessment policy for

the following year was discussed and developed collaboratively by the science teachers and the SMT. The results were presented to a MATSEC official in his role as a representative of a local high-stakes examination board (see Appendix 12).

<b>Dates</b>	<b>Data Collection Method</b>	<b>Participants and purpose</b>
February, 2018	Focus Group	The six science teachers – discussion on current assessment practices and views on dyslexia.
February, 2018	Focus Group	The same teachers and a dyslexia expert - forming an assessment protocol.
Beginning of March, 2018	Interview	Short interview with two students with a profile of dyslexia from a Form 4 Physics class– discussion on the half-yearly examinations.
March and April, 2018	The Intervention – A Case Study	Trialling different types of assessment tools in a Form 4 Physics class that included students with a profile of dyslexia.
End of April, 2018	Interview	Interview with the two students to obtain feedback on the assessment tasks.
June, 2018	Focus Group	The science teachers and the SMT to review school assessment policies.
July, 2018	Interview	Discussion with a MATSEC examinations board official on the findings of the study.

**Table 1: The Various stages of the research process.**

## **3.6. Methods of data collection**

The next sub-section describes each data-collection method used in the study and their rationale.

### *3.6.1 Focus groups*

The main research tool used to obtain data in this research study were the focus group interviews. Focus group interviews have many advantages as a research tool, especially in qualitative methodology. They are “an excellent way to get a ‘bird’s eye view’ of the opinions, values, and feelings about research problems, particularly in the initial and early stages” (Ivey, 2011, p. 251). Also, Krueger and Casey (2015) state that:

...a focus group isn’t just getting a bunch of people together to talk. A focus group is a special type of group in terms of purpose, size, composition, and procedures. The purpose of conducting a focus group is to better understand how people feel or think about an issue, idea, product, or service. Focus groups are used to gather opinions (p. 2).

Three focus group interviews were held with the science teachers and one of them included the SMT, as shown in Table 1. Focus groups were selected as the main method of data collection with the science teachers since I believed that the focus group interview would give the participants the freedom to voice their opinion individually and articulate their own perspectives. They also had the possibility to listen to other opinions and respond to them. Focus groups “generate conversations that uncover individual opinions regarding a particular issue. They also help to reveal group consensus,

where it exists, on the issue at hand” (Cyr, 2016, p. 233). In line with Ivey (2011) and Cyr (2016), I wanted the science teachers to have the possibility to agree and disagree with each other and to give voice to their opinions and beliefs. As a researcher, I sought to keep the debate running smoothly and engaged throughout the whole discussion (Ivey, 2011).

On the other hand, focus group interviews also have limitations. One of them is that there could be some “dominant or shy participants” (Walden, 2008, p. 106). There is also “the difficulty of keeping participants on target,” and the “time-consuming data analysis” (p. 188). However, I still believe that this was the most suitable approach for this study. As reported by Krueger and Casey (2015), “the purpose of conducting a focus group interview is to better understand how people feel or think about an issue, idea, product, or service” and “gather opinions” (p.2).

Ho (2012) states that a number of procedures should be followed when conducting focus group interviews. First of all, the appropriate participants to the research must be chosen and the interviewer should prepare a script consisting of number of questions. The setting of the focus group can also affect the interaction. For that reason I laid the seats in a circle to facilitate eye-contact among the participants.

The focus group data should be analysed critically and accurately, as advised by Morgan (1996), and this requirement must be considered at the planning stage. Decisions have to be made on the number of focus groups conducted in the study, the amount of participants in each group, and the willingness of the participants to take an active part.

Consequently, I prepared guiding questions to be used in opportune moments during each of the focus group interviews.

I also tried to be flexible because unanticipated but original and creative theories may emerge during a focus group interview if a flexible and relaxed environment is established. The participants were given the opportunity to express themselves freely about any subject related to the study.

The prepared questions (see Appendix 10) were not necessarily inquired in the exact way that they were composed but adjusted in line with the exigencies of the moment. Open-ended and close-ended questions were included, with an emphasis on the former. Open-ended questions empower participants to express their true feelings. According to Brown (2008), "open-ended questions are often better for the patron because they encourage him or her to elaborate in detail rather than providing you with the yes or no answer that you would get from a 'closed' question" (p. 4).

Participants were given a name tag and asked to read it out before speaking. This helped to identify the speaker on the audio recording for transcription purposes, and to follow arguments raised by particular participants more easily. These strategies are also mentioned by Winke (2017). "[T]he purpose of using numbers or pseudonyms is to preserve the confidentiality of participants and to make data transcription easier". He also reports: "in recent focus groups that I was involved in facilitating, we trained the focus group participants to say their participant number when they started to talk. This was particularly helpful..." (p. 76).

The participants of the focus group interviews all came from the educational sector so it was easier to establish a relaxed atmosphere, one that would facilitate their maximum contribution. They had also worked together for a number of years and therefore were able to trust each other. As argued

by Krueger and Casey (2015), establishing trust is an essential feature of focus group interviews.

While some participants could be influenced by others and thus fail to express their true opinion, others could be emboldened to speak when they heard others give their views. Participants are eager to identify and solve a 'problem' and thus clarify any doubts and misunderstandings. This was the case in these focus groups as each participant had the opportunity to voice his/her opinion. This helped me develop a well-informed assessment plan for students with a profile of dyslexia. Furthermore, since I had already worked with the participants for a number of years, they felt they could trust me and were at ease during the focus group interviews.

### *3.6.2 Interviews*

Interviews were also held, in the knowledge that participants will be able:

...to discuss their interpretations of the world in which they live, and to express how they regard situations from their own point of view. In these senses the interview is not simply concerned with collecting data about life: it is part of life itself, its human embeddedness is inescapable. (Cohen et al., 2007, p. 349)

In the case of the student participants, it was decided, for ethical reasons, to hold two interviews each one with both participants present. The first was held after the half-yearly examinations so as that experience was still fresh in their mind and they could give their views more easily on these traditional examinations and on the way they were assessed in the school year.

The second interview with the students was held after the implementation of the assessment protocol with its various assessment strategies. To avoid any ethical issues, these interviews were carried out close to and clearly within sight of the school staffroom. Another individual interview was held with a MATSEC official and this took place at the MATSEC support unit.

In all the interviews, emphasis was made on open-ended and 'why' questions in order to explore thoroughly the views expressed. Moreover, the prepared questions were not shown to the participants beforehand. This is in line with Dörnyei (2007), who recommends an interview that "flows naturally, with the various parts connecting seamlessly" (p. 140).

A set of questions (see Appendix 11) were prepared in order to maintain focus. In the same vein, Mackey and Gass (2016) affirm that "in such interviews, the teacher-researcher is guided by a list of written questions but has the freedom to digress and probe if further information is required" (p. 141). Thanks to the interviews, participants had enough time to articulate in depth their opinions, attitudes and feelings regarding the subject.

Various questions were put to the students, such as how they had dealt with the topic, what activity they liked most, and which activity and assessment exercise they felt they had understood most. The reflections of the participants were recorded. The final recommendations (see Appendix 12) were formulated and presented to the MATSEC official during an interview at the end of this part of the study (see Table 1). These were a set of recommendations regarding 'fairer' assessment procedures for students with a profile of dyslexia. Feedback from the MATSEC official was also obtained.

One of the main advantages of interviews is that it is easier to set up the meeting in a particular location with one or two persons rather than trying to form a meeting with a number of participants at one place (Hughes, 2019). In fact, it was easy to find a date and time to interview the students. They were held during the Wednesday mid-day breaks, which were longer than those on other days.

On the negative side, one of the drawbacks of many interviews is that the interviewer has to provide prompts frequently. The interviewee being the sole focus of attention, he or she could feel awkward about expressing his or her views. Another disadvantage related to interviews is the bias and subjectivity that could emerge during the interaction (Marshall, 2016).

Moreover, if the methodology chosen is too rigidly structured, it is likely to produce less valued responses. Flynn (2018) argues that the questions asked should not be like “a shopping list that you should stick to 100 percent” (par. 14). During the interviews, these potential shortcomings were overcome with the use of proper questioning and techniques such as careful and discrete prompting. The student interviewees were reminded repeatedly that no-one would judge their opinions. I behaved as informally as possible to make them feel more at ease.

### *3.6.3 The intervention – a small case study*

Once a number of assessment strategies had been developed by the science teachers, and after the first interview with the students (see Table 1), I implemented the set of assessment tasks as a case study with a Form 4 Physics class of sixteen students. I made this choice of a small case study as it allowed

me to delve into the situation being analysed and to acquire a clear picture of the issues concerned. As in Taylor and Martindale (2014), using a case study gave me the opportunity to delve into a certain circumstance which was under investigation from different viewpoints, attitudes and contexts in order to be able to acquire descriptions which were in-depth and detailed.

Moreover, in consonance with Cohen, Manion and Morrison (2010, p. 181), a case study “provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles”. This is corroborated by Pine (2009), who affirms that a case study is a particular instance towards action. One main limitation of case studies is that the assessment protocol is not implemented with a whole population; however, Cohen et al. (2010) argue that “case studies can penetrate situations in ways that are not always susceptible to numerical analysis” (p. 181).

Another reason for choosing a case study is that I wanted students with a profile of dyslexia to actually experience the experimental assessment protocol at first hand. Although the focus of this study were students with a profile of dyslexia, the assessment strategies were implemented with the whole group of Physics students so as to avoid singling out those with a dyslexic profile.

The assessment protocol consisted of tasks and strategies used to assess the whole class with particular emphasis on students with a dyslexic profile. During the case study, an SMT member carried out a number of class observations with a focus on those tasks and strategies. They recorded instances as they happened in order to check whether any stigmatisation

occurred during the research process with regards to the students with a profile of dyslexia, and to make the research process as transparent and authentic as possible.

### **3.7 My role as a researcher**

The fact that I had a certain “familiarity” with the participants of the research study meant that I was an ‘insider’ (Cui, 2015, p. 357). I very clearly had similar “life experiences as the research participants” (ibid). I was a Physics and science teacher, a colleague of the teachers who participated in the study, and a teacher of the student participants.

The SMT team were the school leaders with whom I shared the same school environment every day. Moreover, I also had experience of the MATSEC examinations as a student and as a teacher. All this evidence attests to the fact that in terms of this study I was an insider. Wearing the teacher-researcher hat was not easy, knowing that it involved a role change and others were accustomed to seeing me only as a teacher. However, this new role appeared to be accepted and this helped me to conduct the study.

Prior to the interviews with the students and the dyslexia expert, and the focus group held with the science teachers and the SMT, it was stressed that the aim of the study was to try and find ways to improve assessment practices at school and in high-stakes examinations. It was made clear that there was no intention to judge others’ beliefs, attitudes and practices. This clarification helped to create a climate of trust. Trust and credibility play an important role in the research process.

One advantage of being an insider is that “insider research include[s] a potential to gather a greater depth of data and the

possible availability of more contextual detail" (Hewitt-Taylor, 2002, p. 35). Taylor (2011) also argues that as an insider, "the data I have gathered from friend-informants compared with informant-friends is significantly greater in volume and depth" (p. 11). Moreover, being an insider helped me to identify more who I am, sharing my identity with others and acknowledging the product of the research that I desired. This role helped me to become more aware of my own beliefs, and this put me in a better position not to interfere with the beliefs of others (Kanuha, 2000; Asselin, 2003).

This study, similar to what is described by Bolton (2010), emphasises the adoption of a "reflexive attitude". This attitude means that the "researchers have to 'stand back' from their scaffolds of understanding about themselves and their relationship with the world, which requires strategies such as internal dialogue, and a critical focus on their worldview" (p. 120). If this kind of attitude is adopted, then it would be difficult to reject any ideas, beliefs or actions of the participants. One will be better able to embrace diversity by not letting assumptions to interfere. This concern is echoed by Mulligan (2016), who states that "by prioritising participant-driven data, rather than relying on researcher assumptions in research design and data collection, the outcomes will be both more realistic and trustworthy" (p. 245). The notion of reflexivity is also raised by Taylor (2011). She argues that:

...the researcher, then, is forced to look both outward and inward, to be reflexive and self-conscious in terms of positioning, to be both self-aware and researcher-self-aware and to acknowledge the intertextuality that is a part of both the data gathering and writing processes (p. 9).

Indeed, knowing the context and having established trust helped me as a researcher to work with the participants in a more trusted manner. Regular contacts with the participants increased the possibility of understanding their ways of communicating, including their body language. In fact, Taylor (2011) argues that as an insider, the researcher has the opportunity to “decode” certain perceptions “through the researcher’s intimate understanding of past events and/or their knowledge of the informant’s personal history” (p. 11).

### **3.8 Analysis of results**

The collected data was analysed using a thematic analysis. According to King and Horrocks (2010), a thematic approach starts off by recording and transcribing the material obtained. A good audio recording ensures that there is no missing context. In fact, the data which I gathered were all recorded and later transcribed. Afterwards, the task was to look for “data that reveal[ed] something of interest regarding the research topic at hand” (ibid., p. 149). In this way, outstanding and relevant themes were extracted and organized accordingly.

Basically, this approach involved linking the raw data to dominant themes. Guest, MacQueen and Namey (2012) explain that thematic analyses “move beyond counting explicit words or phrases and focus on identifying and describing both implicit and explicit ideas within the themes” (p. 10). The thematic approach enabled the analysis of the data to capture in-depth meanings within a set of data (Guest, MacQueen & Namey, 2012).

This approach involves different steps, as illustrated by King and Horrocks (2010). The first step is deciding on the data to be kept or eliminated and the way the interaction is interpreted. Secondly, for a theme to emerge, there must be some sort of 'repetition' of the issues raised by the participants. Accordingly, the themes of this study were formed after identifying the most common and recurrent issues that emerged during the focus group and the interviews. The specified themes formed must also be distinct from each other (King and Horrocks, 2010).

Guest, MacQueen and Namey (2012) argue that a thematic approach entails a number of advantages. One of them is that the researcher becomes more acquainted with the raw data when reading and re-reading it to form themes. On the other hand, this process of analysis entailed considerable time but this was made up for by the way it revealed the concerns and issues of the topic.

### **3.9 Conclusion**

This inductive research was not only a means of finding out answers to the research aims but also a means of self-discovery. Indeed, being self-reflexive throughout the whole process of the methodology enabled critical thinking to develop and helped one to grow and mature as an educator.

## **CHAPTER FOUR**

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### ***Results***

## 4.1 Introduction: Setting the scene

The participants in the study (Table 2) were six science subject teachers, one dyslexia expert, the Head of School, two Assistant Heads of school, two students with a profile of dyslexia and one MATSEC official.

<b>Participants and Specialisation</b>	<b>Abbreviation</b>	<b>Pseudonym</b>	<b>Gender</b>
Head of School	HOS	Pearl	Female
Assistant Head	AH 1	Nina	Female
Assistant Head	AH 2	Mia	Female
Dyslexia Expert	DE	Amelia	Female
Biology and Integrated Science Teacher	T1	Sophia	Female
Biology and Integrated Science Teacher	T2	Ava	Female
Chemistry and Integrated Science Teacher	T3	Luna	Female
Integrated Science Teacher	T4	Kaylee	Female
Physics and Maths Teacher	T5	Lyla	Female
Physics and Integrated Science Teacher	T6	Jack	Male
MATSEC official	SEC	Danny	Male
Student with dyslexia	S1	Petra	Female
Student with dyslexia	S2	Kaia	Female

**Table 2: Information on participants.**

Pearl had been Head of School for the previous five years, whereas Nina and Mia had worked as Assistant Heads of School for the previous four years. Sophia (a Biology and Integrated Science teacher), Ava (a Biology and Integrated Science teacher) and Luna (a Chemistry and Integrated Science teacher) had been teachers for more than eight years; Lyla (a Physics and Mathematics teacher) for five years; Kaylee (an Integrated Science teacher) and Jack (a Physics and Science teacher) had started teaching in the same scholastic year when this research was conducted.

The teachers taught a combination of their specialist science subject (Biology, Chemistry or Physics) and either Integrated Science or Mathematics. The dyslexia expert had practised as a dyslexia specialist for a number of years. She was recruited in order to help the other participants develop an assessment protocol. The remaining participant was a MATSEC official with a background in science subjects.

The two students with a profile of dyslexia were both fourteen year olds thus at the time of the study, they were in Form 4 class. Their strengths were creativity, hands-on activities and they were quite good at expressing their knowledge orally. On the other hand, they struggled when it came to reading and writing.

Though the data collected from the teachers, students and the Senior Management Team (SMT) related to a single school, the teacher participants had different science specialisations, different ages and of both genders. The data that was collected was thus varied and contained a wide spectrum of ideas and diverse perspectives of the topic.

## **4.2 The main themes of the study**

The discussions during the focus groups and interviews produced a large amount of data which when analysed raised many crucial issues. The data was organised around four main emergent themes:

- Theme 1: Learning Physics with a profile of dyslexia;
- Theme 2: Assessing students with a profile of dyslexia;
- Theme 3: Making a change: different forms of assessment;
- Theme 4: From practice – to influencing policy.

Although, for practical reasons, the themes are presented in separate sections, they are closely linked. This part of the study retains the voices of the participants and their views and insights are presented as faithfully as possible.

## **4.3 Learning Physics with a profile of dyslexia**

### *4.3.1 The teachers' views: defining dyslexia*

When teachers were asked what the term *dyslexia* meant to them, they all agreed that students with a profile of dyslexia experienced difficulties in copying, reading and writing. They stated that these difficulties manifested themselves in a tendency to flip words and letters, numerous spelling mistakes, lack of confidence to speak up and slow reading. Lyla, described dyslexia as: *"...a difficulty that students have with writing rather than with communication since they can communicate verbally with their peers like any other student"*.

For Kaylee, another Integrated Science teacher, such students were similar to other students but *"...normally in class, students with a profile of dyslexia tend to respond to questions like any other student but they find it difficult to write and eventually fare poorly in exams"*. These attributes of dyslexia are very similar to the definitions of dyslexia given in the literature where very often such students are described as having "significant problems in reading comprehension but little or no difficulty in listening comprehension" (Das, 2009, p. 54).

For the teachers participating in the study, dyslexia was also a continuum and varied in severity, meaning that in their view some students were mildly dyslexic while others were severely affected. Jack argued that:

*...There are some students who are mildly dyslexic whereas others who are severely. My opinion is that the difficulties that students with a dyslexic profile carry with them depend on the students themselves as well as according to their ages...*

Similarly, Sophia pointed out that, *"I do not think they are all the same, meaning that different students have to be tackled in different ways."*

The participant teachers agreed that in their teaching experience, students with a profile of dyslexia generally did their best and tried to cope with their difficulties. In fact, they pointed out that such students also had talents and gifts that enables them to excel in certain areas such as outstanding creativity and originality, had the ability to 'think in pictures', could solve higher-order problems as well as being good at hands-on activities especially during laboratory experiments.

Jack stated that *"despite the difficulties they encounter, students with a profile of dyslexia have the same potential or even more in some circumstances than the rest of their peers"*. Ava, an Integrated Science teacher, agreed with Jack and argued that *"Albert Einstein was dyslexic and he still inspired a whole lot of work in the Physics area"*.

#### *4.3.2 Challenges faced by teachers when teaching students with a profile of dyslexia*

The participant teachers concurred that they faced a number of challenges when teaching students with a profile of dyslexia and that they were not trained well enough to cater for such students. They stated that neither in their initial teacher education (either the B.Ed. (Hons.) course or the PGCE programme) nor in their continuous professional development had they ever been trained to cater for students with a profile of dyslexia. Ava pointed out that:

*...I had to do my own research about dyslexia when I first had a dyslexic student in my class...I also depended a lot on the learning support assistant who helped me prepare material at the level of the students.*

In fact, the teachers opined that they would have benefited from better training on dyslexia both in their pre-service teacher education and previous professional development.

Some of the teachers also mentioned that apart from training, there should also be collaboration among school guidance teachers, counsellors and parents so that they would be better aware of the individual needs of students. The reason was that teachers felt the need to be equipped with appropriate

methods and approaches of how to tackle students with a profile of dyslexia. In fact, Jack emphasised that each teacher should:

*...refer to counsellors or guidance and with their permission the teacher should talk to the parents of these students...this is so the teacher will be aware of any difficulties which the student encounters. With this, one will be able to construct appropriate assessment tasks, including visual images, appropriate fonts and so on. Naturally, formal open discussion with the parents can also help the students to benefit.*

Kaylee confessed that there were instances when she did not even know that a particular student was dyslexic. The reason was that some students had not been statemented due to the fact that they only had mild dyslexia. She believed that with more training and collaboration with specialists she would be able to help all students with a profile of dyslexia, irrespective of its severity. In her own words:

*I think a course even taking a few classes will definitely help us tackle and identify students with a profile of dyslexia. Such courses help us teachers to be more aware of how and what can one do to help these students.*

On the same line of thought, Ava argued that:

*...there is always the need for teachers to be trained especially in this regard. This is because there are a lot of challenges. Apart from the fact that I believe that there should be some form of counselling as well for the teachers, to be more familiar and know that not all dyslexic students are the same because of the severity. The teacher needs to know the effects, particular problems that the student is suffering. More knowledge awareness about this disability and how could you be able to make the student successful in life like all the others should be provided.*

The participant teachers argued that all teachers should have an understanding of dyslexia and awareness of its main characteristics so as to be able to overcome the challenges that they encountered when dealing with such students.

#### *4.3.3 The students' perspectives: characteristics of a dyslexic profile.*

As mentioned in the previous section, the teachers who participated in the study believed that they needed to know more about 'dyslexia' in order to be able to overcome the challenges they faced when teaching and assessing students with that condition. In the current study, a better understanding of dyslexia was sought by talking to the two students with a profile of dyslexia. Although the views presented in this section are only the views of two students and are in no way meant to represent the views of all students with a profile of dyslexia, they shed some light on how dyslexic students viewed their challenges and difficulties and how having dyslexia affected the way in which they learned and understood physics.

In the interviews and discussions with Petra and Kaia, the two students, it was very evident that they were very much aware of their difficulties and they tried very hard to cope with learning and assessment in the Physics class. They experienced challenges that were not specific only to learning science subjects but also in other subjects. These challenges included the common difficulties of reading, spelling and writing.

In fact, Petra pointed out that:

*Sometimes I see words being flipped, moving around and also blurred. Thus, when I try to read notes in class or while studying for a test, a quiz or for an examination, I find it hard to read and focus.*

Due to these difficulties, the students felt that they took much longer to do their work and this hindered their performance when compared with their peers. Kaia shared Petra's concern when she stated that: "*due to the fact that we read slowly and also take longer to write, we don't usually manage to finish off the task in class*".

The two also felt that in their school-work a great deal of emphasis was placed on spelling. Spelling was an issue for both of them and they used a great deal of time and effort trying to get their spelling right at the expense of understanding the concepts properly. This was very frustrating for them, since very often due to their dyslexia no matter how hard they tried, they would still make spelling mistakes and therefore they knew that they would start off already at a disadvantage with respect to other students. Petra expressed these frustrations:

*...I am literally losing energy and time to study how to write the word rather than to know what the actual meaning of the word is. Many times I get upset because when I look at the other students, I remind myself that they do not have the same problem as I do. They just read the word once and they will remember it. I need to make more effort than any other student.*

Another issue for both Petra and Kaia was the amount of writing that they had to do in order to show what they had

understood and could do. Kaia explained how very often she knew the answers to classwork or homework questions or even in tests and examinations, but when it came to explaining in words, she was not able to communicate what she really meant. Kaia pointed out that:

*...I know the answer. I simply do not know how to write it and even though I try to write it, there is a great chance that the teacher will not understand the meaning of it because it would be nearly unrecognisable.*

One difficulty that the students experienced in relation to Physics was the plotting of graphs. The major challenge here was that the students were asked to plot graphs on small black boxes and this caused visual stress, since because of their dyslexia they could sometimes not distinguish between the small black boxes. Petra stated:

*Usually we always have to plot a graph in a Physics examination paper and I really like plotting points on a graph. However, I hate it when I try to find a scale for the graph and I make mistakes due to the fact that boxes are too small and black. If one small box is ignored by mistake, the entire graph and its questions related to it would be wrong and this frustrates me.*

The two students linked their dyslexia to their performance and the sense of frustration they felt in not being able to show their true potential. This sometimes led to feelings of embarrassment and, as reported in other studies, it influenced their self-esteem and the way in which they looked at themselves in relation to their peers (Lee & Makeham, 2012). Petra explained how certain written tasks made her panic and perform at her worst: *"Although I studied for Physics, I still did not do so well. I tend to feel a lot of panic when faced with a*

*paper full of questions all at once*". Kaia shared this concern that certain tasks did not bring out the best in students with a profile of dyslexia. This influenced her self-concept and she felt very sad that she could not show her best in spite of trying so hard. For Kaia:

*I do not want to see my peers, not only before the exam but also after the exam. I just go straight home. This is because sometimes students start saying that the examination was hard and they had understood what they were asked to do and though I tend not to envy them I feel so sad that I could not give my hundred percent in the examination.*

When asked about their views on dyslexia, the two students focused on the challenges and difficulties rather than on the talents and skills that they might have. Although the teachers who participated in the study looked at both the difficulties and the positive skills associated with a dyslexic profile, the students only talked about the difficulties.

#### **4.4 Assessing students with a profile of dyslexia**

Students, including those with a profile of dyslexia, are assessed throughout their school life. They are assessed for various reasons, such as to improve learning (formative assessment) or to grade the standard achieved at the end of a study unit or programme of studies (summative assessment).

The teachers who participated in the study expressed a number of views and opinions about the way in which students with a profile of dyslexia were currently being assessed and how these assessment practices could perhaps be made 'fairer'.

#### *4.4.1 Current school assessment practices*

Current assessment practices in schools are usually of many different formats: classwork and homework are regularly marked, usually in order to help students improve their learning, while tests are usually held at the end of a particular topic. Students also have to sit for more formal summative examinations in the middle and at the end of the scholastic year known as the half-yearly and annual examinations respectively.

##### *4.4.1.1 Classwork and homework*

One of the most common ways of assessing whether students have achieved specific learning outcomes in Physics is through classwork and/or homework. Most of the participants in this study reported that this work is usually in the form of a worksheet or a set of questions or tasks. Jack stated that:

*...apart from continuously assessing students in the Physics class through proper questioning, generally, we give them a written worksheet during the topic or at the end of the topic/sub-topic".*

According to Kaylee, these tasks involved mainly "*reading and writing skills*". Although the teacher participants were aware that this placed students with dyslexia at a disadvantage, they also felt that they still needed to give written work. What frustrated the teachers was the fact that they knew that students with a profile of dyslexia were capable of much more than what was shown by their written work, but they still

needed to mark them in the same way as the other students.

Lyla argued that:

*...when correcting classwork, homework or worksheets, you know that students know the answer, however you cannot give them the appropriate mark. You know that if that particular question was asked orally, they would have got it right. But ultimately you cannot give them the mark because it would be spelled incorrectly.*

Spelling was in fact a major issue in relation to class and homework. The teachers were divided on how much emphasis they should place on spelling when it came to assessing student work. All the participant teachers agreed that scientific words should be written correctly since, as stated by Sophia:

*...even when it comes to reducing marks with respect to terms, how should they be reduced? Globally, meaning that throughout the whole paper or for each and every word? This will end up in having the students not passing from the exams. And if it is globally, one can say for example decreasing 5% globally concerning spelling mistakes?*

However, Ava, a teacher, made the point that nowadays we do not need to know how to spell the term because one can Google it. She explained that:

*...in your working life you are not going to be writing terms unless you are a teacher. Also, there are programmes and incentives such as autocorrect or a computer exam where the students can use the autocorrect system.*

One positive aspect about current assessment practices in the Physics classroom is the fact that students are engaged in practical experimental work. Luna argued that when doing practical experiments, students with a profile of dyslexia were more confident, participated more, shared ideas and were

highly creative. However, the other participant teachers believed that there was one major drawback with practical work when it was included as part of formal summative assessment such as the SEC examination, and this was the writing of the experiment report.

The quality of the experiment report is in fact credited in the SEC examination, with 15% of the total examination mark allotted to practical work. This practical work usually consists of a choice of fifteen experiments carried out by the students during the year. Although technically the teacher can assign some marks for actually carrying out the experiment, most of the marks are awarded for the written report. However, as pointed out by Luna, *"when the students come to write the report, they find it very difficult and so they lose a lot of marks. As a result the exam mark will automatically decrease"*.

Sophia supported this view and stated that due to their difficulty with writing the report, such students tended to give up writing the lab reports and were put off practical sessions. In fact, Kaia, one of the students said: *"I like doing experiments; hands-on experiments but I dislike the idea that each time a report must be written"*.

#### *4.4.1.2 Half-yearly and annual examinations*

The students who participated in the study gave a great deal of importance to the half-yearly and annual examinations. For the students these examinations caused a certain amount of stress. Petra reported:

*I am not lucky as other students are. When studying for examinations, I need to read and re-read the same paragraph more than once, and studying everything for one single examination does not help at all.*

Similarly, Kaia, the other student, stated: "*I tend to panic when I see that everything is asked in one huge bulk*". Kaia and Petra also explained how the format of the examination and the way in which questions were presented did not cater for their needs. Kaia explained how she studied hard, but sometimes in the examination, questions were written in a different format to how they had done them in class and this caused her to panic and forget all that she knew:

*I studied for the Physics exam – I truly studied. But when I see the examination questions written differently, in a different format and even in sort of different language, I tend to panic a lot.*

This panic, the sense of forgetfulness, and weak memorizing is also reported in other studies. Mortimore (2008) reports that students with a profile of dyslexia "find this kind of memorising stressful, which further reduces performance" (p. 171).

The majority of the teachers who participated in the study in fact felt very frustrated when they had to mark the examination papers of students with a profile of dyslexia. They were aware that some of the students really put a great deal of effort in studying for examinations, yet due to their spelling mistakes or misunderstanding of the questions, they had to be penalised and as a result they obtained low marks overall.

The teachers explained that they were especially uncomfortable when assessing students with a profile of dyslexia because they knew what the students would have wanted to explain, but the students would have written down a wrong answer due to the difficulties encountered because of their dyslexia. For the sake of 'fairness' and to keep marking reliable, the teachers were constrained to reduce marks as

they marked what was written down. Luna, one of the teachers, reported: *"you know that they are capable of doing so much and the mark shows that they do not achieve that much"*.

#### 4.4.2 High-stakes examinations (MATSEC)

Since high-stakes examinations at the end of secondary schooling were given so much importance by students, teachers and parents, a great deal of the focus group discussion focused on the SEC examinations.

##### 4.4.2.1 The teachers' views on the SEC examinations

The participant teachers were all very vociferous in their views that the MATSEC examinations did not cater for students with a profile of dyslexia. Luna's views were typical of her colleagues when she stated that: *"The MATSEC assessment does not cater for students with dyslexia, again, because it is based on a written exam"*. Lyla echoed this view:

*...in Physics, a lot of questions involve explanation answers. Only a small percentage of them require mathematics working. In other words there are a lot of things which students sort of need to learn by heart such as: laws, definitions, principles and so on. Thus, this kind of written examination papers will definitely hinder these students.*

Even Danny, the MATSEC official, agreed that having only written examinations at the end of secondary schooling was problematic for students with a profile of dyslexia. He stated that *"writing brings difficulties with it"*. However, despite being aware of the difficulties, and knowing that written

examinations were not the ideal, for the MATSEC Board they were the most manageable. Danny explained: *"it is true that we can criticize by saying that all the examinations are written, still it is only the fact that they are written which brings manageability"*.

The main concern of the participant teachers with regards to the high-stakes SEC examinations was the fact that due to their written format, the results that dyslexic students obtained were not really a true reflection of what they knew. The teachers reported that this caused dyslexic students a great deal of stress, disheartened them and demotivated them from continuing with further studies. Kaylee, one of the teachers, was very emotional in her assertion that:

*...an examination stresses nearly each and every individual, let alone students with a profile of dyslexia. Sometimes, they feel that they are not capable of sitting for the examination, not because they are really not capable but because of the system. It is unfair that students know the answer but they are not given the chance to show their true and maximum potential.*

The participant teachers felt very frustrated by the fact that they were trying to make their assessment practices in the classroom 'fairer' for students with a profile of dyslexia but then the same students had to sit for their SEC examinations that were still presented in the traditional format of a written examination. The teachers were highly critical of the SEC examinations as they felt that they did not allow students to show their true potential, and the challenge for students with a profile of dyslexia was even more complex.

Lyla explained all this and made a very strong argument:

*...I think that throughout the scholastic year, we as teachers can do so much practice to help students with a profile of dyslexia. We can do oral examinations, concept maps, games and many more. But at the end of the day students are faced with MATSEC examinations so if the MATSEC does not change its assessments, the practice performed in class is useless. This is because at the end of the day students need to present their MATSEC certificates, not the school certificates. If the things we do were to be reflected by the MATSEC, it would be a totally different story. The education system is losing a lot of students, let alone students with a profile of dyslexia.*

The participant teachers pointed out that sometimes they had to resort to traditional written forms of assessment in their own classroom practice so as to prepare students for the SEC examinations. Pearl, the Head of School, opined that assessment practices in schools needed to reflect the high-stakes examinations. This is because ultimately students had to face those types of assessment:

*...if we are going to change the assessment policy of next year, we cannot change that of Form 5. This is because the Form 5 examination should be a 'mock' examination. It should be exactly as the MATSEC examination is.*

The discussions held with the teachers and the SMT made it very evident that the teachers were torn between wanting to use alternative methods of assessment, as they knew that these would, as described by Kaylee, "tackle the various needs of students and reach each and every student", and wanting to prepare students for the high-stakes examinations in the best way possible.

#### 4.4.2.2 *The students' views on the SEC examinations*

The two students who participated in the study stated that the SEC examinations presented them with a number of challenges that became more pronounced because of their dyslexic profile. The students were in fact concerned about the written aspect of the SEC examinations, the environment in which they were held, and the impact on future life chances.

The first major challenge faced by students with a profile of dyslexia when sitting for the high-stakes SEC examinations was the actual amount of memory work involved in a single examination since the SEC examinations covered work carried out over three years. Indeed, Kaia, one of the students, stated: *"when I am faced with the end-of-school examination, I tend to panic. I do not even want to imagine what I will be doing when faced with the SEC examinations"*. Petra, the other student, shared Kaia's view:

*it gives me chills when talking about SEC examinations, I do not know how I will be able to remember all the things that I will study for each and every subject. We should not be assessed at the end of our secondary school. We have to study for each and every subject and we do not have three or four subjects. How can I remember all subjects' definitions, explanations, workings and so on?*

Kaia explained that it was the written format of the examinations that was problematic for her. She described how in Art she did not feel the same pressure. According to her, *"an Art examination is not like a Physics examination. I do not feel the same panic, stress and pressure. I just go and enjoy it"*. This is because in Art there was very little reading and writing involved. The students were also concerned about their handwriting and whether the examiners would be able to

understand what they had written. Kaia commented: *"I wonder, when it comes to MATSEC, whether they will be able to read what I try to explain through writing."*

Kaia and Petra were also concerned about the environment in which they had to sit for the SEC examinations. Kaia, for example, argued that if she could sit for the SEC examinations in her own school, an environment she was used to, then she would not feel so anxious about high-stakes examinations. Thomson (2007) points out that students with a dyslexic profile tend to "fear new situations" (p. 8). In fact, Petra, stated:

*I wish that I have a say where we can do the examination. I wish that we can do them in our own class or if not at least in our own school. The fact that we need to go to a new, big hall together with many other students from different schools frightens me a lot. Until you try to find your desk, I will definitely be in panic.*

The students were not only concerned with their studies but also with the impact that the SEC could have on their future life choices. They were worried that if they did not perform well in their SEC examinations they would have wasted three years of their lives and would not have the necessary qualifications to continue their studies or find a job. Kaia, argued that:

*If I sit the Form 5 examinations next year and I fail them, it means that I failed three years of my life, not to mention earlier years. I wish examinations are just like hospitality (one of the vocational subjects) examinations where the syllabus of Form Three is done at the end of that particular year and does not repeat itself in the Form Four and Form Five syllabus.*

Therefore, for both Petra and Kaia, the SEC examinations were a challenging experience that affected their perception of assessment.

## **4.5 Towards 'fairer' assessment: Current practices**

The main aim of the current study was to explore ways of making assessment practices 'fairer' for students with a profile of dyslexia. According to Suskie (2000):

...equitable assessment means that students are assessed using methods and procedures most appropriate to them. These may vary from one student to the next, depending on the student's prior knowledge, cultural experience, and cognitive style (p. 1).

The first issue that was explored with the participants of the study was whether they thought that current assessment practices at school as well as the MATSEC system were in their view 'fair' for students with a profile of dyslexia. The next section explores their views before moving on to discuss the implementation of a change in assessment practices.

### *4.5.1 Current practices – adaptations and access arrangements*

The participant teachers agreed that assessments at school and in high-stakes examinations should be as 'fair' as possible for all students, including those with a profile of dyslexia. Dorans and Cook (2016) argue that fairness, validity and accessibility play an important role in assessment. The

significance of fairness and equity is also stressed by Stobart (2005), who expounds that fairness and equity in assessment is best defined as “a qualitative concern for what is just” (p. 275). Similarly, Jack argued that:

*The assessment strategies should be implemented in a way that is 'fair', meaning that it should cater for the abilities of the student under your responsibility. Without doubt, each and every student has his/her potential regardless the difficulties they encounter.*

#### 4.5.1.1 School adaptations

The participant teachers agreed that one step closer to fairness would be the implementation of modifications to assessment procedures according to the needs of students in a given school. In fact, within the school context they tried their best to cater to this individuality and used assessment tasks and tools that actually brought out the best in their students. Lyla described how she believed that:

*...students with a profile of dyslexia should be assessed in a way which they prefer such as visually and/or orally. Then, we teachers should do our utmost to help them flourish in their gifts which they have such as through the use of graphics, arts and many more.*

In fact, she tried to implement this philosophy in her own science lessons and made use of different assessment tasks such as quizzes and role play to assess her students. Similarly, Sophia used oral questioning and quizzes in her science lessons.

She argued that:

*When you ask them questions orally, students with a profile of dyslexia participate and reply very well. But when it comes to writing, they literally blank and find it hard to concentrate. So why not give them a chance to express themselves?*

The teachers were also aware that, as described in the literature, (Cochrane, Gregory & Saunders, 2012) students with a profile of dyslexia work better with specific fonts and coloured paper such as “non-white paper (e.g. cream) where relevant with an accessible font and layout” (ibid., 2012, p. 23). This was also brought up by Amelia, the dyslexia expert:

*...fonts like verdana, century gothic or antique all help some of the students with a profile of dyslexia. Also the paper should not be white - it should be on the slightly beige side so as to account for the visual stress. The use of borderlines and highlighters, appropriate font, adequate line spacing, clear images as well as appropriate graph papers and coloured papers help students with a profile of dyslexia to read and write during examinations.*

In fact, the participant teachers stated that they did take this into account and tried to use specific fonts and where possible they used neutral paper when preparing worksheets and handouts for their students. Similarly, in Physics the issue of using green graph paper rather than black was also tackled. Lyla reported:

*I teach Maths and Physics and when I did the topic of transformations in Maths I had to print several graphs for the students. One of the students with a profile of dyslexia asked me whether it would be possible to have a green graph paper rather than a black one. In fact I printed a green one just for her.*

With regards access arrangements during half-yearly and annual examinations, the SMT reported that they tried their best to accommodate students with a profile of dyslexia. Morewood (2010) argues that “exam access arrangements are vitally important to enable fair assessment for all students” (p. 111).

The Head of School was also in favour of providing students with a profile of dyslexia with special arrangements to help them perform better in the school examinations:

*We always argue that persons who are diabetic should not eat fats, a lot of carbohydrates, sugars and so on. Instead they are advised to eat a balanced diet. Ultimately, everyone must have a balanced diet. We all need to follow that kind of plan and in the same way. In fact, this same logic is to be applied to education. Access arrangements do help students with a profile of dyslexia but some arrangements help all the students and not only students with a profile of dyslexia.*

In fact, the SMT had decided that during their half-yearly and annual examinations, students with a profile of dyslexia would be provided with coloured paper. Mia and Nina, the Assistant Heads of school confirmed this. Mia explained that:

*When I taught in other schools, we sometimes had visually impaired students and they had bigger sheets of paper. It does not matter. We have to learn to accept that it is part of our needs. We can also ask them: what colour would you like your paper? We have no problem, the students are identified and as for the following examinations that they will sit for, they will be provided with coloured paper as an access arrangement.*

Some of the teachers, such as Sophia, were not in favour of singling out students with a profile of dyslexia and giving them papers that were different from those of their peers. Sophia

felt that this would put students in an awkward position and make them more self-conscious. However, the students themselves did not feel so sensitive about having different arrangements from other students. In fact, they spoke about feeling better when given, for example, extra time. Petra, one of the students, stated: *"I prefer to be given at least a bit more extra time"*. Kaia, the other student, argued that *"if we are given that extra time, less pressure will be on us to finish and try to read fast"*.

#### 4.5.1.2 MATSEC access arrangements

Examination boards, including MATSEC, generally give access arrangements to students with a profile of dyslexia. Danny, the MATSEC official, stated that the MATSEC Board does offer a selection of access arrangements that included:

*...a room with a few candidates, scribe, reader, prompter, extra time, larger paper and so on. Nowadays, those who prefer to use a computer are also given a computer so the students write themselves and not through a scribe. Arrangements by MATSEC do a lot more than people think they do.*

However, the students pointed out that they were not always given access arrangements and that this could be very discouraging. Petra stated:

*I wish that examinations are done fairer. In school examinations, I have 'reader when requested' but I know that for the MATSEC examination I am not going to be entitled to a reader. Why is this done? This is cruelty. We, dyslexic students did not leave at the same point as my friends. I am not granted what I wish to have, because if so I would have more courage to sit for an examination.*

The teachers also gave examples of circumstances when they had applied for access arrangements for students with a profile of dyslexia but were denied by the MATSEC Board. Nina, one of the two Assistant Heads, described how in previous years she had applied for enlarged font for a particular student with a profile of dyslexia and this was not granted. In fact, she stated:

*It is true that as an arrangement there is the enlarged font, but last year I applied and asked whether a dyslexic student can have an enlarged paper as an access arrangement and they told me the enlarged font will only be granted to those who are visually impaired and not for dyslexic students.*

On his part, the MATSEC official argued that the MATSEC Board did its best to accommodate students with a profile of dyslexia:

*We changed the font this year and not last year as when we tried to delve into what the literature says, there is not a clear agreement which font is the most favoured by students with a profile of dyslexia.*

He also stated that in order to aid readability, the MATSEC Board was currently printing examination papers on coloured paper. He explained that:

*In the early years, only some of the papers used to be in colour and the rest were white. As from this year, 2018, they are all on coloured paper: paper 1 and also papers 2A and B. The reason behind this is to aid readability.*

However, he argued that not everything was possible because an examination board had to consider the costs involved.

With regards to printing papers in a larger font he stated:

*It is impossible to print larger fonts than that because you need to keep in mind that an examination paper occupies a lot of space and a lot of space means more costs apart from increasing the printing time.*

He explained that at times it was a question of security and protecting the identity of a candidate in order to ensure that all candidates were treated the same. Some studies, for example, suggested that the use of highlighters helped students in examinations. Rello, Saggion and Baeza-Yates (2014) found that "highlighting keywords improved the comprehension of participants with dyslexia" (p. 30). This was also pointed out by Amelia, the dyslexia expert, who stated that "*highlighters help students with a profile of dyslexia extract what the examiner is asking. However, unfortunately, MATSEC bans the use of highlighters.*" Danny explained that this was problematic. He defended the position of the MATSEC Board:

*...use of highlighters and coloured pens is not permitted in MATSEC examinations due to candidate identity. Markings on a script which are not answers (could be scribbles, coloured pens, drawings, notes, etc) could be a candidate's attempt to reveal his or her identity. This is taken seriously, given the small size of the island.*

It is true that access arrangements should "allow learners with special educational needs, disabilities or temporary injuries to access the assessment" (Lowson, 2015, p. 1). However, one can also understand Danny's point of view and therefore one has to tread with care when advocating certain special arrangements.

## **4.6 Making a change: Identifying what needs to change**

Changing one's practice is not an easy task and when it involves changing modes of practice that have been used in schools for a number of years it is even more difficult. As cited by The National Council for Curriculum and Assessment (2019), change "is based on the optimism and belief that schools, notwithstanding the difficulties being faced, will as always contribute directly to the potential of the next generation of learners" (p. 7). Part of the current study entailed coming up with a plan of action so as to change current practices of assessing science in the school where I teach. This involved getting together as a group of science teachers, exploring what needed to change, coming up with a plan of action, implementing it, and obtaining feedback on the effectiveness of the changes.

### *4.6.1 What needs to change in current school assessment practices*

In the view of the science teachers and the students who participated in the study, the main change that needed to be carried out in the school science assessment practices was to include different forms of assessment in the course of the school year. As pointed out by Amelia, the dyslexia expert, "*students are still being assessed traditionally with the same type of assessment – that of examinations – so it cannot be fair to all the students*". This needed to change and the participant teachers agreed that science teachers should adopt

different forms of assessments. Luna expressed the point of view of her colleagues:

*...the system does not cater for all. The system prefers those who do well in written examinations. For the system to be 'fairer', students must be assessed throughout the whole academic year by using different types of assessments.*

Pearl, the Head of School, agreed with the teachers:

*...in reality, adopting different kinds of assessments applies for all students, let alone students with a profile of dyslexia. It is true that it may increase the amount of work for the teachers but I believe that this should be done more frequently.*

Although the teachers discussed their own school assessment practices, they made the argument that the high-stakes assessment practices at the end of secondary school (the SEC examinations) should reflect what was happening in schools. Kaylee argued that assessment practices could be made 'fairer' for all students if the assessment tasks carried out in school contributed to the final mark of the SEC examinations:

*There should be some sort of formative assessment which is allotted the biggest portion of the global mark – say 75% of the examination. The rest of the 25% should be allotted to the written examination. This should have a small percentage.*

This argument was also made by Sophia, who pointed out that the results of the SEC examinations had an important impact on whether students continued their studies and for employment. However, the mark they usually got was not a true reflection of what the students were actually capable of.

In her opinion:

*If after their schooling students try to be employed, they are asked to present certificates with grades and marks They are not asked to show their formative assessment. This has to stop as marks do not always show one's true potential and to be fair, a mark cannot determine one's ability if that student was assessed by an examination which was not fair to him or her.*

This is similar to the arguments made by Tait (2015), who believes that examination results do not show students' true potential. Tait (2015) argues that "we lose too many talented people by defining intelligence through exams that are wholly inadequate and constricting" (par. 1).

In this study, there seemed to be a unanimous desire for a variety of assessment tasks to be introduced in the school assessment system. This is in line with the literature. Berry (2008) states that "assessment can be varied in form, depth or breadth to reflect different facets of learning. A variety in types of assessment allows a range of different learning outcomes to be assessed" (p. 15).

The students who participated in the study felt that it would be 'fairer' if they were assessed through various types of assessment. Petra suggested that:

*...marks should be divided into various types of assessments. If you fail from one assessment, there is the other type of assessment which will help you make up for the other one which you failed. The more assessments we will be assessed with, the 'fairer' the system is – thus the better.*

Similar to students in a study by Elwood (2013), the two students in this study were not in favour of eliminating tests and examinations completely. The two believed that there

should be only one form of assessment that contributed to a more holistic evaluation of their skills and capabilities. Kaia, the other student, argued that:

*...I would still leave the half yearly and annual examinations but other different types of assessments should be included. If you do not do so well in the examinations, you will not give up as there are still some marks gained from, for example, practicals, quizzes and so on.*

The students also felt that synoptic examinations, and single tests on all the material covered in yearly or half-yearly periods should be replaced. Petra argued that it would be 'fairer' if students were assessed separately on individual topics and not on all the topics covered throughout the year:

*...I wish that we are assessed throughout the year and not through a single examination at the end of a term or a year. We feel that pressure of trying to do so well. A percentage from different assessments must be calculated from all the assessments being done throughout the academic year.*

Kaia also opposed single synoptic examinations at the end of the year:

*[It] is not fair, as more pressure is done on us when we are assessed through one examination. It is true that teachers assess differently in class but these do not count as examination marks. It would be much 'fairer' if we were assessed, for example, one topic with a quiz, another topic with a practical, another topic orally and so on. And that would be it; those topics will not be studied again.*

Scott et al. (2014) make the case that all students including those with a profile of dyslexia benefit from being assessed through different forms of assessment since the latter target

the different strengths and abilities of students. This point came out very strongly in the current study and in fact, the main call for change made by both the teachers and the students was for different kinds of assessments to be used. While this could be very easily implemented in school assessment, the participants expressed their desire that different forms of assessment tasks would also be introduced in high-stakes examinations. Sophia summed up the views of the participants in her statement:

*...we agree that there should be different types of assessments so as to reach the abilities of all students. These kinds of assessments can be done at school but can also play a part in high-stakes examinations.*

#### **4.7 Developing a plan of action: what can be changed**

In their discussions among themselves and with the dyslexia expert, the teachers came up with a number of actions that could actually be introduced in the school science assessment practices. Fullan (1993) declares that the point of shifting towards change are the individual themselves. In other words, this means that every individual involved has a certain degree of liability towards the accomplishments of proposed changes and thus one must give his or her utmost. All the teachers concurred with implementing change and this was the most important first step.

#### *4.7.1 Developing different forms of assessment*

As shown in the previous section all the teachers who participated in the study agreed that the school science assessment protocol should take up different forms. Currently it is required that students should be given a mark. In Physics students are assessed by an examination consisting of written tasks that are allotted 85% of the mark, and the remaining 15% allotted to practical experiments done in class throughout the year.

However, as discussed earlier, one type of assessment cannot determine one's ability. In their discussions, the science teachers and the dyslexia expert favoured the introduction of different forms of assessment tasks. These tasks (see Table 3 and Appendix 13) would be allotted various weightings so that the final marks would be distributed over different assessment tasks and not just on a written examination and practical work.

In order not to shock the system too much, the participants thought that initially it would be best to keep the percentage of marks allotted to the written tasks as one of the highest. Practical tasks should also be given a high percentage as students with a profile of dyslexia excel more during hands-on activities. A considerable percentage would also be allotted to oral tasks as generally students with a profile of dyslexia find it easier to explain themselves orally than in writing. A good percentage for the assessment pack (see below Section 4.8.1.3) was favoured as it was a form of continuous assessment. Finally, a small percentage was allotted for quizzes and participation in class.

<b>Assessment</b>	<b>Percentage of final mark</b>
Pack Activities	(15%)
Practical Activity	(30%)
Written Test	(30%)
Oral Activity	(15%)
Participation	(5%)
IWB Quiz Activity	(5%)

**Table 3: Percentages of marks allotted to different types of assessments.**

The main difference in assessment practices in the school would be that in addition to the examination, students would also be assessed through different tasks suited to different learning styles including those of students with a profile of dyslexia. The salient features of the proposed assessment protocol and their rationale given by the teachers are described in the next section.

#### *4.7.2 More emphasis on class-based activities*

One of the main changes that the science teachers who participated in the study agreed on was to place more emphasis in the final mark on class-based assessments. The idea was to allow students with a profile of dyslexia to show what they had understood through different assessment tasks. This would be a move away from the 'one-size-fits-all' end-of-year examination. For this purpose, I together with the participant teachers and dyslexia expert developed a pack of

assessment tasks that would be allotted 15% of the total mark awarded to students at the end of the scholastic year.

The pack included sixteen different assessment tasks that required students to answer questions with the use of diagrams, mind-maps, posters and matching. Particular attention was paid to the formatting of these tasks. Following Cochrane, Gregory and Saunders (2012), sparse words, particular fonts and spacing, borders and coloured pages were a feature of these tasks. Flashcards and game cards were also used. The assessment tasks were conducted at the end of each Physics lesson covering the topic "Newton's Laws of Motion". The participant teachers believed that by using different assessment activities, they would be able to target the various areas that students with a profile of dyslexia excelled in. Mia, one of the Assistant Heads of School, argued very eloquently:

*...at the end of the day, we do assessments to check for understanding so if she got that mark, it means that she truly understood the topic but unfortunately, we assess with one type of method. How can we reach all the students by only using one type?*

This provided the basic rationale for introducing different forms of assessment in the assessment of science subjects in our school. The science teachers who participated in the study shared the view that some marks should be given for participation in these class-based activities.

The participation entailed homework and classwork, oral interaction, group and pair work, and attentiveness during the lesson. Students were also given marks if they practised appropriate skills such as teamwork, leadership and communication, and for appropriate behaviour. To ensure reliability, an informal set of criteria was discussed with the

students before working on the sub-topic. Students were praised when questions related to the topic were made and also when they interacted with their opinions and ideas following questions put by the teacher or by their peers.

A short IWB quiz activity was carried out in class as part of the assessment and assigned 5% of the total mark. Multiple-choice questions were used as they helped students to think critically through the use of application and evaluation, and they targeted what students really knew about that topic.

Moreover, since this quiz was carried out on the IWB, pictures and photographs could be used. Visualisation is in fact one of the most effective tools for students with a profile of dyslexia. According to Mortimore (2008), "visualisation is undoubtedly a powerful tool for learning and inspiration, which can be undervalued in some school systems. It is also the preferred approach of many, but not all, students with dyslexia" (p. 201).

#### *4.7.3 More emphasis on practical work*

Prior to the current study, practical work was allotted 15% of the total marks given at the end of their scholastic year. This was in line with the protocol of the SEC Physics examinations. However, the science teachers who participated in the study agreed that more emphasis should be given to practical work. As a result, the proposed assessment protocol allocated 30% of the marks for such work.

One benefit of using more practical tasks is that students work in groups. Catapano (2009) states that "students participating in group work is a key ingredient in student learning" (par. 1).

The teachers believed that allowing the students to work together helped students with a profile of dyslexia since they could rely on someone else when it came to writing. Jack argued that:

*...students who find difficulty in writing should be paired up with another student who is confident in writing. A student who is good at one ability, should be paired with another student good at another ability so they can help each other each using their potentials.*

The teachers discussed the issue of ensuring 'fairness' and reliability when students work in groups during practical work. The problem was that students would be assessed as a group and perhaps some of the students would take advantage of others. Ava remarked that students could "copy materials from other students," but Luna had a solution for this:

*...it is true that it will not be an individual task but still that it is the responsibility of the teacher to monitor the students throughout the whole task. Marks can also be reduced if some students try to copy others' works.*

However, overall, the benefits of using practical work with students with a profile of dyslexia seemed to outweigh the issues of reliability raised by some of the teachers. In fact, the research suggests that students with a profile of dyslexia enjoy themselves when conducting experiments and tend to come up with innovative and creative ideas of how to conduct them (Glazzard, 2010). Reid et al. (2004) report that students feel comfortable in subjects which involve hands-on activities. This argument was also made by the participant teachers.

Luna, for example, stated that:

*...when students with a profile of dyslexia are asked to perform hands-on activities, they tend to be happy and participate a lot; however, when it comes to writing, students tend to withdraw from the activity.*

#### *4.7.4 The introduction of an oral component*

A suggestion by participant teachers that involved real change in order to help dyslexic students feel more at ease during assessment was the introduction of an oral component with an allotment 15% of the marks. Oral assessment has many advantages for students (Huxham et al., 2012). Reid et al. (2004) consider oral assessments as one of “the most important compensatory strategies” to other forms of assessments (p. 318), for students with a profile of dyslexia.

Despite the fact that oral assessment has many advantages, it is not common in science subjects. Huxham, Campbell and Westwood (2012) report that “the apparent rarity of the oral examination is surprising given its many possible advantages” (p. 125). Amelia opined that “*oral assessment should be included in physics, chemistry, biology or science.*” Lyla, one of the teachers, stated that including an oral form of assessment would certainly benefit students with a profile of dyslexia since they would be assessed on whether they had understood specific science concepts rather than on their writing skills.

This point of view was shared by Danny:

*Orals have certain advantages. Sometimes the candidate does not understand the question and when the examiner is correcting the examination paper, she can notice that the candidate did not understand due to the misunderstanding of the question. In orals, this is eliminated as they give you the advantage of putting questions in other ways if the students did not understand.*

In the current study, the oral activity took place during the lesson immediately after the written test in order to assess skills that had not been assessed in it. The students were asked to stay in one room supervised by a teacher, and they were called one by one to attend the oral session in the room next door. An oral task sheet was prepared for them and placed on a desk outside the classroom. The sheet consisted of a title and five questions. Each question consisted of three pictures from which they were asked to choose the odd one out and give a reason for their answer. They also had some space to write or draw anything which could have helped them arrive at their answer. They were given some time alone to read and think about the questions before the oral session.

In their discussions about the introduction of oral assessment, teachers showed concern about the fairness of being assessed by one's own teacher. The participant teachers were of the view that oral assessment could be more reliable and valid if they were not carried out by class teachers.

Lyla explained:

*It would be a great idea if we assess students through an oral examination in Physics; we can assess the other teacher's students. If I teach Physics and there is another teacher who teaches Physics, we exchange our students so we will not be biased and thus increase validity and reliability.*

These were healthy debates that showed the commitment of the participant teachers to make their assessment practices 'fairer.' Oral assessment was in fact introduced because the participant teachers believed that students with a profile of dyslexia would be given the opportunity to explain verbally rather than in writing their understanding of Physics concepts.

#### *4.7.5 The written test*

The written test, which was allotted 30% of the final mark, followed the traditional approach. It assessed knowledge and understanding through writing. However, in light of the discussions held with the teachers and the dyslexia expert, more attention was given to the actual formatting of the test paper.

In line with the guidelines of the British Dyslexia Association Guide (2018), yellowish-cream-coloured papers were used in order "to accommodate the needs of dyslexic students" (Reid et al., 2004, p. 182). Moreover, some key words were printed in bold to make them stand out. The respective marks were put next to each question. The general layout of the text was also designed carefully. This included diagrams and pictures to help students visualise the concepts that were featured.

Questions started and finished on the same page so as to avoid any turning over pages.

All these modifications, recommended by the teachers, were trialled by myself with a Form 4 Physics class I was teaching. The syllabus topic was "Newton's Laws of Motion".

## **4.8. Evaluating the new assessment protocol**

### *4.8.1 The students' feedback*

In the first part of their feedback, students were asked which assessments they preferred most and least. In the second part of their feedback, a 'let us imagine' game was played with the students. They were asked to imagine the kind of assessment they would have implemented had they had the authority to do it. The two participant students with a dyslexic profile were encouraged to learn more science by the fact that the marks they got in the assessment were obtained from different tasks and not only from a written task. This meant that 'their eggs were no longer in one basket', and this helped them to show their potential in a better way.

#### *4.8.1.1 Oral assessment*

Students' positive feedback concerned mainly the introduction of oral assessment. Both students agreed that it gave them the opportunity to express what they had studied, what they knew and their potential.

Petra stated:

*I prefer to be assessed orally also because there will not be a lot of pressure on one examination only. The pressure is divided into several types of assessments and if I do not do so well in one assessment, I might do better in the other.*

Kaia also appreciated the fact that the questions to be answered orally were not expressed entirely in writing but also through pictures, adding:

*...we had ample time to go through the pictures and oral assessment alone in a quiet place before entering the classroom. That helped me a lot to concentrate and distinguish the difference between the pictures. So apart from the fact that I had less pressure on me that I need to write the answer, I also had less pressure in how to read the question.*

They also supported the decision to carry out the orals and presentations with the teacher only and not in the presence of the whole class. Kaia argued:

*I really liked the idea of oral in Physics but the most important thing is that orals and presentations should be done in front of the teacher only – exactly as we did them and not in front of the whole class. For example, we have other subjects where we need to do a presentation to the whole class, sometimes I tend to panic and feel stressed. But it may be due to the fact as we are not used to that type of assessment that much.*

The students in the study found oral assessment an effective mode of assessment as it enabled them to show what they had learned without having to negotiate the written barrier.

#### 4.8.1.2 Practical work

Petra and Kaia enjoyed the practical tasks that were performed as part of the topic of “Newton’s Laws of Motion”. Kaia explained that she especially enjoyed working with her peers and the fact that she was doing something hands-on and which did not involve much writing. She reported:

*There were different kinds of assessments which I liked doing such as the orals, handouts - pack, small tests, quizzes but mostly the practical activity. I believe that marks related to experiments are all 'bonus' for me as I prefer doing things with my hand rather than giving me chunks of paragraphs and I have to always struggle with reading and writing them.*

Petra shared these views and admitted that it was very helpful for her to be working with peers as it built up her confidence:

*I had so much fun doing the unseen practical activity as I helped my classmates decide what should be done and how we can use the given apparatus to arrive at the conclusion. Then, I reassured myself that they were going to help me when it came to the writing of the practical activity. Even during the quiz activity we helped each other to arrive at the correct answer.*

As pointed out by Johnson, Johnson and Smith (2014), when a student’s success is recognised by the group, a positive interdependence and a sense of positive co-operation is created. Although some research (for example, Hodge, 2000) seems to suggest that students with a profile of dyslexia do not like to speak out in class, the two students with a profile of dyslexia in the current study indicated that within a safe environment they were not afraid of participating.

In fact, Petra reported that working in a group increased her self-confidence:

*It is important to participate in class; however, sometimes I do not feel confident enough to participate. Sometimes I am afraid that I answer incorrectly. But I feel that I am improving in this aspect. To start with, these activities are helping me to participate more. In fact, there were instances when I did not feel shy and did my best to participate as much as I could.*

The participant students also found practical assessment as a sufficient method of assessment as it gave them the opportunity to practise hands-on tasks.

#### *4.8.1.3 The assessment pack*

Another recommendation that was trialled with the Form 4 Physics class was an assessment pack consisting of a number of different activities (see Appendix 13). The activities were chosen to cater for the different needs and learning styles of students since it is well documented in the literature that students have different styles of learning and can perform at different levels in different assessment tasks. Indeed, “for teaching and planning learning it is important to be aware of students’ individual learning preferences” (Reid, 2005, p. 66).

Petra and Kaia were very positive about the assessment pack. Although they agreed that examinations should not be eliminated altogether, they felt that different weightings for different tasks showcased their strengths rather than their weaknesses.

Petra described the pack in this way:

*The pack which you gave us was really good as we could answer the questions in many different ways. I also like the idea of being assessed, for example, one topic through one kind of assessment and another topic through a different kind of assessment. This will eliminate too much emphasis on two written examinations at the end of the terms.*

The two students also appreciated the fact that the pack was very student-friendly and that each question was written concisely in a large and clear font, proper spacing and use of visual images. Petra stated:

*...I liked the idea where we could answer in point form and not in chunks of words. The use of mind mappings with few words in separate boxes also helped me summarize the definitions of each key word. Doing activities on the computer helped me to associate the theory with the practice. How I wish that we can use the computer for tests and examinations! I will no longer see the words on top of each other scabbled over the others.*

The pack also included activities using diagrams, games and computers. As described by Rouman (2003), the use of educational games helps students see learning as fun. This was similar to Kaia's views:

*I really enjoyed answering questions using diagrams or games. Computer games, bingo and snakes and ladders, apart from the fact that they were fun games, they also made it easier for me to participate and words on a computer tend to be seen clearer than printed on a piece of paper.*

The two students appreciated the fact that the use of different assessment tasks in the pack made learning more fun. The marks that the students with a profile for dyslexia had

obtained in the traditional written half-yearly examinations were compared to the marks they obtained using the different assessments and it was evident that there was some improvement, as can be seen in Table 4 and Table 5 below.

	<b>Half-Yearly Examination Mark</b>	<b>Assessment Protocol Mark</b>
<b>Petra</b>	48%	84%
<b>Kaia</b>	49%	91%

**Table 4: Comparison between the marks obtained by the students with a profile of dyslexia in the half-yearly exam and in the trialled assessment protocol.**

	<b>Petra</b>	<b>Kaia</b>
<b>Oral Activity</b>	$\frac{5}{5}$	$\frac{4.5}{5}$
<b>Practical Activity</b>	$\frac{15}{15}$	$\frac{15}{15}$
<b>IWB Group Quiz</b>	$\frac{9}{10}$	$\frac{8}{10}$
<b>Short Written Test</b>	$\frac{22}{30}$	$\frac{17}{30}$
<b>Pack Activities</b>	$\frac{16}{16}$	$\frac{16}{16}$
<b>Participation</b>	$\frac{5}{5}$	$\frac{5}{5}$

**Table 5: The breakdown of marks obtained by students with a profile of dyslexia in the different tasks of the trialled assessment protocol.**

From these very raw figures it can be seen that students performed much better in the trialled assessment protocol than they did in the written test. Although these are only the results of two students it can shed some light on the implications of using various forms of assessment tasks in the Physics classroom.

When these results were reviewed by the science teachers who participated in the study and the members of the SMT, it was concluded that adapted assessment did have a positive impact on students with a profile of dyslexia. In fact, Nina, the assistant head, argued that through the adapted assessment, students with a profile of dyslexia: *"tend to pluck up more courage for the rest of the topics. They will reassure themselves that they are fine and that they are capable. The system is not catering for them and not vice versa"*. This view was echoed by Kaylee, one of the teachers, who stated: *"students with a profile of dyslexia tend to give up from school because they think that they are not fit enough to cater for these types of examinations."*

Ava also commented very favourably on this result and was impressed by the way in which various assessment formats seemed to increase the achievement of students with a profile of dyslexia. While one must keep in mind that various other factors could have influenced the results and that the study was carried out only with two students, the results can give some insight into the potential positive effect of using different assessment formats.

As stated by Ava:

*These students with a profile of dyslexia from failing went to an A. Now it is true that they were assessed over one topic and in half-yearly examinations they have around two or three topics but still having the first student obtaining 48% in her half yearly Physics examination and then she got 84% through the implementation of the new different tasks while the other from 49% she got 91%. This clearly shows something.*

Ava explained further how these results inspired her to change her own assessment practices and to use oral assessment with one of the students in her own classroom:

*...I have a student in class and lately, I decided that for the test, she was assessed orally rather than through a written test. I tried to be different, to change the assessment for her. She got 80% which is quite a good mark. So definitely, if we as teachers work together to form new types of assessments it will help all the students.*

All the teachers who participated in the study agreed that it was important to use different forms of assessment with students with a profile of dyslexia. This is similar to the research carried out in other countries (Chapman, King and King, 2005). This conclusion is very eloquently expressed by Mia:

*...at the end of the day, we do assessments to check for understanding so if she got that mark, it means that she truly understood the topic but unfortunately, we assess with one type of method. How can we reach all the students by only using one type?*

## **4.9 From practice – to influencing policy**

The results were presented to the SMT, who approved the new assessment protocol. Thus, together as a school community, we implemented a change in the school assessment policy for science subjects. Finally, it was also presented to a representative of the MATSEC Board for their consideration.

### *4.9.1 Changing assessment structures and policies*

The only thing that is constant in life is change. To change the assessment structures and policies involves the effort of every stakeholder. This is because change brings about new procedures, methods, ideas and plans. Change frequently causes resistance from people as sometimes it can lead to negative pressure and anxiety. Fullan (1993) stresses that one must be determined when putting into action change because it entails time. In fact, Mia, the Assistant Head, asserted: *"when there is something new being implemented, the first reaction of people is to draw back until they get used to it"*.

Together with the other participants in this research study, I worked to implement a change in the assessment practices in our school. By encouraging discussion and listening to everyone's point of view I tried to create an atmosphere that would alleviate the fear of change described by Mia and motivate the teachers to change their assessment practices. All the participant teachers agreed that assessment practices could be changed and made 'fairer' for students with a profile of dyslexia.

Lyla expressed the views of all the teachers:

*Why let the students suffer by the current assessment tasks? We can change the school assessment policy of science subjects and it will surely help students with a profile of dyslexia.*

While in principle all the teachers agreed that a change in assessment practices was needed and would have a positive impact on all students and not only on those with a profile of dyslexia, the SMT members raised a number of concerns. In their view, assessment practices could not be changed unless all the science teachers in the school embraced the changes. According to Pearl, the school Head, a change in practice could not be imposed from above but has to be endorsed by the teachers who have to put it into practice. Pearl pointed out that:

*...if we are revising the school policy for everybody, it is automatically going to help students who are dyslexic. However, the school development policy needs to be accepted by all the staff for positive change to take place. It is not something which the SMT can change alone. The assessment protocol cannot be imposed because ultimately you are not allowing teachers to show their creativity in their professionalism. However, we can work collaboratively to make changes which help all the students show their true potential through various assessments. And I wish that this applies to all the science subjects so we can say science subjects enjoy the same uniformity.*

A major reason behind the change of the school assessment policy in science was to increase the opportunities for students with a profile of dyslexia to show their true worth. Schools and their communities cannot be considered static but active and ever-changing. "Nowadays, the luxury of choice is long gone.

Change is persistent, demanding and continually expected” (Busuttil, 2004, p. 10). This change in the school assessment policy was desired by all the participants of the study.

#### *4.9.2 Challenges in changing a school assessment policy*

Schön (1971, p. 12) remarks that real change involves “passing through the zones of uncertainty...the situation of being at sea, of being lost, of confronting more information than you can handle”. In fact, the Head of School stated that the biggest challenge in implementing change and changing school assessment policy would be the teachers themselves:

*...sometimes we are not consistent. We want our students to study for their examinations; yet, we still give them homework a few weeks and even days before the examination days start. When I asked the teachers not to give homework, I know that there were still some teachers who do. Why? Because they resist change. So here we are developing a school assessment policy but it does not mean that all teachers will be on board. I hope not, but there is always the possibility to have people who refuse change.*

Similarly, Nina stated: “for such changes to flourish, all teachers have to be on board, at least the vast majority of them”. The participant teachers anticipated that much of the resistance to the change in the science school assessment policy would be the arguments about time and not managing to finish the syllabus. Luna pointed out that for some teachers, introducing a variety of assessment tasks “would be time consuming” and therefore there was the risk that the changes would not find favour with all teachers.

Lyla countered this concern:

*...the teacher will still be abiding by the syllabus. To assess differently and throughout the year does not mean that one consumes more time. We always assess students in class and in examinations, but this time each assessment will be given a mark and thus is given a percentage of the final mark.*

Jack, another teacher, stated that in his view the main stumbling block would be the introduction of oral examinations in science subjects as this would require more teachers to carry out the oral examinations and more teachers to supervise the other students.

Again, Lyla had an answer: *"the oral examination should take place after the written examinations so teachers will have finished their invigilation duties of the written examinations"*. However, despite these concerns, the science teachers still decided to implement these changes in the next academic year.

#### *4.9.3 Impact of changes in school assessment policies on high-stakes examinations*

Assessment practices take place within a context and a school assessment policy should not be considered as if it exists in a vacuum. As Elwood and Lundy (2010) state, "one of the most fundamental aspects of a child's best interests in the context of assessment is whether their experience of assessment practices through the education provided meets the standards" (p. 338). Assessment is out of necessity a social process that impacts on students, learning, and curricula. My main concern when I embarked on this study was to help improve the nature

of science assessment practices in the school where I taught, but I also believed that the insights obtained from my study could also be of service to the MATSEC authorities. This was the purpose of a discussion held between myself and Danny, the MATSEC official. The proposed changes in our school science assessment policy were discussed and we raised the issue of whether these could also be implemented on a national level in the SEC examinations.

Danny was very vocal about his view that the high-stakes examinations offered by the MATSEC Board were often criticised though they tried their best to accommodate students. He reported that the SEC examinations were at the time going through an intensive review and would in the future incorporate more school-based assessment:

*...MATSEC is a very easy target. A lot of people do not know what we do. Although there is room for improvement, we try to accommodate a lot of students and we do many positive things. It is true that one can criticise the fact that all the examinations are written but it is only written which brings manageability. Then again, if the central examination is supported with school-based assessment, which is planned by MATSEC in the near future, we prefer that those assessments will include different forms of assessments.*

Danny regarded school-based assessment as important but as an official of an examinations board, the technical issues of validity and reliability were more important for him. The importance of these two qualities of assessment is indeed stressed in the literature (Berry, 2008): "there are two aspects of quality of assessment information that must be considered: validity and reliability" (p. 12).

Danny argued in the same vein:

*School-based assessment is a very important type of assessment but it gives the opportunity to all stakeholders for a lot of abuses. It is a type in which the validity and reliability of the examination drastically decreases. In schools, you have the possibility to do different types of assessments but national examinations are standardised.*

The participants of the study believed that through proper reflection and appropriate criteria, the proposed assessment protocol could influence assessments on a national level.

#### **4.10 Conclusion**

The introduction in school of the new assessment protocol with its different types of tasks entailed the courage, commitment and determination of all the stakeholders. The entire science department, the SMT and the two students with a profile of dyslexia shared the same goal. The current study has shown, as confirmed by the views of the science teachers and dyslexic students, that the different types of assessments in the proposed protocol helped the dyslexic students to flourish.

Thanks to the results of this study, I have learnt that change is a necessity that cannot be ignored if one is to help students with a profile of dyslexia succeed in their learning process. The students with a profile of dyslexia I worked with and their positive feedback inspired and motivated me throughout this study.

## **CHAPTER FIVE**

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### ***Discussion***

## **5.1 Dyslexia**

### *5.1.1 Students with a dyslexic profile in the science classroom*

This research study explored the views of science teachers and students with dyslexia in Saint Clemson secondary school in the Maltese Islands and the challenges they faced in teaching and learning the subject respectively. The study also sought to try and develop 'fairer' assessment practices in science for dyslexic students. Teachers should have a good understanding of dyslexia if they are to identify ways in which assessment practices can be made 'fairer' for dyslexic students. Although the literature emphasizes the importance of training and guidance for teachers teaching students with a profile of dyslexia (as outlined in Chapter Two, Section 2.8.2), the teachers in the current study reported that no or little training is provided on how to deal and help students with a profile of dyslexia in the classroom (see Chapter Four, Section 4.3.2). In fact, throughout this study, while working on the assessment protocol, the teachers were engaged by the inspiration of the dyslexia expert as they became aware of some insights and incentives which could increase the integration and participation of students with a profile of dyslexia in class.

The literature gives a variety of views and perspectives regarding what dyslexia is and how it can be identified in the classroom. Most of the research studies (Burden, 2010, Farrugia, 2017, British Dyslexia Association, 2017) describe dyslexia as a learning difficulty that mainly affects reading accuracy, spelling, writing speed and handwriting legibility (see Chapter Two, Section 2.1). As outlined in Chapter Four,

Section 4.3.1, the teachers who participated in this study reported that the dyslexic students they taught had difficulties in reading, writing, spelling, sequencing of ideas and following instructions. Similarly, the two students who participated in the study (as described in Chapter Four, Section 4.3.3) disclosed that they had problems with reading. They reported that words appeared flipped or blurred, they found it hard to keep up with their peers, and spent a longer time to read and answer questions.

As stated in the literature review, the definition of dyslexia adopted in this study was that used by the British Dyslexia Association. This definition (see Chapter Two, Section 2.1) identifies other difficulties with short-term memory, sequencing and numeracy, motor skills, connections as well as emotional and behavioural issues. However, the participants in the current study did not include any of these difficulties as major characteristics of a dyslexic student. For the participants of this study, both teachers and students (see Chapter Four, Section 4.3), dyslexia was a learning difficulty associated mainly with reading and spelling. Although, no generalisations can be made from this conclusion, it gives an insight into the way in which dyslexia is defined by teachers and students in a Maltese classroom context.

The literature (Chapter Two, Section 2.2.6) also reveals the 'other side of the coin' with respect to dyslexia; that is, the strengths of students with a profile of dyslexia (Davis & Braun, 1997). Some of the teachers who participated in the study described dyslexia as a 'gift' (Chapter Four, Section 4.3.1). In fact, such 'gifts' and talents were used to construct alternative assessments. The implication of this finding is that, as argued by Reid and Fawcett (2008, p. 222), "it is crucial that all involved in the education and the development of children and

adults with dyslexia recognise the 'gift' and help all use their abilities to overcome the barriers that confront them in learning and in life".

Although the teachers in this study acknowledged that, as is also found in the literature (Chapter 4, Section 4.3.1), students with a profile of dyslexia had gifts and talents that enabled them to excel in various creative activities, the two students who participated in the study did not seem to recognise their own talents. As outlined in Chapter Four, Section 4.3.3, the dyslexic students who participated in this study talked mostly about their difficulties and challenges rather than the positive aspects of dyslexia. They described the negative consequences they experienced as a result of their dyslexia. These included feelings of degradation, envy towards peers who did not experience similar difficulties, low self-esteem and embarrassment in the presence of peers (see Chapter Four, Section 4.3.3). The two students also expressed their frustration at not being able to put down in writing what they had understood conceptually, as reported in Chapter Four, Section 4.3.3. The feelings and frustrations of the students who participated in the study were similar to those reported on students in other studies. Donnelly (2000), for example, reported that the students in his study "had great ideas in [their] head, but for some reason were unable to put them down on paper" (p. 12).

In light of the literature review and the views shared by the teachers and students who participated in this study, it would seem that there is a vast spectrum of views and perspectives with respect to the term *dyslexia*. Upon reflection, I would argue that 'there is no rainbow without any rain'. Dyslexia can be seen from many different perspectives and can be viewed as a challenge or deficit or a gift. The lens through which

dyslexic students are viewed can determine their success or failure in their learning of Science and Physics in particular.

## **5.2 Assessment and students with a profile of dyslexia**

Current research suggests that students with a profile of dyslexia experience more challenges during assessment practices than students who do not have dyslexia. In fact, Riddell and Weedon (2006) state that:

...dyslexic students pose particular challenges...because of their claims that traditional forms of assessment are fundamentally discriminatory and that the onus lies with the institution to find new forms of assessment which will no longer penalise students with learning difficulties (p. 58).

The results of this study corroborate the views of this international study which states that traditional assessments tend to be disadvantageous for students with a profile of dyslexia. As noted in the next sections, these disadvantages can be observed both in school-based assessment practices and in high-stakes MATSEC examinations.

### *5.2.1 The impact of school-based assessments on students with a dyslexic profile*

According to most of the literature perused in this study (Chapter Two, Section 2.4), assessment is conducted for diagnostic, formative and summative purposes. It is interesting

to note that in this study the participants considered the current school and national assessment practices as mainly summative. This emphasis on summative assessment was also observed in other countries where "some of the more common assessment tasks are examinations, tests and essays" (University of Waikato, 2018, par. 1).

It is of concern in terms of the assessment of students with a profile of dyslexia that although the teachers who participated in the study were aware that written tasks hindered such students they still assessed them in that way. While a number of studies (Reid, 2005, Lyon, Shaywitz & Shaywitz, 2003; Crisp, Johnson & Novakovic, 2012; Stein, 2001) (see Chapter Two) emphasize the importance of formative approaches such as peer assessment, self-assessment and feedback, especially for students with a profile of dyslexia, the participant teachers did not make reference to such tools. Although this finding cannot be generalised to all teachers and to all school-based assessment processes in the country, it sheds light on the predominance of summative assessment practices in schools, which are problematic for dyslexic students.

### *5.2.2 The impact of high-stakes assessments on students with a dyslexic profile*

In the current study, high-stakes examinations are defined as examinations that impact directly on the lives of students (see Chapter Two, Section 2.6). Consequently, the half-yearly, annual and end-of-course examinations (MATSEC) were considered to be high-stakes examinations. The school examinations were considered to be high-stakes because they

determined promotion from one year to another, while the MATSEC examinations determined entry into post-secondary education or the quality of future employment.

In light of the current study, I would argue that the main impact of high-stakes examinations on students with a profile of dyslexia was the great amount of stress and anxiety. This was also found in other studies (for example, Carroll & Iles, 2006, p. 658) which report that students with a profile of dyslexia are “at high risk for anxiety in times of difficulty, stress and frustration”. The two students who participated in this study in fact argued that examinations made them very anxious and their results did not reflect what they really knew. These views are similar to those of the students in a study by Chetcuti et al. (2016).

In the current study it was found that school examinations and high-stakes examinations were stressful events even for the teachers (see Chapter Four, Section 4.4.1.1) since the teachers repeatedly indicated their concern about not knowing how to assess dyslexic students. Of particular concern to the participant teachers was whether they should penalise students when it came to spelling mistakes. This sense of confusion, insecurity and lack of knowledge and training was not reported in international studies. In my view, this finding is important. One of the main difficulties of students with a profile of dyslexia is in fact spelling. As explained by Chetcuti et al. (2016), this can place students running the examinations race at a disadvantage, what they describe as ‘a pebble in the shoe’. The fact that the participant teachers were concerned about the way they were assessing students, and the fact that they were aware of the challenges, suggest that they would be more open to new ideas about assessing students with a profile of dyslexia.

One other finding that emerged from the current study is the strong element of writing skills in high-stakes examinations such as the end-of-course examinations (MATSEC). The main concern expressed by the participant teachers and students (see Chapter Four, Section 4.4.2.2) was that these high-stakes examinations, as the term indicates, were directly linked to future careers and life chances. This is similar to what is reported in the international literature (Scott et al., 2014) as well as in a local study by Chetcuti et al. (2016). The latter quotes a student with a profile of dyslexia: “without good examination results, I will miss out on opportunities because I will not have the necessary qualifications” (p. 40). However, while the participant teachers and the SMT made the point that written examinations did not cater for all students, the MATSEC representative argued (see Chapter Four, Section 4.9.3) that a written examination satisfied three important criteria of reputable assessment: validity, manageability and reliability.

From the perspective of examiners and test developers, the examination is a ‘true’ measure of ability and is consistent over time with as little error as possible (Caines, Bridglall, and Chatterji, 2013). However, from a social justice perspective, ensuring that all students are given the opportunity to show what they know and can do should be a priority in any examination (Elwood, Hopfenback & Baird, 2015).

Therefore, a main implication of this study is that the impact of high-stakes examinations on students with a profile of dyslexia is in most cases debilitating. This is an issue of fairness which was one of the main factors that spurred me to start the current study and to which I shall now turn.

### *5.2.3 Ways of making assessments fairer*

Another strategy of the current research study was to work with the science teachers and SMT in the school where I work to reach the objective of making assessment practices 'fairer' for students with a profile of dyslexia. The overarching theme that emerged from the student and teacher interviews was the message that one form of examination system is not suitable for all students. Like Elwood et al. (2015), the participants argued that the 'one-size-fits-all' system of examinations hinders students to the extent that it could be a violation of their rights.

In the discussion on assessment practices, held to produce a plan of action to improve science assessment practices in the school, the participant teachers voiced the view that differentiated forms of assessment would be 'fairer' for all students and not just students with a profile of dyslexia. Such an assessment system, as explained by Chapman, King and King (2005),

...assist[s] students as their needs occur in daily activities. Individuals receive prompt interventions with specific, corrective feedback as they work. This avoids the pitfalls of failure as students learn to monitor their own work and take more personal control of learning (p. 11).

In fact, the teachers and the students who participated in this study suggested that a 'fairer' assessment system should include a variety of assessment tasks carried out throughout the whole year, with separate weightings that would add up to the final mark given to students at the end of the year (see Chapter Four, Section 4.6.1).

At the same time, the teachers and in particular the SMT were concerned that any changes introduced in the school-based science assessment practices would not be reflected in the MATSEC examinations. The implication of this study is therefore that more debate and discussion needs to be carried out among teachers, SMTs and the MATSEC Board to ensure that there is congruence between school assessment practices and national examinations. Although the teachers and the SMT in the current study favoured the use of a variety of assessment tools, they were concerned that this would not prepare students for the national examinations.

#### *5.2.3.1 Access arrangements and accommodations*

A more traditional approach to ensuring 'fairer' examinations for students with a profile of dyslexia focused on the MATSEC examinations and involved suggestions regarding current access arrangements (accommodations) offered to students during these examinations. In the interviews carried out in this study, it became very evident that there were differing views among the teachers, the SMT, the students and MATSEC official. While the latter mentioned with satisfaction the allocation of various access arrangements which concurred with the local and international literature (Farrugia, 2017, Scott et al., 2014), the other participants expressed their dissatisfaction. In fact, the latter shared the view (see Chapter Four, Section 4.5.1.2) that more concessions should be given to students with a profile of dyslexia.

While the participants of this study were very much in favour of access arrangements, there are mixed views in the literature about them. A number of studies report that

accommodations do help students with a profile of dyslexia (see Chapter Two, Section 2.7.1.3). However, other studies suggest that these pose some disadvantages. Lee and Makeham (2012), for example, suggest that access arrangements are an embarrassment for dyslexic students since they single them out and make them appear different from their peers. These conflicting opinions are also reflected in a local study by Grima and Ventura (2006), who point out that in the Maltese context:

...the special arrangements that are granted depend on the present[ed] condition and its severity. Some stakeholders question the fairness of making special arrangements since these may diminish the integrity of the examination. Others believe that the Board is not generous enough with its provisions (p. 210).

The point which the participant teachers and the SMT tried to make in this study was that some accommodations for students they were suggesting were really simple and could easily be implemented in the MATSEC examinations. These included larger fonts and spacing and the use of highlighters (Farrugia, 2017). However, the MATSEC representative was adamant that there was no research evidence to suggest that these adjustments would actually help the students and furthermore it would incur more expenses for the Board. In his view, accommodations such as the use of highlighting could also facilitate cheating (see Chapter Four, Section 4.5.1.2).

These findings imply that there could be a conflict between the recommendations of students and teachers and the principles of validity, reliability and costings that feature prominently in any decisions taken by examination boards. However, the teachers and the SMT who participated in this study made a strong case that giving all students the opportunity to show

what they know outweighed any flaws in the access arrangements.

## **5.3 Implementing Change**

### *5.3.1 Working together*

The teachers who participated in the study advocated strongly for a change in science assessment practices. They wanted to move away from a traditional school assessment policy that was based solely on written examinations to one that would include a variety of assessment tasks to cater for the different needs of students (see Chapter Four, Section 4.6.1). Like Berry (2008), they believed that “assessment tasks should be flexible to suit different needs” (p. 114). Pertinently, as was reported in Chapter Four, Section 4.7.1, the teachers and the dyslexia expert came up with the idea of developing a resource pack of assessment tasks that assessed learning in different ways. They would also increase the practical component and introduce oral assessment in the examination.

Research suggests that changing a school assessment policy is not an easy process, especially when the change goes against traditional practice (see Chapter Two, Section 2.8.1). However, during the development of the assessment protocol with the other teachers and the dyslexia expert, a calm and collaborative atmosphere was created. This was probably because the participants of the study were strongly in favour of assessment change, and the protocol was not in conflict with inner core principles. The teachers could work together towards developing ‘fairer’ assessment practices in science because, as suggested by Fullan (1993), they worked well

together, they could communicate their feelings, and they felt that their voice was valuable and could make a difference.

Rather than glorifying the end product of the student who succeeded, the proposed protocol developed by the teachers and the dyslexia expert (see Chapter Four, Section 4.7.1) placed greater emphasis on the learning journey. The assessment plan they developed could even be implemented that same scholastic year.

### *5.3.2 Introducing and implementing different types of assessment*

The assessment protocol consisted of a number of diverse strategies based on: (1) more practical activities; (2) oral assessment; (3) IWB Group Quiz; (4) a short written test; (5) Pack Activities; and (6) active class participation. Each assessment was allotted a portion of marks that together amounted to the 100% global mark. I would argue that through the implementation of this strategy, the science teachers could examine the breadth and depth of a variety of science concepts. This strategy is also reported in other studies (Flint & Johnson, 2011; Linn, 1992; Stobart, 2005) which suggest that a holistic assessment of competence and achievement carried out over a longer period of time could be of benefit to the students.

#### *5.3.2.1 Practical Work and IWB quiz*

There are mixed ideas in the literature about practical work and group activities with respect to students with a profile of

dyslexia. Some studies conclude that they hinder students while others found that such activities are of benefit (see Chapter Two, Section 2.3.2). In this study, the teachers seemed to favour the latter view. The participant teachers and students did not consider practical work as too challenging for students with a profile of dyslexia. They believed that practical work helped the dyslexic students to show what they knew.

In fact, they increased the marks allotted to practical work from the present 15% to 30% and also introduced the IWB group quiz with a percentage of 5%. In my view, this showed the commitment of teachers to introduce assessment tools that would help dyslexic students show their true potential. As in Wiliam (2011) (see Chapter Two, Section 2.4.2), the participant teachers believed that when students worked collaboratively they had the opportunity to learn from each other. However, I noted that no suggestion was made by the participants to include IBL activities. Yet, multiple research suggest (The National Research Council, 1996, PRIMAS, 2013, Reid et al., 2004) that IBL activities have many advantages for students especially those with a profile of dyslexia.

The students who participated in the study were also very positive about practical work and quizzes. In their evaluation (reported in Chapter Four, Section 4.8.1.2), students revealed that hands-on activities increased their self-confidence. This was also reported by Ebonhöh (2014), who states that a student with a profile of dyslexia grows in confidence when hands-on experiences are introduced as it helps them learn with much less effort. It also gave students the opportunity to be creative and innovative (Glazzard, 2010).

An important finding in the current study concerns the laboratory report. Participant teachers and students pointed

out that students with a profile of dyslexia tend to encounter problems when writing the report. Similarly, Stonehouse (2008)(see Chapter Two, Section 2.3.2) found that students with a profile of dyslexia dislike writing laboratory reports. This author makes various suggestions to address this problem such as “allowing a student to submit a piece of work on video rather than in writing” (ibid., p. 29).

However, some teachers questioned the fairness of practical assessment and the IWB quiz when carried out in groups (see Chapter Four, Section 4.7.3). Indeed, research studies are divided about this. Frey, Fisher and Everlove (2009) state that a groupwork session “frequently starts out with good intentions but often ends with one or two students taking over and doing the lion’s share of the work while the rest play minor roles” (p. 4). This was in fact the concern expressed by the participant teachers. However, Jaques (2000) believes that this issue can be overcome by careful monitoring by the teacher.

#### *5.3.2.2 Oral assessment*

Another assessment tool which was favoured by the participants in this study was the introduction of oral assessment. It was evident from the results that teachers and the dyslexia expert felt that if at least part of the examination was conducted orally, students with a profile of dyslexia would find it easier to show what they know. The majority of teachers concurred with Huxham et al. (2012) and Armstrong (2009), who maintain that students express themselves better through oral examinations. However, two of the teachers pointed out (see Chapter Two, Section 2.4.3) that oral assessment could

bring with it increased stress levels especially for students with a profile of dyslexia, as reported by Passe (2007). However, eventually all the science teachers favoured the inclusion of oral assessment since from their experience they knew that it could give such students a better opportunity to show what they really knew about the subject (see Chapter Four, Section 4.5.1.1).

At the same time, this study raised a number of issues that have to be taken into consideration when sanctioning oral assessment. They were flagged by the two dyslexic students who participated in the study and these issues had in fact not occurred to the teachers. The students (see Chapter Four, Section 4.6.3.1) insisted that any form of oral assessment should take place only in the presence of the teacher and not that of the whole class as they would otherwise feel shy and embarrassed. Humphreys (2002) argues that the risk of this 'timid behaviour' needs to be acknowledged by teachers. However, other researchers (for example, Mortimore & Dupree, 2008; Reid et al., 2004), suggest that this shyness can be overcome by developing a dyslexic-friendly environment.

In fact, when the oral activities of my study took place each student sat with the examiner on her own and no 'shyness' was evident. Indeed, as reported in Chapter Four, Section 4.8.1.1, this was appreciated by the students. The students were also given some time alone to read the test paper before sitting for the oral activity so that they would be mentally prepared beforehand. This approach is supported by various research studies including that conducted by Tracy (2006).

As a result of this study, science subjects in my school incorporated an oral component in the half-yearly exam as

from this year (2018). This was a positive move towards introducing 'fairer' assessment practices since, as stated by one of the teachers (see Chapter Four, Section 4.7.4), during oral examinations, questions could be discussed with students and clarified. This is also reported in an international study conducted by Huxham et al., (2012) which found that oral examinations give the opportunity to students to clarify any misconceptions related to the questions. They conclude that "oral examinations are more authentic than most types of assessment" (p. 125).

In light of the advantages of 'oral assessment' as found in this study, the possibility of its introduction in the national examinations was discussed with the MATSEC representative. He argued (see Chapter Four, Section 4.9.3) that oral examinations could undermine the principles of validity and reliability. In his view, oral examinations for MATSEC would have to be carried out by a teacher other than the class teacher and this would reduce validity. Furthermore, oral examinations would have to be held on the same day for all students in order to prevent questions being leaked and consequently giving certain students unfair advantage. These views highlight the complexity of the issue and the differences of opinion between practising teachers and examination officials on the matter.

### *5.3.2.3 Participation*

In the new protocol a small percentage (5%) of marks was allotted to active participation in class. 'Participation' includes classwork and homework, oral interaction and skills practice. In this study, the element of participation was highly evident

during the pack activities. Although some studies (Passe, 2013, Carroll & Iles, 2006) suggest that students with a dyslexic profile see participation as a disadvantage, the students who participated in this study were very positive about being assigned marks for participation. I believe this positive attitude was due to the fact that the students considered the Physics classroom as a safe environment. It enabled them to show their potential and learn how to value their own worth. In fact, I felt that they really tried hard to participate during the activities and this was reflected in the mark they obtained, as shown in Table 4 (Chapter Four, Section 4.8.1.3). The students reported that they were feeling valued and that it helped them to increase their participation in class (see Chapter Four, Section 4.8.1.2). An implication of this finding is that a 'dyslexic-friendly' environment is essential in the development of 'fairer' assessment practices for students with a profile of dyslexia.

#### *5.3.2.4 The written test*

The participant teachers, the dyslexia expert and I, also developed a short written test. This was given a substantial portion of the global mark: 30%. This was done to ensure a smooth transition between the traditional examination and the new assessment protocol. Although the participant teachers were very eager to implement new modes of assessment, they were also very much aware that they were part of a community of teachers whose views also needed to be taken into consideration.

### *5.3.3 Some reflections*

It can be concluded that doing one's best to address student individuality in terms of learning styles by means of different tasks and assessments shows respect towards the dignity of students (Pettifor & Saklofske, 2012, cited in Scott, Webber, Lupart, Aitken & Scott, 2014 – see Chapter Two, Section 2.7.1.1). Following some reflection, one would also contend that the new protocol in science subjects assessment should help students with a profile of dyslexia to integrate and enjoy learning more.

The analysis of the results also indicates that the different types of tasks, the introduction of the oral component, and increasing the mark allotment of practical tasks were of benefit to the students. One should also point out that the proposed changes are not extraordinary measures. They were forms of assessments that can be implemented by the teachers themselves. However, they surely left an impact on the students with a profile of dyslexia as the protocol helped them to show their true potential and rebuild their self-confidence, and motivated them enough to increase their participation and interaction in class.

## **5.4 Change: Ticket out the door**

I believe that the action plan developed by the participant science teachers, and in particular the use of different assessment tools throughout the whole year, can be used as a student's 'ticket out the door'. However, for this to occur, change must take place. As argued by Stoll and Fink (2002), one of the important conditions for change to take place is an

understanding of the problem, and this was the first thing that I attempted to do in the current study.

By asking the science teachers and students to share their views on dyslexia and the assessment of students with dyslexia, I provided them with an opportunity to voice their ideas. This prompted the teachers to reflect on and confront what was in fact for them the almost daily challenge of addressing the needs of dyslexic students and what they thought should be changed. The focused interaction of the science teachers among themselves and with other participants, including myself and the dyslexia expert, was a catalyst for change. As outlined in Chapter Four, Section 4.7, once this spark was set off, the teachers worked together and they shared reflections in the focus groups developed and were gradually honed by the constructive criticism of their peers. Change often involves challenges and it can sometimes frighten the people involved (Fullan, 2007). In the context of this study, these challenges affect students, teachers, administrators, examiners and other educators.

#### *5.4.1 Challenges of change in the school context*

Fullan (1993) states that if change is not embraced by all the stakeholders, the process will be more challenging and it can lead to negative consequences. In fact, in the same work, Fullan (1993, p. 12) shows the desire for change agents to be always exposed “to discovering new ends as the journey unfolds”. This means that it is necessary, as mentioned by the Head of School during the focus groups, for all the stakeholders, that is, teachers, students, parents and the senior management team to be on board (Chapter Four,

Section 4.9.1). Challenges can be overcome by a spirit of collaboration among the stakeholders towards a common goal, namely, to improve and make more effective the educational experience of those entrusted into our care, the students.

In the present study, a few participants were initially resistant to the changes recommended by their colleagues. They mentioned issues such as the likelihood that the proposed modifications were more time consuming, that the MATSEC examinations did not reflect the assessment protocol, and the complexity of assessing individual students during group work. However, these issues were all tackled by the discussions of the participants themselves. I would argue that the resistance put up in the beginning was due to the absence of or hasty reflection. As argued by Ely (1999), teachers need "to acquire knowledge and skills, plan for use, adapt, integrate and reflect upon what they are doing" (p.4).

This study also carries a further implication for other educators who are trying to bring about changes in assessment practices and policies in their school. In such situations, all dominant contributors, including teaching, administrative staff, school management teams, students and parents/guardians should have their say. Of these contributors just mentioned, the ones who did not voice their opinions in this study were the parents of students with a profile of dyslexia. This was because my main concern was to develop an action plan with the professional personnel who were most closely involved in the field, namely, the teachers, the dyslexia expert, and the examiner, and I was eager to seek feedback especially from students with a profile of dyslexia. However, if the parents' opinions had also been heard, it could have yielded further insights. According to Borg and Bugeja (2015) "Change has to come from the grassroots; central authorities should work

together with the peripheries to strive towards obtaining the best decisions and arrive at successful conclusions” (p. 8).

#### *5.4.2 Challenges of change at a national level*

The results of the present study including the recommendations made by the teachers were presented to the MATSEC official (see Chapter 4, Section 4.7). The main recommendations were: (1) introducing a variety of assessment tasks and giving more weighting to school-based assessment tasks carried out during the school year; (2) incorporating oral and practical assessment with the written examination; (3) using larger fonts and spacing, and coloured paper including green graph paper instead of black ones.

The first two recommendations require a change in the mindset of the representatives of the MATSEC authorities for them to be implemented. They would be introduced over a period of time after appropriate training sessions for teachers and examiners. The MATSEC representative was very critical of giving more weighting to school-based assessment tasks as in his view it could lead to a number of abuses (see Chapter Four, Section 4.9.3). His arguments against oral assessment were based on reliability and the necessity of sessions taking place on the same day. To counter the first part of this argument, it was suggested that audio recordings of the oral proceedings could be introduced. If necessary, the use of audio recordings can also spread to practical sessions. In terms of using different coloured paper and larger fonts and spacing, it was mainly an issue of time and money. On the other hand, when discussing the graph papers, the MATSEC representative

indicated that this idea would be discussed with his colleagues at MATSEC.

I believe that the benefits for students, especially those with a profile of dyslexia, outweigh all other arguments, which can be watered down to time, money, validity and reliability. Thus it is hoped that different types of assessments in science subjects like those proposed in the assessment protocol can also fit in at a national level.

It is true that these changes will need to take time to be fully accepted. According to Cassar and Bezzina (2005, p. 209), a sustainable long-term change “requires what we call a ‘mental renaissance’; a change which comes from within the person”. These authors propose a model that influences and encourages the individuals to truly experience change rather than remain surrounded by it without being influenced. Guest (1992) argues that for a more enriching response, people influenced by changes must do their utmost to incorporate them in their life. This is a challenge which, as Gretchen (2003) explains, has to be conquered and worked upon as no positive results can be achieved without effort.

On the other hand, short-term changes involve operational modifications, structural as well as renovations (Cassar & Bezzina, 2005, p. 209). Practical changes which do not need considerable effort, such as the school-based assessments proposed in this study, could also be implemented if proper marking schemes and validation checkers are adopted.

Change can be imposed or voluntary (Brummelhuis, 1995). An imposed educational change is initiated by “policy makers, with researchers at their side, attempting to find ways of assisting schools to implement a particular innovation” (p. 25). This type of change is controlled by persons which can be found

high up in the administrative hierarchy. This follows a 'top-down' model of change. On the other hand, voluntary change empowers teachers to practice a sense of ownership, whilst motivating them towards innovation. As argued by Borg and Bugeja (2015)

"these two paths can be experienced simultaneously as central authorities may impose certain changes while schools and teachers in their own classrooms may be introducing their own changes. They can co-exist. Ideally, though, rather than imposition, one needs a system that engages people from all levels when central authorities want to introduce particular changes" (p. 9).

In my view, if the examinations at a national level follow the changes that have been adopted in the school where this study was conducted, teachers will feel more willing to embrace them.

## **5.5 Conclusion**

One of the achievements of this study was that a group of science teachers got together and managed to come up with a number of strategies aimed at making the educational experience of students with dyslexia more satisfying and effective. The assessment protocol produced by this study should make students feel more valued and more confident to make their voices heard in the science classroom. Although the study involved only a small number of participants it provided insights into the complex process of implementing change in a school context.

## **CHAPTER SIX**

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### ***Conclusion***

## **6.1 Summary of findings**

The main aim of this dissertation was to find ways of making the assessment strategies in science subjects 'fairer' for students with a profile of dyslexia by enabling them to show their best potential. I wanted to explore teachers' and students' views regarding dyslexia and current assessment practices and I hoped that by listening to the voice of the teachers and students, and trying to implement some changes in the assessment practices of the school where I teach through a small case study, I would be able to shed some light onto the way in which students with a profile of dyslexia are assessed in science subjects.

The science teachers who participated in the study articulated various ideas about dyslexia. Although they were aware that the characteristics of a dyslexic profile included a number of talents and not only challenges, they mainly looked at dyslexia as a challenge for students that created an obstacle to learning. It was important to understand the context, and the ideas that the teachers and students were bringing with them into the study as these views without doubt influenced the way in which the teachers tried to change their practices. Since the teachers and students viewed the characteristics of dyslexia as being challenging, it was evident in the study that it was not easy for them to acknowledge their limitations and this had an impact on their suggestions and recommendations for 'fairer' assessment practices.

An important finding of the study, was the view of the participant teachers and students with a profile of dyslexia that traditional forms of assessments, such as written examinations, posed a number of challenges for students with a dyslexic profile. The participants were clearly convinced that because of the present

system of formal assessment both in terms of school assessment as well as high stakes examinations, students with a profile of dyslexia were disadvantaged when compared to other students. The participants of the study believed that students with a profile of dyslexia did not start off at the same point as students who had no learning difficulties. Although both the teachers and the students still felt the need for written examinations, they believed that they should be accompanied with other kinds of assessments. The 'one-size-fits-all' assessment system was not compatible with 'fairness'. However, it was agreed that the introduction of new forms of assessment should be supported by the appropriate training of teachers and examiners.

In fact, another main focus of this dissertation was the development of 'an action plan' to introduce 'fairer' assessment practices in science subjects in the school where I teach. What was very evident from the results of the current study was the complexity and nuances involved in trying to change current assessment policies even when restricted to science subjects and in a particular school. The stakeholders (the teachers and administrators), quite predictably, defended their own perspectives of the matter but the discussions held by the teachers in conjunction with a dyslexia expert enabled the participant teachers to consider their own views in a broader context. Moreover, since it became clear that the teachers and the SMT shared the same goal, that of trying to help students with a profile of dyslexia show their best potential, and therefore, the process of change became easier.

A significant outcome of the current study was the implementation of the 'action plan' developed by the participant teachers. This action plan in fact introduced a range of assessment tasks within the science subjects in the school context. It was encouraged to note that the introduction of oral

assessment, practical work and a diverse range of assessment types in class enabled the students' with a profile of dyslexia to show competences that would have otherwise remained unused and unrecognized if tested merely in a written form. The conclusion drawn from this finding reinforces the notion that a written examination on its own does not allow students with a profile of dyslexia to perform at their best. However, the introduction of simple changes such as orally assessing students, and giving students acknowledgement for their class participation had an impact on the achievement of students with a profile of dyslexia.

In spite of the fact that there was a consensus that the changes in the assessment system implemented at school level were successful in their objectives, the teachers and the SMT were also aware that it was much more difficult to implement these changes at MATSEC level. The needs and context of a particular school do not necessarily match those of other schools, not to mention *all* schools at a national level, for which MATSEC has to cater. A further step in the journey initiated by this study should therefore be discussions with the MATSEC board to find out to what degree can the changes in assessment implemented at school level be replicated or reflected at national level.

## **6.2 The main implications of this research study**

The findings of the current study have a number of implications. One of the implications is that although science teachers had a basic understanding of dyslexia and its characteristics, they still needed further training and professional development on how to tackle students with a profile of dyslexia. An implication of this finding is that teachers should be trained regarding dyslexia and

the characteristics of a dyslexic profile and how to work positively with dyslexic students. Such training should take place during Initial Teacher Education and updated from time to time in the continuous professional development that teachers need to attend (Ministry of Education and Employment, 2017). It could also be organised by the school as one of the Community of Professional Educators (CoPE) sessions.

It is also evident from the current study that teachers need to recognize the skills and talents of dyslexic students and use these skills in the teaching, learning and assessment of science subjects. It was clear that the manner and style of teaching and learning left an impact on students with a profile of dyslexia. A clear example brought up by teachers was that students with a profile of dyslexia could often respond orally to questions in class but found it difficult to express that knowledge and understanding in writing. This meant that students with a profile of dyslexia did not find it particularly difficult to communicate verbally but self-expression through writing was much more of a hurdle for them. Therefore, it would be extremely beneficial for students with a profile of dyslexia if they were assessed using different assessment tools and not just writing.

The results of the study also showed that developing 'fairer' assessment practices is a complex issue with many layers both overt and hidden. The study showed for example that while many educators including teachers and examiners consider the allocation of access arrangement to students with a profile of dyslexia as making the assessment practices 'fairer', this is not a complete picture. Although access arrangements do in some way mitigate the disadvantages faced by students with a profile of dyslexia, they do not necessarily allow the students to give a complete picture of all they knew, understood and could do. The implication of this finding is that educators and examiners need

to look deeper into issues of equity and fairness and listen to the voice of the students, when taking decisions regarding assessment practices.

Accordingly, the study introduced different forms of assessment strategies in the school where I taught to cater for students with dyslexia in science subjects. The proposed protocol contained strategies such as the use of oral assessment. Moreover, the teachers benefitted from a clearer picture of the notion of fairness as a result of the focus group discussions. This could motivate them further to implement and further strengthen the strategies in the assessment protocol. Indeed, as teachers repeatedly affirmed their belief in the principle of fairness, they were responsive to the feedback from the students and thus they became better informed on ways of putting this principle into practice.

It was evident that oral and practical assessments did help students with a profile of dyslexia to show their potential. This implies that the incorporation of such assessments by other teachers in their schools could help them discover their students' strengths. Class-based activities such as the assessment pack and the IWB quiz, as well as day-to-day participation in class should play a role in assessment strategies. The only resistance to such measures occurred during the focus groups when some of the teachers expressed their doubts on the possibility of assessing individual students reliably during group work. This is admittedly a complicated evaluation task that has to be addressed. One possibility is to assign two teachers to be present in the classroom during group work assessment. One of the teachers would direct the group work session while the other would observe the group interaction and performance and assess the contribution of each student.

Thanks to this study, the participating teachers became more aware of the fact that students with dyslexia too had potential and it was worth making efforts and taking measures in order to be able to develop and evaluate that potential. Even more, the futility of labelling students became more obvious, especially when it was based on the traditional 'one-size fits-all' assessment system. I strongly believe that the modified assessment protocol was one step further towards helping students with dyslexia show what they know and ensuring that their attainment matched their potential. This in turn helped them realise that failure was not an option and eased any anxiety that they experienced in traditional assessment tasks.

Lastly, in this study it was also evident that change is not an easy process. However, the experience of this research study has shown that the process of change can be made easier if all the educators shared the same goals and passion about getting it right for the sake of the students. It also helped that the teachers and the SMT were aware that the assessment system that had been in place did not cater for all the students and so they did not need any further persuasion about the matter. So the need for change was a collective disposition among the participants.

### **6.3 The limitations of this study**

The choice of my own school as the site of investigation saved me time and facilitated access which in turn enabled me to explore the subject in more depth. However, like any other research, this study also has its limitations. The views of parents, which might have given further insights into the matter, do not

feature in this study, as its focus was mainly on the teachers, administrators and students.

Also, although this study was mainly focused on students with a profile of dyslexia, it could have helped if enough time was granted to interview and explore the rest of the students' opinions and ideas about the alternative types of assessments which were introduced throughout this study.

Moreover, although informal meetings with teachers indicated that they felt that the assessment protocol was generally successful in its aims, another formal focus group meeting would have allowed each teacher more time to evaluate the protocol in greater detail. As a result, this can be considered as a starting point for further studies to be carried out on the subject.

## **6.4 Recommendations and directions for future research**

Back in 2005, Cassar and Bezzina argue that change is a necessity in our schools as society itself is rapidly changing. Therefore, other similar studies could focus on subjects other than science so as to examine any similarities or differences of the changes being implemented. Case studies on the development of assessment protocols applicable to more than one subject could also be conducted. Having said this, it would be ideal and interesting to explore whether the same types of assessments which proved effective with students with dyslexia in science would be equally effective or different in other subjects. Such studies will be analysed together with the conclusions of this study.

A similar study could be conducted involving the addition of other stakeholders to the range of participants. Such participants could have been the parents of students with a profile of dyslexia because their views could bring further insights into the topic. In this case, maybe questionnaires involving open-ended questions could be used to explore the parents' views about dyslexia, their daughter's/son's day-to-day struggles which they encounter with and the 'gifts' that they believe they have as well as what they are most concerned and worried about their children both academically as well as in their personal life.

Additionally, although I believe that a saturation point was achieved in this study, the views of students from different levels of secondary education would also be interesting as it could have enabled a comparison between the levels. Moreover, a larger number of cohort could also continue to shed light on the importance of inclusion of all the students present in class. Lastly, what I would find curious and fascinating as a future research would be the incorporation of grown-ups who decided to opt for the work life instead of the continuation of student life due to the fact that our current assessment system do not cater and help students with a profile of dyslexia to fully overcome the obstacles which dyslexia brings with it.

## **6.5 Final reflections on my research**

Throughout this journey as a researcher, I feel I have benefited not only in terms of expertise but also in many other ways both personal and professional. Working with colleagues and school administrators required a sustained spirit of collaboration and the sense of mutual respect if all that work was to bear any fruit. I also learned to empathise with the views of other professionals

holding positions different from mine even though I may have disagreed with those same views.

All experience is subjective and what may seem obvious to one is not to others, and the other way round. Professionals in different roles often follow different priorities and I learnt in this project that finding a common ground and establishing identical goals as early as possible improves drastically the chances of success. And as in many other cases, my experience of this project has confirmed that when there is teamwork, its achievement is greater than the sum of its parts. The successful outcome of this project could inspire other groups of teachers in other schools to team up and implement positive change in their own schools. I was also happy to note that, thanks to the collective effort and mutual respect involved in this study, my bond with the rest of the school staff has been consolidated.

This research study has also strengthened my resolve to be a reflective professional. Teachers, especially, have to reflect continuously on their practice because the danger and temptation of fossilisation is always round the corner. I would rather be a teacher with a learning curve of twenty years' experience than a teacher who has been giving the same lessons for twenty years. This positive attitude towards change is not only desirable but necessary. Augustine (2000) quotes Charles Darwin's warning that "it is not the strongest of the species that survives, nor the most intelligent. Rather, it is the one that is most adaptable to change" (p. 18).

## **6.6 Concluding thoughts**

I believe that one of the strengths of this research study was that all the participants took their involvement in the study

seriously and all of us worked hard to develop an assessment protocol that helped students in general and those with a profile of dyslexia in particular. Apart from the two students, a good range of professionals involved in this aspect of education participated in this study.

I believe that the introduction of different types of assessments to be conducted throughout the year can ease the anxiety and stress that school-based and MATSEC examinations bring with them. All educators know that learning is meaningful when students enjoy the journey of the learning experience and not when faced with written examinations.

On a final note, it is hoped that this study, alongside others, will help to eliminate the view that may still persist in some parts of society that dyslexia is purely problematic. Children with dyslexia can indeed outshine others in certain skills and knowledge and, as in the case of other children, it is the duty and the goal of educators to help them develop their gifts. Then one can truly say that a level playing field has been established: we, as educators will be bystanders no more.

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## ***Appendices***

## ***Appendix A***

FREC Proposal Form and Approval

M. Ed Dissertation Proposal Form

Permission to write this thesis in a dyslexic-friendly format

**FREC Proposal Form**

Applicant's email: [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt)

Index No: EDU/088/17

**UNIVERSITY OF MALTA**

**UNIVERSITY RESEARCH ETHICS COMMITTEE**

***Check list to be included with UREC Proposal Form***

Please make sure to tick **ALL** the items. Incomplete forms will not be accepted

		<b>YES</b>	<b>NOT APP.</b>
1a.	Recruitment letter/ information sheet for subjects, in English	✓	
1b.	Recruitment letter/ information sheet for subjects , in Maltese	✓	
2a.	Consent form, in English, signed by supervisor, and including your contact details	✓	
2b.	Consent form, in Maltese, signed by supervisor and including your contact details		✓

3a.	In the case of children or other vulnerable groups, consent forms for parents/guardians, in English	✓	
3b.	In the case of children or other vulnerable groups, consent forms for parents/guardians, in Maltese	✓	
4a.	Tests, questionnaires, interview or focus group questions, etc in English	✓	
4b.	Tests, questionnaires, interview or focus group questions, etc in Maltese	✓	
5a.	Other institutional approval for access to subjects: Health Division, Directorate for Quality and Standards in Education, Department of Public Health, Curia...	✓	
5d.	Other institutional approval for access of data: Registrar, Data		✓

	Protection Officer Health Division/ Hospital, Directorate for Quality and Standards in Education, Department of Public Health...		
5c.	Approval from Person Directly responsible for subjects: Medical Consultants, Nursing Officers, Head of School	✓	

Received by Faculty Office on	
Discussed by Faculty Research Ethics Committee on	
Discussed by University Research Ethics Committee on	

## UNIVERSITY OF MALTA

### Request for Approval of Human Subjects Research

Please type. Handwritten forms will not be accepted.

<p>FROM: (<i>name, address for correspondence</i>)</p> <p>Name: Marouska Cauchi</p> <p>Address: Marben's Santorini</p> <p style="text-align: center;">Ghajn Tuta Street, Kercem Gozo, KCM 1262</p>	<p>PROJECT TITLE:</p> <p>Bystanders No more: Science assessment strategies for students with a profile of dyslexia.</p>
<p>TELEPHONE: 21551415</p>	
<p>EMAIL: marouska.borg.11@um.edu. mt</p>	
<p>COURSE AND YEAR:</p> <p>M.Ed in Science Education [2016-2019] (second year)</p>	
<p>DURATION OF ENTIRE PROJECT:</p> <p>From September, 2017</p> <p>To May, 2019</p>	<p>FACULTY SUPERVISOR'S NAME AND EMAIL:</p> <p>Deborah A. Chetcuti</p> <p>deborah.chetcuti@um.edu. mt</p>

ANTICIPATED FUNDING SOURCE:

*(Include grant or contact number if known)*

Not Applicable

1. Please give a brief summary of the purpose of the research, in non-technical language.

The aim of this dissertation is to identify current needs and gaps in assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in science. The purpose of this research is to:

- Explore the participant teachers' views on dyslexia;
- Develop assessment strategies for students with a profile of dyslexia;
- Implement these assessment strategies with dyslexic students;
- Obtain feedback from Senior Management regarding the strategies;
- Review these strategies in light of feedback obtained;
- Develop a set of recommendations regarding 'fairer' assessment practices for students with a profile of dyslexia and present it to the director of the MATSEC Support Unit.

2. Give details of procedures that relate to subjects' participation

(a) How are subjects recruited? What inducement is offered?  
*(Append copy of letter or advertisement or poster, if any.)*

After being granted the permission from the Church School Secretariat and the Head of School where I am currently teaching, I will ask the Head of School to distribute the information letters to all participants. Participants include: Senior Management team, science teachers, parents and students with a profile of dyslexia.

Seven science Teachers (physics, integrated science, chemistry and biology).

The science teachers in the school will be recruited on a voluntary basis following an information session regarding the study. The members of the Senior Management team will also be asked to participate in the study on a voluntary basis, always with the consent of the Head of School.

Two Students with a profile of dyslexia

The dyslexic students will be chosen depending on whether they have been identified as being dyslexic and stated by a psychologist. Once the dyslexic students are identified, the parents of the dyslexic students will be contacted and informed about the study. The students will also be asked if they are interested in the study and asked whether they would like to participate in the study on a voluntary basis.

Information letters and consent forms are also distributed to one dyslexia expert and the director of MATSEC. They will also be recruited on a voluntary basis following an information session regarding the study.

(b) Salient characteristics of subjects – number who will participate, age range, sex, institutional affiliation, other special criteria:

The study will take place in an all girls Church school. These are the people who will be participating in my research study:

Head of school and two assistant heads;

Seven science teachers: both males and females. sciences including: integrated science, physics, chemistry and biology;

Two Form 4 students with dyslexia, both females having an

age range between 14-15 years;

Dyslexia expert;

MATSEC representative.

(c) Describe how permission has been obtained from cooperating institution(s) – school, hospital, organization, prison, or other relevant organization (*append letters*). Is the approval of another Research Ethics Committee required?

An information letter will be sent to the church school secretariat and after permission is granted, I will seek for the permission from the Head of School. The Head of School will distribute the information sheets and consents to the participants.

(d) What do subjects do, or what is done to them, or what information is gathered? (*Append copies of instructions or tests or questionnaires*) How many times will observations, test, etc., be conducted? How long will their participation take?

Focus group 1: science teachers: This first focus group interview will seek to examine what science teachers know about the term dyslexia, whether they use any specific teaching methods as well as any specific forms of assessments for children with dyslexia, and how they think such students could learn and perform better in examinations. This focus group will be carried out according to the timetable that will be discussed and finalised with the Head of School. The duration of this focus group session will be around 40 minutes. Audio-recordings will be undertaken and participants will be notified beforehand. Quotes can also be extracted but all the data will be anonymised. This focus group session can take place in one of the empty classes of the school.

Professional Development Session: science teachers and a dyslexia expert: With the help of a dyslexia expert, the objective of the session will be to produce an action plan aimed at tackling the assessment of students with dyslexia in our classrooms. This professional development session will be carried out according to the timetable that will be discussed and finalised with the Head of School. The duration of this session will be around 1 hour 20 minutes. Audio-recordings will be undertaken and participants will be notified beforehand. Quotes can also be extracted but all the data will be anonymised. This focus group session can take place in one of the empty classes of the school.

Interview 1: One short interview with the two students with a profile of dyslexia is carried out to be aware of students with dyslexia feel with the current traditional assessment strategies. This interview will be carried out on a Wednesday as on such day, students have a longer break. The duration of this interview session will be around 10-15 minutes. Audio-recordings will be undertaken and participants will be notified beforehand. Quotes can also be extracted but all the data will be anonymised. This session can take place in one of the empty classes/labs of the school.

The assessment strategies developed by the science team will be implemented in my physics classroom. The assessment strategies will be used with the two students with dyslexia who will be participating in the study together with the rest of the classroom. During this implementation, I will be writing reflective journals with respect to the observation of the students with a profile of dyslexia. Moreover, any comments or responses will also be collected from them.

Interview 2: Following the implementation of the assessment

action plan, another short interview will be carried out so that some feedback from students with dyslexia will be gathered. Such feedback will be based upon certain aspects such as: how they dealt with the topic, what activity they liked most and which activity and assessment they understood most and so on. The feedback will be used to fine tune the assessment strategies and the action plan developed by the science teachers participating in the study. This interview will be carried out on a Wednesday as on such day, students have a longer break. The duration of this interview session will be around 10-15 minutes. Audio-recordings will be undertaken and participants will be notified beforehand. Quotes can also be extracted but all the data will be anonymised. This session can take place in one of the empty classes/labs of the school.

Focus Group 2: science teachers and SMT: During this focus group interview, I will present my results. This will enable me to fine tune the action plan and discuss any feedback regarding the strategies given from the SMT and the science teachers. If teachers wish to write any reflections on how they felt during the focus groups, they may also do so. Assessment strategies will be reviewed in light of the feedback obtained. This focus group will be carried out according to the timetable that will be discussed and finalised with the Head of School. The duration of this focus group session will be around 40 minutes. Audio-recordings will be undertaken and participants will be notified beforehand. Quotes can also be extracted but all the data will be anonymised. This focus group session can take place in one of the empty classes of the school.

Focus Group 3: The final recommendations will be also be formulated and finalised by myself. Thus, a set of recommendations regarding 'fairer' assessment for students

with a profile of dyslexia will be presented and discussed with the director of MATSEC.

See also attached 'list of questions' to be used during the focus groups/interviews.

(e) Which of the following data categories are collected? Please tick where appropriate.

Data that reveals:

Race and ethnic origin	No
------------------------	----

Political opinions	No
--------------------	----

Religious and philosophical beliefs	No
-------------------------------------	----

Trade union memberships	No
-------------------------	----

Health	No
--------	----

Sex life	No
----------	----

Genetic information	No
---------------------	----

3. How do you explain the research to subjects and obtain their informed consent to participate? (*If in writing, append a copy of consent form.*) If subjects are minors, mentally infirm, or otherwise not legally competent to consent to participation, how is their assent obtained and from whom is proxy consent obtained? How is it made clear to subjects that they can quit the study at any time?

An appointment will be set with the Head of school and an information sheet and consent form will be given. A letter will be sent to the senior management and the teachers including what this study involves and what they are entitled to do. A consent form will be given by hand to those who agree to participate in my study.

As some of the participants are minors, parents need give their consent to participate. Thus, the Head of school is to contact the parents of the two students participants and if they agree, a meeting will be set. After a meeting with the Head of school, parents are also asked to sign the consent forms for their daughter's participation. In the consent forms, participants will be informed that they can withdraw at any stage during the research work being undertaken.

4. Do subjects risk *any* harm – physical/ psychological/ legal/ social – by participating in the research? Are the risks necessary? What safeguards do you take to minimize the risks?

No risk envisaged. All participants will be informed as to the reasons behind the study and how it would be conducted. They will also be informed that they can withdraw at any stage during the research work being undertaken. It is also good to point out that assessment strategies will be implemented to

the whole Physics class, thus meaning that students with a profile of dyslexia will not be singled out during the conduction of the case study. However no data such as comments or responses from the rest of the class will be gathered.

Moreover, for the short interviews held with the students with a profile of dyslexia, I will ask them to come during the longer break held on Wednesday. I will ask them privately and let them know that I need to speak to them after the lesson. Due to the fact that I ask different students to come during any break to help them revise or let them know where they can improve their work and so on, I will not be stigmatizing the students with a profile of dyslexia. I will also ask them to come for the interviews in pairs. One of the reasons would be due to ethical issues and secondly, they will feel more at ease and encourage each other to participate. I will be having a senior member of staff such as an Assistant Head reviewing the assessment tasks and also making sure that no pressure to participate is done on the students with a profile of dyslexia and to ensure that no stigmatisation is done.

5. Are subjects deliberately deceived in *any* way? If so, what is the nature of the deception? Is it likely to be significant to subjects? Is there any other way to conduct the research that would not involve deception, and, if so, why have you not chosen that alternative? What explanation for the deception do you give to subjects following their participation?

No. All participants will be informed by the way information is being gathered and what will be done with it.

6. How will participation in this research benefit subjects? If subjects will be 'debriefed' or receive information about the research project following its conclusion, how do you ensure

the educational value of the process? (*Include copies of any debriefing or educational materials*)

The subjects will benefit when participating in this study throughout these experiences, many opinions and ideas are shared. The discussions raised will indirectly offer moral support to those participants. Additionally, those subjects who come with a blurred perspective of what students with dyslexia go throughout their educational journey, will improve and alter their mentality towards a successful and different assessment implementation which they can adopt themselves in the classroom. Apart from this, if these assessments will help students with dyslexia flourish, other students will surely benefit too. Moreover the finding and recommendations of this study will be discussed and shared with the school leaders and the MATSEC officials.

Through this study I believe that all the participants will benefit. Teachers together with Senior Management and MATSEC director will be more aware of the current needs and gaps in assessment strategies for students with dyslexia. They will identify some assessment strategies which are currently lack form our educational system. Moreover, students with dyslexia will benefit from this research as different assessment strategies apart from those traditional, could help them achieve their goals and potential in science.

#### TERMS AND CONDITIONS FOR APPROVAL IN TERMS OF THE DATA PROTECTION ACT

- Personal data shall only be collected and processed for the specific research purpose.
- The data shall be adequate, relevant and not excessive in relation to the processing purpose.
- All reasonable measures shall be taken to ensure the correctness of personal data
- Personal data shall not be disclosed to third parties and may

only be required by the University or the Supervisor for verification purposes. All necessary measures shall be implemented to ensure confidentiality and where possible, data shall be anonymized.

- Unless otherwise authorized by the University Research Ethics Committee, the researcher shall obtain the consent from the data subject (respondent) and provide him with the following information: The researcher's identity and habitual residence, the purpose of processing and the recipients to whom personal data may be disclosed. The data subject shall also be informed about his rights to access, rectify, and where applicable erase the data concerning him.

I, the undersigned hereby undertake to abide by the terms and conditions for approval as attached to this application.

I, the undersigned, also give my consent to the University of Malta's Research Ethics Committee to process my personal data for the purpose of evaluating my request and other matters related to this application. I also understand that, I can request in writing a copy of my personal information. I shall also request rectification, blocking or erasure of such personal data that has not been processed in accordance with the Act.

Signature:

APPLICANT'S SIGNATURE:

*I hereby declare that I will not start my research on human subjects before UREC approval*

FACULTY SUPERVISOR'S SIGNATURE

*I have reviewed this completed application and I am satisfied with the adequacy of the proposed research design and the measures proposed for the protection of human*

DATE	<i>subjects.</i>  DATE
------	------------------------------

***To be completed by Faculty Research Ethics Committee***

We have examined the above proposal and advise

**Acceptance**  
**Conditional Acceptance**

**Refusal**

For the following reason/s:

Signature:

Date:

***To be completed by University Research Ethics  
Committee***

We have examined the above proposal and advise

**Acceptance**  
**Conditional Acceptance**

**Refusal**

For the following reason/s:

Signature:

Date:

## ***Approval from FREC***

Dear Ms Cauchi,

In line with new procedures adopted by the University Research Ethics Committee on 1<sup>st</sup> December 2017 ([www.um.edu.mt/urec](http://www.um.edu.mt/urec)), please be informed that your Research Ethics Proposal EDU/088/17 '*Bystanders no more: Science assessment strategies for students with a profile of dyslexia*', does not need to be sent to UREC for final approval. Acceptance by FREC will suffice.

### **You may now start collecting your data.**

I will let you know when your file becomes available so that you can come and collect the original documents from my office (temporary office Room 311 Faculty of MaKS) in due course.

Thanks and regards

Isabelle Warrington

Secretary

Faculty Research Ethics Committee

f/Dr Marie Therese Farrugia

## M. Ed Dissertation Proposal Form

	<b>UNIVERSITY OF MALTA</b> Faculty of Education	<b>M.Ed Dissertation Proposal Form</b>							
<b>Date</b>			<b>Course Title and Years</b>			<b>Proposal Number</b>			
Day 29 <sup>th</sup>	Month August	Year 2017	<b>Title</b> M.Ed in Science Education	<b>Years</b> 3 (2016-2019)	1 <sup>st</sup> x	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	

Student's Particulars			
Name (block letters) MAROUSKA CAUCHI		Tel 21551415	Email marouska.borg.11@um.edu.mt
Address Marben's Santorini, Ghajn Tuta Street, Kercem Gozo		Mob 99271625	Signature
Supervisor's Particulars			
Name (block letters) PROF. DEBORAH CHETCUTI		Tel 99841262	Fax
Faculty/Junior college	Dept/Institute	Full time/Part-time/Visiting Part-time/External**  Full-time Faculty of Education Department of Mathematics and Science Education	Email deborah.chetcuti@um.edu.mt
Address (to be completed only by Part-time/ Visiting Part-time/ External supervisor)			Signature

\*External Supervisor to submit CV with this form

Advisor's ^ Particulars			
Name (block letters)		Tel	Fax
Faculty/Junior college	Dept/Institute	Full time/Part-time/Visiting Part-	Email
Address (to be completed only by Part-time/ Visiting Part-time/ External advisor)			Signature

\* Where applicable, \*\*External Advisor to submit CV with this form.

University Research Ethic Committee (UREC) / Faculty of Education Research Ethics Committee (FREC)			
Request for Approval of Human Subjects Research Form		Faculty of Education Research Ethics Committee Consent Form	
<input type="checkbox"/> has been submitted	<input checked="" type="checkbox"/> is to be submitted	<input type="checkbox"/> has been submitted	<input checked="" type="checkbox"/> is to be submitted

FOR OFFICIAL USE		
Your dissertation proposal:		
<input type="checkbox"/> has been accepted	<input type="checkbox"/> has been rejected	<input type="checkbox"/> is to be amended as remarked
Chairperson (M.Ed Board of Studies)	Date:	

**Proposed title of dissertation**

Not more than more 15 words.

Bystanders No More: Science assessment strategies for students with a profile of dyslexia.

**Dissertation proposal (to be included on separate sheets)**

*The dissertation proposal should be approximately 1,500 words in length and should include the following:*

- An introduction of the issue/s to be investigated.
- The objectives and research / project hypothesis.
- A brief review of the literature.
- A **clear explanation of the methodology** of the study, including whether the research / project is mainly of a quantitative or qualitative nature.
- Brief information regarding expectations and possible results.
- An indication regarding the **time frame and different phases** of the research / project.
- A clear indication as to whether ethical issues are involved in the topic under investigation.
- A selective bibliography.

*NB: The dissertation proposal **must** be signed by the supervisor and by the M.Ed. course coordinator.*

**Description of research methods to be applied**

Tick one or more of the following:

X	Action research	
	Historical documents	
	Resources/ Software Development	
X	Interviews	Approx. sample size 2 interviews 2 focus groups
X	Case Studies	Approx. sample size 1
	Questionnaires	Approx. sample size
	Standardised tests	Approx. sample size
	Others (please specify) One Professional Development Session One Discussion Session	

Brief description:  
The research project mainly uses a qualitative approach as data will be gathered through focus group interviews. In the process of planning, acting and observing during the implementation of the action plan, as well as during the collection of data from the different stakeholders, I will be adopting an action research approach. A small case study approach will also be adopted as a number of students, including those with dyslexia, will be asked to carry out an action plan based on a discussion by Science teachers and an expert on dyslexia. The study will be held in a local Church school in Gozo with seven Science teachers and two students with a profile of dyslexia. An expert of dyslexia will also be asked to participate in our focus groups to help us develop assessment strategies which could help fairness for all students to flourish. The action research spiral process consists of:

- one focus group interview with seven Science teachers;
- one interview to two students with a profile of dyslexia
- a professional development session with the above mentioned science teachers and a dyslexic expert
- the implementation of the action plan which was discussed during the PD session (case study).
- another interview to two students with a profile of dyslexia
- one focus group with SMT and science teachers
- one discussion session with the MATSEC officials.

**Languages of dissertation**

Write down the language to be used in the main text and any other languages:

1 Main: English	2 In some of the transcripts: Maltese	3
--------------------	--	---

**Keywords**

Write 3 – 6 keywords related to the content of the dissertation:

1 Dyslexia	2 Students	3 Fairness
4 Assessment	5 Science	6 Education

***Permission to write this thesis in a dyslexic-friendly format***

Dear Marouska,

Your request has been approved and is supported by the M.Ed. Board of Studies. I wish you all the best in your research work.

Best regards,

Charles Bonello

## ***Appendix B***

Permission letter to the Church School Secretariat

Approval from the Church School Secretariat

## ***Permission letter to the Church School Secretariat***

Dear Secretariat,

My name is Marouska Cauchi and I am currently a second year M. Ed student in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on the development of assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in Science. The purpose of this research is to explore the views of a group of science teachers' who teach science subjects together with me at a girls' church school in the Maltese Islands, about dyslexia and the assessment of students with a profile of dyslexia.

As part of the study, I would like to work with these science teachers to develop assessment strategies for students with a profile of dyslexia; obtain feedback from the students, Senior Management team and MATSEC officials regarding the strategies; as well as to develop a set of recommendations for policy makers regarding 'fairer' assessment practices for students with a profile of dyslexia.

I am seeking your permission so that I can carry out this research study at the school where I teach; (name of school). The study will involve carrying out two focus group interviews and a professional development session with the team of science teachers (seven teachers); a focus group interview with the Senior Management team including the Head of School; two interviews with two dyslexic students who have been stated by the school psychologist.

Each focus group interview and interviews with students with a profile of dyslexia will be audio-recorded and will take forty

minutes and ten to fifteen minutes respectively. The professional development session will take one hour twenty minutes.

Should you be so kind as to give your permission to carry out this research study, all participants will be informed about the research, asked whether they would like to participate in the study on a voluntary basis and their informed consent to participate in the study obtained. They will be aware that all data gathered will be anonymised and data collection will be carried out in a fair and transparent manner.

Participants can withdraw from the study at any stage. Audio-recording will be stored securely and destroyed once the dissertation is over. The name of the school will not be divulged to third parties except to my supervisor. Throughout the study, care will be taken that no harm will come to the students who will participate in the study and that all the teachers and senior management who agree to participate in the study will be treated with respect and as collaborators in the research process. All ethical considerations will be adhered to.

I believe that the study is of importance as through the views of the teachers I will be able to identify assessment strategies that will be able to benefit students with a profile of dyslexia and also enable science teachers and senior management to become more assessment literate especially in relation to the assessment of students with a profile of dyslexia.

Your assistance and support will be greatly appreciated and I look forward to receiving your permission to carry out the study. Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

Thanking you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi  
Master of Education in Science Education  
Faculty of Education, University of Malta

***Approval from the Church School Secretariat***

Dear Ms Cauchi

I am very pleased to inform you that you have been granted permission to conduct your research, on the development of assessment strategies that can help students with a profile of dyslexia to achieve their goals and potential in science, as part fulfilment of your studies leading to a Master Degree in Science Education with the University of Malta.

Please do not hesitate to contact me should you need further assistance.

With best wishes for your studies.

Dr Rose Anne Cuschieri  
Director for Educational Services in Church Schools  
Secretariat for Catholic Education  
16 The Mall, Floriana  
Tel: 27790060

## ***Appendix C***

Permission letter to Head of School

Approval from the Head of School

## ***Permission letter to Head of School***

Dear Head of School,

My name is Marouska Cauchi and I am currently a second year M. Ed student in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on the development of assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in Science. The purpose of this research is to explore the views of a group of science teachers' who teach science subjects together with me at a girls' church school in the Maltese Islands, about dyslexia and the assessment of students with a profile of dyslexia. As part of the study, I would like to work with these science teachers to develop assessment strategies for students with a profile of dyslexia; obtain feedback from the students, Senior Management team and MATSEC officials regarding the strategies; as well as to develop a set of recommendations for policy makers regarding 'fairer' assessment practices for students with a profile of dyslexia.

I am seeking your permission so that I can carry out this research study at the school which is under your supervision and where I teach that is Saint Clemson Secondary School. The study will involve carrying out two focus group interviews and a professional development session with the team of science teachers (seven teachers); a focus group interview with the Senior Management team including the Head of School; two interviews with two dyslexic students who have been stated by the school psychologist. Each focus group interview and interviews with students with a profile of dyslexia will be audio-recorded and will take forty minutes and ten to

fifteen minutes respectively. The professional development session will take one hour twenty minutes.

Should you be so kind as to give your permission to carry out this research study, all participants will be informed about the research, asked whether they would like to participate in the study on a voluntary basis and their informed consent to participate in the study obtained. They will be aware that all data gathered will be anonymised and data collection will be carried out in a fair and transparent manner. Participants can withdraw from the study at any stage. Audio-recording will be stored securely and destroyed once the dissertation is over. The name of the school will not be divulged to third parties except to my supervisor. Throughout the study, care will be taken that no harm will come to the students who will participate in the study and that all the teachers and senior management who agree to participate in the study will be treated with respect and as collaborators in the research process. All ethical considerations will be adhered to.

Throughout the study, care will be taken that no harm will come to the students who will participate in the study and that all the teachers and senior management who agree to participate in the study will be treated with respect and as collaborators in the research process. All ethical considerations will be adhered to.

I believe that the study is of importance as through the views of the teachers I will be able to identify assessment strategies that will be able to benefit students with a profile of dyslexia and also enable science teachers and senior management to become more assessment literate especially in relation to the assessment of students with a profile of dyslexia.

Your assistance and support will be greatly appreciated and I look forward to receiving your permission to carry out the study.

Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

Thanking you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education  
Faculty of Education  
University of Malta

### ***Approval from the Head of School***

Dear Ms Cauchi,

I hereby grant you permission to carry out your research on the development of assessment strategies to assist students with a profile of dyslexia achieve their potential in Science, within our school community.

I wish you the best of luck in your studies and would be interested in learning more about the outcomes of such research.

Kind regards

Head of School

Saint Clemson Secondary School

## ***Appendix D***

Information letter to Head of School and  
SMT members

Consent form to Head of School and SMT  
members

## ***Information letter to Head of School and SMT members***

Dear Sir/Madam,

My name is Marouska Cauchi and I am currently a second year M. Ed student in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on the development of assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in Science. The purpose of this research is to explore the views of a group of science teachers' who teach science subjects together with me at a girls' church school in the Maltese Islands, about dyslexia and the assessment of students with a profile of dyslexia. As part of the study, I would like to work with science teachers to develop assessment strategies for students with a profile of dyslexia; obtain feedback from the students, Senior Management team and MATSEC officials regarding the strategies; as well as to develop a set of recommendations for policy makers regarding 'fairer' assessment practices for students with a profile of dyslexia.

I would like to enquire whether it is possible to ask for your participation in this study which will involve one focus group session of approximately forty minutes duration. Your participation is voluntary and your role is to discuss with the researcher the findings and recommendations to help the teachers including myself to develop 'fairer' assessment strategies which can be implemented for students with a profile of dyslexia.

With your permission, the focus group interview will be audio recorded to facilitate collection of data and later transcription for analysis. However, the identity will be completely confidential and

anonymous quotations may be used and data collection will be carried out in a fair and transparent manner. Audio-recorded data will be destroyed after my graduation and I do not intend to use it for any other research. I would also like to assure you that all ethical considerations will be adhered to and that there are no known or anticipated risks to you as a participant in this study. Your participation is voluntary and you may decline to answer any of the interview questions or withdraw from this study at any time if you so wish.

Your assistance and support will be greatly appreciated and I look forward to speaking with you so as to carry out the study. If you wish to participate in this research, kindly fill in the attached consent form and give it to me one week from the date you received this sheet. Thereafter, I will be contacting you to set an appointment for the session. Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

I very much look forward to working with you and whilst I thank you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education  
Faculty of Education  
University of Malta

**Consent form to Head of School and SMT members**

I, the undersigned have read the information sheet presented by Ms. Marouska Cauchi who is reading a master’s degree course in science education at the University of Malta. I understand that she needs to conduct part of her research; “Bystanders No More: Science assessment strategies for students with a profile of dyslexia” in her school.

I have been given the opportunity to take part in a focus group session, being approximately 40 minute duration. I am aware that the session will be audio recorded to ensure an accurate recording of my responses. I am also aware that any excerpts from the session will be written in the dissertation. However quotations will also be anonymous.

I understand that Ms. Marouska Cauchi will abide by the following conditions:

- All data gathered will be anonymised;
- Data collection will be carried out in a fair and transparent manner;
- Participants can withdraw from the study at any stage without giving a reason or suffering any negative consequence;
- Audio- recording will be stored securely and destroyed once the dissertation is over.

-----  
*Acceptance for Study:*

I understand that I am agreeing by my signature on this form, to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Name of SMT \_\_\_\_\_  
SMT e-mail address: \_\_\_\_\_  
Area of profession: Head/Assistant Head: \_\_\_\_\_  
Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_  
Signature of researcher  
Ms. Marouska Cauchi

\_\_\_\_\_  
Signature of Supervisor  
Prof. Deborah Chetcuti

## ***Appendix E***

Information letter to Science teachers

Consent form to Science teachers

## ***Information letter to Science teachers***

Dear Sir/Madam,

My name is Marouska Cauchi and I am currently a second year M. Ed student in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on the development of assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in Science. The purpose of this research is to explore the views of a group of science teachers' who teach science subjects together with me at a girls' church school in the Maltese Islands, about dyslexia and the assessment of students with a profile of dyslexia. As part of the study, I would like to work with these science teachers to develop assessment strategies for students with a profile of dyslexia; obtain feedback from the students, Senior Management team and MATSEC officials regarding the strategies; as well as to develop a set of recommendations for policy makers regarding 'fairer' assessment practices for students with a profile of dyslexia.

I would like to enquire whether it is possible to ask for your participation in this study which will involve two focus group sessions and one professional development session of approximately forty minutes and one hour twenty minutes duration respectively. With your permission, each session will be audio recorded to facilitate collection of data and later transcription for analysis. However, your identity will be completely confidential and anonymous quotations may be used and data collection will be carried out in a fair and transparent manner. Audio-recorded data will be destroyed after my graduation and I do not intend to use it for any other research. I would also like to assure you that all ethical considerations will be

adhered to and that there are no known or anticipated risks to you as a participant in this study. Your participation is voluntary and you may decline to answer any of the interview questions or withdraw from this study at any time if you so wish.

Your assistance and support will be greatly appreciated and I look forward to speaking with you so as to carry out the study. If you wish to participate in this research, kindly fill in the attached consent form and give it to me one week from the date you received this sheet. Thereafter, I will be contacting you to set an appointment for the focus groups. Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

I very much look forward to working with you and whilst I thank you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education  
Faculty of Education  
University of Malta

### **Consent form to Science teachers**

I, the undersigned have read the information sheet presented by Ms. Marouska Cauchi who is reading a master's degree course in science education at the University of Malta. I understand that she needs to conduct part of her research; "Bystanders No More: Science assessment strategies for students with a profile of dyslexia" in her school.

I have been given the opportunity to take part in the following sessions each being approximately 40 minute duration: - one focus group interviews with seven Science teachers (Chemistry, Biology, Physics and Integrated Science); a professional development session with the team of science teachers together with a dyslexia expert; one focus group interview with the Senior Management team and Science teachers.

Moreover, I have been given the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions and any additional details I want. I am aware that my interviews will be audio recorded to ensure an accurate recording of my responses. I am also aware that any excerpts from the interviews will be written in the dissertation. However quotations will also be anonymous. In fact, I will be assigned a pseudonym.

I understand that Ms. Marouska Cauchi will abide by the following conditions:

- All data gathered will be anonymised;
- Data collection will be carried out in a fair and transparent manner;
- Participants can withdraw from the study at any stage without giving a reason or suffering any negative consequence;
- Recording will be stored securely and destroyed once the dissertation is over.

-----  
*Acceptance for Study:*

I understand that I am agreeing by my signature on this form, to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Name of science teacher: \_\_\_\_\_

Science teacher e-mail address: \_\_\_\_\_

Area of Profession: Biology/Physics/Chemistry/Integrated Science

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_  
Signature of researcher  
Ms. Marouska Cauchi

\_\_\_\_\_  
Signature of Supervisor  
Prof. Deborah Chetcuti

## ***Appendix F***

Information letter to dyslexia expert

Consent form to dyslexia expert

## ***Information letter to dyslexia expert***

Dear Sir/Madam,

My name is Marouska Cauchi and I am currently a second year M. Ed student in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on the development of assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in Science. The purpose of this research is to explore the views of a group of science teachers' who teach science subjects together with me at a girls' church school in the Maltese Islands, about dyslexia and the assessment of students with a profile of dyslexia. As part of the study, I would like to work with science teachers to develop assessment strategies for students with a profile of dyslexia; obtain feedback from the students, Senior Management team and MATSEC officials regarding the strategies; as well as to develop a set of recommendations for policy makers regarding 'fairer' assessment practices for students with a profile of dyslexia.

I would like to enquire whether it is possible to ask for your participation in this study which will involve one professional development session in the form of a focus group with Science teachers of approximately one hour twenty minutes duration. Your participation is voluntary and your role is to help the teachers including myself to develop an action plan with respect to assessment strategies which can be implemented for students with a profile of dyslexia.

With your permission, the professional development session will be audio recorded to facilitate collection of data and later transcription for analysis. However, your identity will be

completely confidential and anonymous quotations may be used and data collection will be carried out in a fair and transparent manner. Audio-recorded data will be destroyed after my graduation and I do not intend to use it for any other research. I would also like to assure you that all ethical considerations will be adhered to and that there are no known or anticipated risks to you as a participant in this study. Your participation is voluntary and you may decline to answer or comment on any part of the discussion or withdraw from this study at any time if you so wish.

Your assistance and support will be greatly appreciated and I look forward to speaking with you so as to carry out the study. If you wish to participate in this research, kindly fill in the attached consent form and give it to me one week from the date you received this sheet. Thereafter, I will be contacting you to set an appointment for the session. Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

I very much look forward to working with you and whilst I thank you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education  
Faculty of Education  
University of Malta

**Consent form to dyslexia expert**

I, the undersigned have read the information sheet presented by Ms. Marouska Cauchi who is reading a master’s degree course in science education at the University of Malta. I understand that she needs to conduct part of her research; “Bystanders No More: Science assessment strategies for students with a profile of dyslexia” in her school.

I have been given the opportunity to take part in a professional development session with the team of science teachers, being approximately one hour twenty minutes duration. I am aware that the session will be audio recorded to ensure an accurate recording of my responses. I am also aware that any excerpts from the session will be written in the dissertation. However quotations will also be anonymous.

I understand that Ms. Marouska Cauchi will abide by the following conditions:

- All data gathered will be anonymised;
- Data collection will be carried out in a fair and transparent manner;
- Participants can withdraw from the study at any stage without giving a reason or suffering any negative consequence;
- Recording will be stored securely and destroyed once the dissertation is over.

-----  
*Acceptance for Study:*

I understand that I am agreeing by my signature on this form, to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Name of dyslexia expert: \_\_\_\_\_

Dyslexia expert e-mail address: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_  
Signature of researcher  
Ms. Marouska Cauchi

\_\_\_\_\_  
Signature of Supervisor  
Prof. Deborah Chetcuti

## ***Appendix G***

Information letter to a MATSEC  
representative

Consent form to a MATSEC representative

## ***Information letter to MATSEC Representative***

Dear Sir/Madam,

My name is Marouska Cauchi and I am currently a second year M. Ed student in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on the development of assessment strategies that could help students with a profile of dyslexia achieve their goals and potential in Science. The purpose of this research is to explore the views of a group of science teachers' who teach science subjects together with me at a girls' church school in the Maltese Islands, about dyslexia and the assessment of students with a profile of dyslexia. As part of the study, I would like to work with science teachers to develop assessment strategies for students with a profile of dyslexia; obtain feedback from the students, Senior Management team and the Director of MATSEC regarding the strategies; as well as to develop a set of recommendations for policy makers regarding 'fairer' assessment practices for students with a profile of dyslexia.

I would like to enquire whether it is possible to ask for your participation in this study which will involve a meeting in the form of focus group session of approximately forty minutes duration. Your participation is voluntary and your role is to discuss with the researcher the findings and recommendations to help the teachers including myself to develop 'fairer' assessment strategies which can be implemented for students with a profile of dyslexia.

With your permission, the focus group session will be audio recorded to facilitate collection of data and later transcription for

analysis. However, your identity will be completely confidential and anonymous quotations may be used and data collection will be carried out in a fair and transparent manner. Audio-recorded data will be destroyed after my graduation and I do not intend to use it for any other research. I would also like to assure you that all ethical considerations will be adhered to and that there are no known or anticipated risks to you as a participant in this study. Your participation is voluntary and you may decline to answer or comment on any part of the discussion or withdraw from this study at any time if you so wish.

Your assistance and support will be greatly appreciated and I look forward to speaking with you so as to carry out the study. If you wish to participate in this research, kindly fill in the attached consent form and give it to me one week from the date you received this sheet. Thereafter, I will be contacting you to set an appointment for the session. Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

I very much look forward to working with you and whilst I thank you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education  
Faculty of Education  
University of Malta

**Consent form to MATSEC Representative**

I, the undersigned have read the information sheet presented by Ms. Marouska Cauchi who is reading a master’s degree course in science education at the University of Malta. I understand that she needs to conduct part of her research; “Bystanders No More: Science assessment strategies for students with a profile of dyslexia” in her school.

I have been given the opportunity to take part in an interview session, being approximately 40 minute duration. I am aware that the session will be audio recorded to ensure an accurate recording of my responses. I am also aware that any excerpts from the focus group session will be written in the dissertation. However quotations will also be anonymous.

I understand that Ms. Marouska Cauchi will abide by the following conditions:

- All data gathered will be anonymised;
- Data collection will be carried out in a fair and transparent manner;
- Participants can withdraw from the study at any stage without giving a reason or suffering any negative consequence;
- Recording will be stored securely and destroyed once the dissertation is over.

-----  
*Acceptance for Study:*

I understand that I am agreeing by my signature on this form, to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

MATSEC Representative: \_\_\_\_\_

Representative of MATSEC e-mail address: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_  
Signature of researcher  
Ms. Marouska Cauchi

\_\_\_\_\_  
Signature of Supervisor  
Prof. Deborah Chetcuti

## ***Appendix H***

Information letter to parents/guardians

Consent form to parents/guardians

*(English and Maltese Versions)*

## ***Information letter to parents/guardians***

Dear parent,

My name is Marouska Cauchi and I am currently following a master's course in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

I am presently conducting a study focusing on how assessment in Science could be improved to help students with a profile of dyslexia show their true potential. As part of this research, I would like to work with teachers, dyslexia expert, Head of School and assistant heads, MATSEC officials as well as students with a profile of dyslexia.

I would like to ask you whether it is possible to ask for your daughter's participation in this study which will involve one interview session of approximately ten to fifteen minutes duration. During this interview your daughter together with another student will be asked some questions related to the half-yearly examinations. Moreover, for a short period of time, I will be developing assessment tasks which help students with a profile of dyslexia show their true potential. However, students will be participating and doing these assessment activities just like any other student in the class. During these activities I will be observing her and write any comments or responses she wishes to do.

Lastly, after the implementation of these assessment tasks, I will interview again your daughter for ten to fifteen minutes to ask her about the assessment tasks and what would she change or keep as part of her future assessment tasks. May I remind you that her participation is voluntary and her role is to discuss with me any different assessment tasks to develop 'fairer' assessment

strategies which can be implemented for students with a profile of dyslexia.

With your permission, each session will be audio recorded to facilitate collection of data and later transcription for analysis. However, your daughter's identity will be completely confidential and anonymous quotations may be used and data collection will be carried out in a fair and transparent manner. Audio-recorded data will be destroyed after my graduation and I do not intend to use it for any other research. I would also like to assure you that all ethical considerations will be adhered to and that there are no known or anticipated risks to you as a participant in this study. Your daughter's participation is voluntary and she may decline to answer any of the interview questions or withdraw from this study at any time if she so wish.

Your assistance and support will be greatly appreciated and I look forward to speaking with your daughter so as to carry out the study. If you wish your daughter to participate in this research, kindly fill in the attached consent form and give it to me one week from the date you received this sheet.

Thereafter, I will be contacting your daughter to set an appointment for the session. Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

I very much look forward to working with your daughter and whilst I thank you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education  
Faculty of Education  
University of Malta

## ***Ittra ta' informazzjoni lill-ġenituri/kustodji***

Għażiż ġenitur/kustodju,

Jien jisimni Sa Marouska Cauchi u bħalissa qed insegwi l-kors fil-Maġisteru tax-Xjenza Edukattiva fl-Università ta' Malta taħt is-supervizjoni ta' Prof. Deborah Chetcuti.

L-istudju li qed nagħmel huwa ffukat fuq kif l-assessjar tax-Xjenza jista' jkun aħjar halli jgħin lill-istudenti bid-dislessija juru aktar il-pontenzjal veru tagħhom. Bħala parti mir-riċerka tiegħi, nixtieq naħdem flimkien ma' għalliema, esperti fid-dislessija, il-Kap tal-Iskola, l-Assistenti Kapijiet, l-Uffiċjali tal-MATSEC u kif ukoll studenti li għandhom id-dislessija.

Nixtieq nistaqsik, jekk hux possibbli li nistaqsi lil bintek biex tipparteċipa f'dan l-istudju li jinkorpora żewġ sessjonijiet ta' intervisti li kull waħda hija twila madwar ħmistax-il minuta. Matul l-ewwel intervista, l-istudenti se jiġu pprezentati b'sett ta' mistoqsijiet relatati mal-eżamijiet ta' nofs is-sena. Barra minn hekk, fi żmien qasir, se nkun qiegħda noħloq forom differenti ta' assessjar li jgħinu lill-istudenti bid-dislessija juru aktar il-potenzjal veru tagħhom. L-istudenti se jkunu qed jipparteċipaw u jaħdmu fuq dawn l-attivitajiet ta' assessjar bħall-istudenti kollha li jkun hemm fil-klassi. Fl-aħħar nett, wara l-implimentazzjoni ta' dawn il-forom differenti ta' assessjar, se nerga' nintervista għat-tieni darba lil bintek għal madwar għaxra jew ħmistax-il minuta oħra u nistaqsiha dwar il-forom differenti ta' assessjar u kieku hi x'kienet telimana jew iżżomm fil-futur mill-forom differenti ta' assessjar li tkun diġà ħadmet fuqhom. Nixtieq infakkrek li l-partecipazzjoni tagħhom hija fuq bażi volontarja u l-irwol tagħha huwa li flimkien niddiskutu alternattivi oħra ta' strategiji ta' assessjar li jkunu

aktar ġusti ħalli b'hekk jiġu implimentati ma' studenti bid-dislessija.

Bil-permess tiegħek, l-intervisti se jiġu rrekordjati b'mod awdjo viżiv ħalli b'hekk jiffaċilitaw il-ġabra ta' informazzjoni u wara t-transkrizzjoni għall-analiżi. Però, l-informazzjoni kollha se tinżamm kunfidenzjali u l-kwotazzjonijiet li jistgħu jintużaw se jibqgħu anonimi. L-informazzjoni se tiġi mħassra wara li niggradwa u m'iniex beħsiebni nużaha għal xi riċerka oħra. Nassigurak li se jinżammu livelli għoljin ta' etika u li mhu se jkun hemm l-ebda riskju antiċipat fuq il-parteciċipant li se jieħu sehem f'dan l-istudju. Il-parteciċipazzjoni tagħha hija volontarja u tista' tirrifjuta milli twieġeb xi mistoqsijiet jew saħansitra li tiegħaf kompletament milli tieħu sehem f'din ir-riċerka.

L-assistenza u s-sapport tiegħek jiġu apprezzati u ninsab ħerqana biex nitkellem ma' bintek ħalli nkunu nistgħu nwettqu flimkien dan l-istudju. Jekk tixtieq li bintek tipparteċipa f'dan l-istudju, jekk jogħġbok, imla l-formola ta' kunsens u għaddiheli sa mhux aktar tard minn ġimgħa minn meta tircievi din l-ittra. Wara nikkuntattja lil bintek biex nagħmlu appuntament ħalli nkunu nistgħu nwettqu s-sessjoni.

Barra minn hekk, jekk tixtieq tikkuntattjani jew inkella għal aktar informazzjoni, tista' tagħmel dan billi tibgħatli ittra elettronika fuq: [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) jew permezz tal-mowbajl: 99271625. Jekk trid takkwista aktar informazzjoni tista' tikkuntattja wkoll lil Prof. Deborah Chetcuti li din ir-riċerkaqed tkun taħt is-superviżjoni tagħha fuq [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

Inħares 'il quddiem biex naħdem flimkien ma' bintek u nirringrazzjak bil-quddiem talli sibt iċ-ċans biex taqra din l-ittra ta' informazzjoni u tal-koperazzjoni tiegħek.

Dejjem tiegħek,

---

Sa Marouska Cauchi  
Magisteru tal-Edukazzjoni fix-Xjenza Edukattiva  
Fakultà tal-Edukazzjoni  
Università ta' Malta

### ***Consent form to parents/guardians***

I, the undersigned have read the information sheet presented by Ms. Marouska Cauchi who is reading a master's degree course in science education at the University of Malta. I understand that she needs to conduct part of her research; "Bystanders No More: Science assessment strategies for students with a profile of dyslexia" in her school.

She is giving the opportunity to my daughter to take part in two interview sessions each being approximately 15 minute duration. My daughter will also be taking part in some assessment tasks provided by the teacher as discussed by a dyslexia expert and Science teachers.

Moreover, my daughter has been given the opportunity to ask any questions related to this study, to put forward her opinions about exams and any other form of assessment tasks. She is also eager to receive satisfactory answers to my questions and any additional details she wants. I am aware that the interviews of my daughter will be audio recorded to ensure an accurate recording of her responses. During the observations, comments and responses as well as any excerpts from the interviews will be written in the dissertation. However quotations will also be anonymous. In fact, my daughter will be assigned another fake name. I understand that Ms. Marouska Cauchi will abide by the following conditions:

- All data gathered will be anonymised;
- Data collection will be carried out in a fair and transparent manner;
- My daughter can withdraw from the study at any stage without giving a reason or suffering any negative consequence;
- Recordings will be stored securely and destroyed once the dissertation is over;

- During the implementation of the new assessment tasks, my daughter will not be singled out from any Physics lesson. She will be observed and can comment on the assigned task.

-----

*Acceptance for Study:*

I understand that I am agreeing by my signature on this form, to give permission to my daughter to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Name of parent: \_\_\_\_\_

Name of student: \_\_\_\_\_ Form: \_\_\_\_\_

Parent e-mail address: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_

Signature of researcher

Ms. Marouska Cauch

\_\_\_\_\_

Signature of Supervisor

Prof. Deborah Chetcuti

## ***Il-formola ta' kunsens tal-ġenituri/kustodji***

Jiena qrajt l-ittra ta' informazzjoni pprezentata minn Sa Marouska Cauchi li bħalissa qed issegwi l-kors fil-Maġisteru tax-Xjenza Edukattiva fl-Università ta' Malta. Nifhem li tixtieq l-għajnuna biex tkun tista' twettaq ir-riċerka tagħha: "Bystanders No More: Science assessment strategies for students with a profile of dyslexia".

Hija qed tagħti l-opportunità lil binti biex tkun parti minn żewġ intervisti ta' madwar ħmistax-il minuta kull waħda. Barra minn hekk, binti se tkun qiegħda tiegħu sehem f'forom differenti ta' assessjar flimkien mal-klassi sħiħa pprezentati mill-għalliema tal-Fizika li qabel ġew diskussi ma' espert fid-dislessija u l-għalliema tax-Xjenza.

Barra minn hekk, binti se jkollha l-opportunità biex tistaqsi kwalunkwe mistoqsija relatata mal-istudju u kif ukoll tagħti l-opinjoni tagħha dwar eżamijiet u kull forma ta' assessjar ieħor. Hija wkoll tinsab imħegġa li tircievi twegibiet sodisfaċenti għall-mistoqsijiet u għad-dettalji addizzjonali li ser tagħti. Barra minn hekk, ġejt mgħarrfa li l-intervisti se jiġu rrekordjati biex biex b'hekk tkun aktar awtentika mingħajr ebda żbalji. Ninsab infurmata wkoll li partijiet mit-twegibiet li ser tagħti binti waqt iż-żewġ intervisti se jiġu miktuba fid-dissertazzjoni. Però l-kwotazzjonijiet se jkunu anonimi. Fil-fatt, binti se tingħata isem falz biex ma tingħarafx.

Nifhem li Sa Marouska Cauchi se żżomm ma' dawn il-kundizzjonijiet:

- L-informazzjoni miġbura se tibqa' anonima;
- L-informazzjoni miġbura se tkun ġusta u bl-aktar mod trasparenti possibbli.
- Binti tista' tieqaf milli tiegħu sehem mill-istudju f'kull stadju mingħajr ma tagħti raguni u mingħajr konsegwenzi negattivi;

- L-irrekordjar tal-intervisti se jibqgħu miġbura f'post sigur u jithassru meta d-dissertazzjoni tkun lesta.
- Binti mhix se tkun maqtugħa barra mill-bqija tal-klassi tal-Fizika matul is-sehem tagħha fil-forom differenti ta' assessjar. Hija se tiġi osservata u tista' tagħti l-kummenti tagħha dwar dawn il-forom differenti ta' assessjar.

-----

*Aċċettazzjoni għal dan l-istudju:*

Nifhem li qed naqbel billi niffirma din il-formola li se nagħti permess lil binti biex tiegħu sehem f'dan il-proġett ta' riċerka u li se nirċievi kopja ffirmata ta' din il-formola ta' kunsens bħala rekord għalija.

Isem il-ġenitur/kustodju: \_\_\_\_\_

Isem l-istudenta: \_\_\_\_\_ Il-Klassi: \_\_\_\_\_

Indirizz elettroniku tal-ġenitur/kustodju: \_\_\_\_\_

Firma: \_\_\_\_\_ Data: \_\_\_\_\_

\_\_\_\_\_

Firma tar-Riċerkattriċi

Sa Marouska Cauchi

\_\_\_\_\_

Firma tas-Supervizur

Prof. Deborah Chetcuti

## ***Appendix I***

Information letter to students

Assent form to students

## ***Information letter to students***

Dear student,

My name is Marouska Cauchi and I am currently following a master's course in Science Education at the University of Malta under the supervision of Prof. Deborah Chetcuti.

- I am presently conducting a study focusing on how assessment in Science could be improved to help students with a profile of dyslexia show their true potential.
- I believe that this study will be helping me as a teacher and other teachers to help us improve our assessment tasks in science.
- I would like to ask you if you wish to participate in this study on a voluntary basis and you can choose not to take part in the interviews at any time you want.
- During this study you will be assessed in the same way as your classmates.

What the study will involve from your end is:

1. participation in an interview following the half-yearly examinations to learn about your views on assessment;
2. participation in some new assessment tasks I will assign during your Physics lessons;
3. participation in a interview following the introduction of these new assessment tasks in order to obtain your feedback about them.

During both interviews, you will be paired with another student and each interview will only take around 10-15 minutes.

If you agree:

- The interviews will be audio recorded and some quotations may be used but your name will not be shown in the study.
- Whilst carrying out the new assessment tasks, I will be observing and taking notes and comments you wish to say.
- I will destroy all the audio recorded data as soon as I graduate.

You will not be harmed in any way and you can approach me at any time for any difficulties.

I would be really happy to work with you and I appreciate your help. If you wish to participate in this research, please sign the consent form and give it to me one week from the date you received this sheet. Then, I will be contacting you to set an appointment for the session.

Moreover, if you require any further clarifications regarding the study, please contact me at [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) or on my mobile number: 99271625. Furthermore, should you require any further information from my supervisor she can be contacted at [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

I very much look forward to working with you and whilst I thank you in advance for your time and co-operation.

Yours truly,

---

Marouska Cauchi

Master of Education in Science Education

Faculty of Education

University of Malta

## ***Ittra ta' informazzjoni lill-istudenti***

Għażiża studenta,

Jien jisimni Sa Marouska Cauchi u bħalissa qed insegwi l-kors fil-Maġisteru tax-Xjenza Edukattiva fl-Università ta' Malta taħt is-superviżjoni ta' Prof. Deborah Chetcuti.

- L-istudju li qed nagħmel huwa ffukat fuq kif l-assessjar tax-Xjenza jista' jkun aħjar ħalli jgħin lill-istudenti bid-dislessija juru aktar il-pontenzjal veru tagħhom.
- Nemmen li dan jista' jkun ta' benefiċċju għaliya u għal għalliema oħra bħali biex itejbu l-assessjar fil-ħidma Prattika tax-Xjenza.
- Permezz ta' din l-ittra, nixtieq nistaqsi, jekk tixtieqx tipparteċipa f'dan l-istudju fuq bażi volontarja u tista' tirrifjuta milli tiegħu sehem fl-intervisti f'kull ħin.
- F'din ir-riċerka int m'intx se tkun assessjata b'mod differenti minn sħabek stess tal-klassi.

Dan l-istudju jirrikjedi li inti:

1. tipparteċipa f'intervista wara l-eżamijiet ta' nofs is-sena biex nitgħallmu dwar kif taħsibha fuq l-assessjar;
2. tipparteċipa f'forom differenti ta' assessjar waqt il-lezzjonijiet tal-Fizika;
3. tipparteċipa f'intervista wara l-partecipazzjoni tiegħek fit-tipi differenti ta' assessjar biex b'hekk twassal ir-rispons tiegħek.

Fiz-żewġ intervisti, inti se jkun hemm miegħek studenta oħra tiegħu sehem u kull intervista hija twila madwar 10-15-il minuta.

Jekk taqbel:

- l-intervisti se jiġu rrekordjati b'mod awdjo viżiv u jistgħu jittieħdu xi kwotazzjonijiet, però ismek ma jidher imkien f'dan l-istudju.
- Jiena nkun qed nosserva, nieħu xi punti u kummenti tagħkom waqt li tkunu qed tagħmlu l-forom differenti ta' assessjar.
- la niggradwa, iż-żamma tal-informazzjoni tiġi mħassra.

Qatt m'inti se tkun esposta biex tiġi mwegġa' u tista' faċilment tikkuntattjani f'każ ta' diffikultà.

Inkun verament kuntenta li naħdmu flimkien u napprezza ħafna l-għajjnuna tiegħek. Jekk tixtieq tipparteċipa f'dan l-istudju, jekk jogħġbok, imla l-formola ta' aċċettazzjoni u għaddiġi sa mhux aktar tard minn ġimgħa minn meta tirċievi din l-ittra. Wara nikkuntattjak biex nagħmlu appuntament ħalli nkunu nistgħu nwettqu s-sessjoni.

Barra minn hekk, jekk tixtieq tikkuntattjani jew inkella għal aktar informazzjoni, tista' tagħmel dan billi tibgħatli ittra elettronika fuq: [marouska.borg.11@um.edu.mt](mailto:marouska.borg.11@um.edu.mt) jew permezz tal-mowbajl: 99271625. Jekk trid takkwista aktar informazzjoni tista' tikkuntattja wkoll lil Prof. Deborah Chetcuti li din ir-riċerka qed tkun taħt is-superviżjoni tagħha fuq [deborah.chetcuti@um.edu.mt](mailto:deborah.chetcuti@um.edu.mt).

Inħares 'il quddiem biex naħdem miegħek u niringrazzjak talli sibt iċ-ċans biex taqra din l-ittra ta' informazzjoni u tal-koperazzjoni tiegħek.

Dejjem tiegħek,

---

Sa Marouska Cauchi

Maġisteru tal-Edukazzjoni fix-Xjenza Edukattiva  
Fakultà tal-Edukazzjoni  
Università ta' Malta

### ***Assent form to students***

- I have read the information sheet presented by Ms. Marouska Cauchi who is currently following a master's degree course in science education at the University of Malta. I understand that she needs to conduct part of her research; "Bystanders No More: Science assessment strategies for students with a profile of dyslexia".
- I am going to take part in two interview sessions each being approximately 15 minute duration and in some assessment tasks together with the whole class, provided by the Physics teacher. I will not be singled out from any Physics lesson and I will be observed during these tasks.
- I can ask any questions related to this study and state my opinions about exams and any other form of assessment tasks. I am also willing to receive satisfactory answers to my questions and any additional details I want.
- I am aware that my interviews will be audio recorded to ensure an accurate recording of my responses. They will be stored and destroyed when she graduates.
- I am also aware that my name will not be shown when any comments from the interviews will be written in the dissertation. I will be assigned another fake name.
- I understand that at no point in time in the research will I be harmed in any way and that I can decline to take part in the interviews from the study at any stage.

-----

**Acceptance for Study:**

I understand that I am agreeing by my signature on this form, to take part in this research project and understand that I will receive a signed copy of this assent form for my records.

Name of student: \_\_\_\_\_ Form \_\_\_\_\_

Student e-mail address: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_  
Signature of researcher

Ms. Marouska Cauchi

\_\_\_\_\_  
Signature of Supervisor

Prof. Deborah Chetcuti

### ***Il-formola ta' aċċettazzjoni mill-istudenti***

- Jiena qrajt l-ittra ta' informazzjoni ppreżentata minn Sa Marouska Cauchi li bħalissa qed issegwi l-kors fil-Maġisteru tax-Xjenza Edukattiva fl-Università ta' Malta. Nifhem li tixtieq l-għajjnuna biex tkun tista' twettaq ir-riċerka tagħha: "Bystanders No More: Science assessment strategies for students with a profile of dyslexia".
- Jiena għandi l-opportunità li nkun parti minn żewġ intervisti ta' madwar ħmistax-il minuta kull waħda. Barra minn hekk, se nkun qiegħda nieħu sehem f'forom differenti ta' assessjar flimkien mal-klassi sħiħa ppreżentati mill-għalliema tal-Fiżika. Fl-ebda ħin, m'jien se nkun qed nagħmel xi haġa differenti minn sħabi tal-klassi.
- Matul ir-riċerka nista' nistaqsi kwalunkwe mistoqsija dwar l-istudju u kif ukoll nagħti l-opinjoni tiegħi dwar eżamijiet u kull forma ta' assessjar ieħor. Ninsab imħegġa li nirċievi twegibiet sodisfaċenti għall-mistoqsijiet u għad-dettalji addizzjonali li ser nagħti.
- Ġejt mgħarrfa li l-intervisti se jkunu rrekordjati b'mod awdjo viżiv biex b'hekk l-intervisti jkunu aktar awtentici mingħajr ebda żbalji. Iż-żamma tal-informazzjoni rrekordjata se tkun miżmuma f'post sigur u wara tiġi distrutta la d-dissertazzjoni tkun ippreżentata.
- Barra minn hekk, ninsab konxja wkoll li xi partijiet mill-intervisti se jkunu mniżżlin fid-dissertazzjoni. Però qatt mhu se jitniżżel ismi fl-ebda stadju tar-riċerka. Fil-fatt, se ningħata isem fittizju biex tinżamm l-anonimità.
- Nifhem li fl-ebda ħin mhu se jkun hemm xi tip ta' sofferenza fuqi u li nista' nieqaf nieħu sehem minn din ir-riċerka (jiġifieri li nieqaf nieħu sehem fl-intervisti) f'kull mument.

### **Aċċettazzjoni għal dan l-istudju:**

Nifhem li qed naqbel billi niffirma din il-formola li se nieħu sehem f'dan il-proġett ta' riċerka u li se nircievi kopja ffirmata ta' din il-formola ta' aċċettazzjoni bħala rekord għalija.

Isem l-istudenta: \_\_\_\_\_ Klassi: \_\_\_\_\_

Indirizz elettroniku tal-istudenta: \_\_\_\_\_

Firma: \_\_\_\_\_ Data: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Firma tar-Riċerkattriċi

Firma tas-Superviżur

Sa Marouska Cauchi

Prof. Deborah Chetcuti

## ***Appendix J***

### Focus Group Questions

Focus Group 1 - Questions with Science Teachers

Focus Group 2 - Professional Development Session with Science teachers and dyslexia expert

Focus Group 3 - Prezi Presentation for Science teachers and SMT members

### ***Focus Group 1 - Questions with Science Teachers***

1. What comes to mind when you hear the term 'Dyslexia'?
2. Have you ever taught students with a profile of dyslexia? If yes, what triggered you to notice that a particular student is dyslexic?
3. Do you think that you are trained enough to tackle dyslexic students properly?
4. What are your views about current assessment practices such as half-yearly and annual examinations held in our schools?
5. What are your views about high stakes examinations such as SEC, with regards to students with a profile of dyslexia?
6. Do you think that our assessment practices are catering for dyslexic students? Is it valid, fair, reliable and practical for them?
7. Do you face any difficulty when assessing a child with dyslexia? In what sense?
8. If you were asked to change something in the educational sector related to assessment to help students with dyslexia, what would it be?

***Focus Group 2 - Professional Development Session with Science teachers and dyslexia expert***

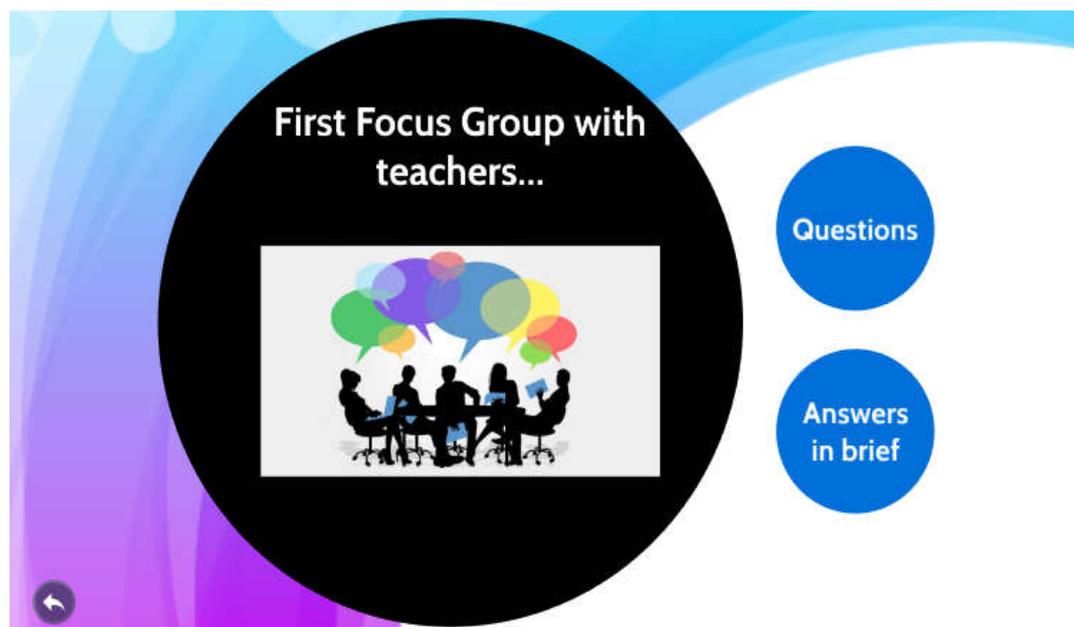
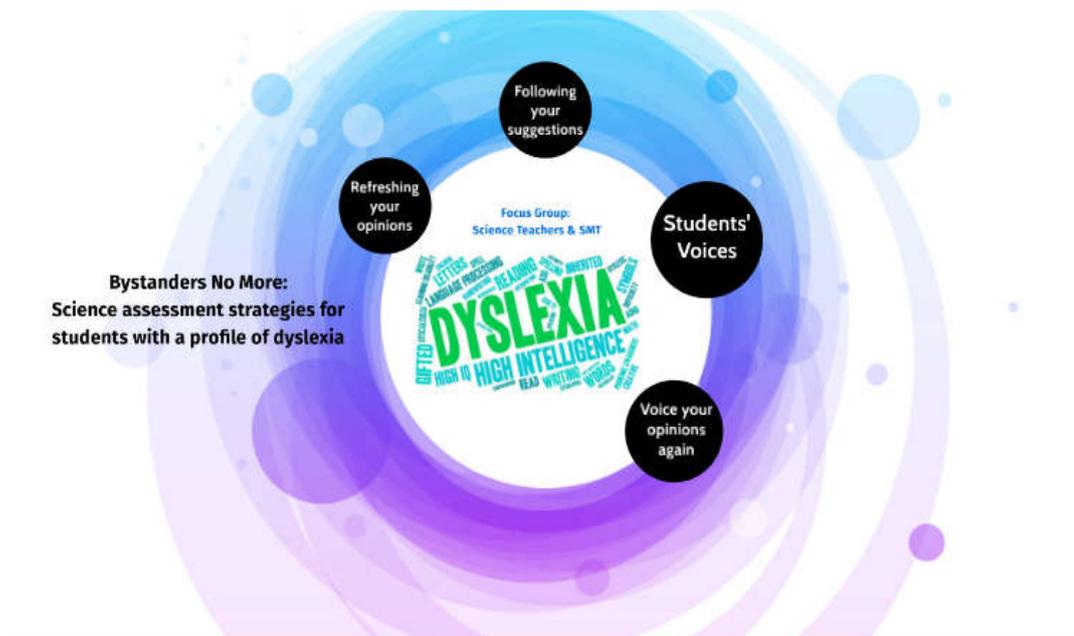
1. Are you aware of any alternatives how students with dyslexia can be assessed in Science? Mention ways of these alternatives so that an action plan will be formulated. This can include: (both formative and summative assessment) depending on what strategies do you think they use to master their situation.
2. Do you think that there are any other assessment strategies that have not yet been addressed and implemented and that you feel they should be for the benefit of the students with dyslexia? If yes, can you mention them?

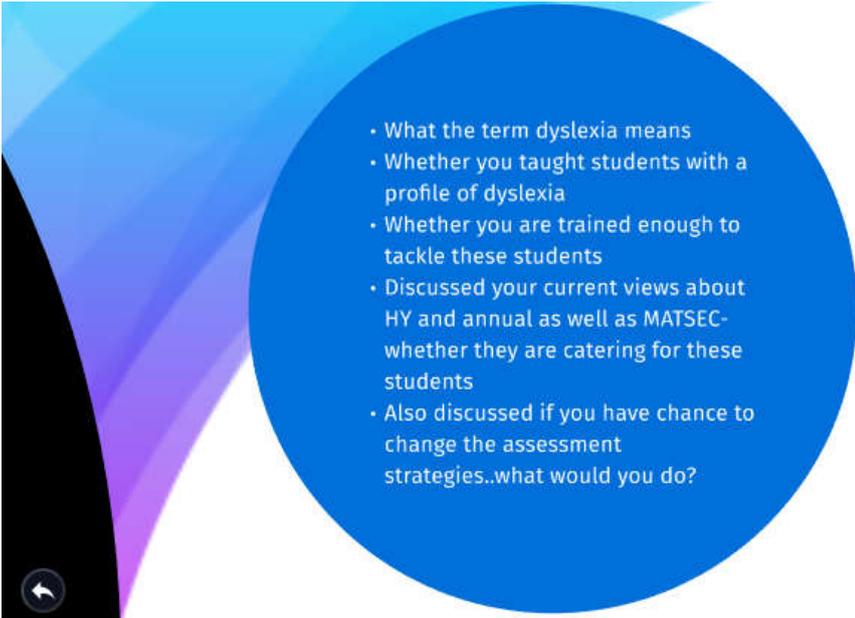
Discussion of the action plan.

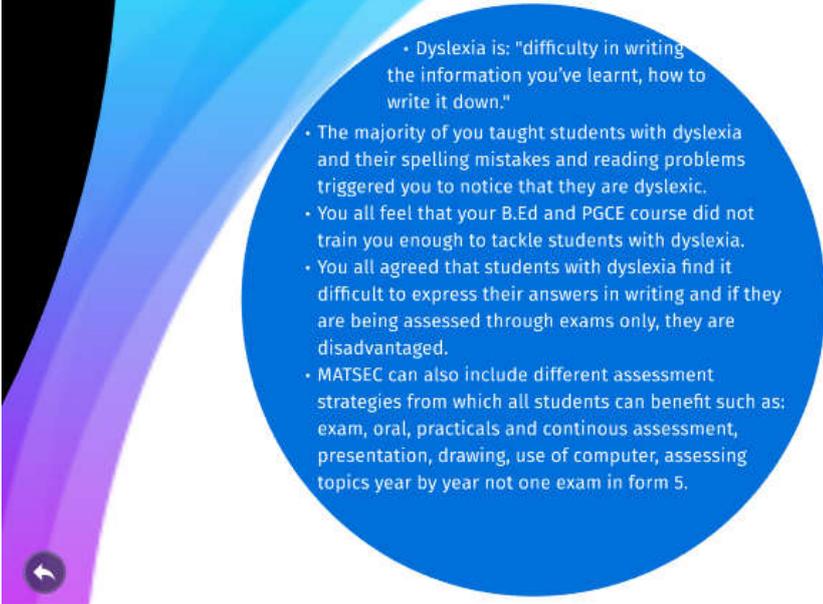
**Focus Group 3 - Prezi Presentation for Science teachers and SMT members**

Prezi link: <https://prezi.com/p/r2f8iixu7gdw/>

Prezi shots:



- 
- What the term dyslexia means
  - Whether you taught students with a profile of dyslexia
  - Whether you are trained enough to tackle these students
  - Discussed your current views about HY and annual as well as MATSEC- whether they are catering for these students
  - Also discussed if you have chance to change the assessment strategies..what would you do?

- 
- Dyslexia is: "difficulty in writing the information you've learnt, how to write it down."
  - The majority of you taught students with dyslexia and their spelling mistakes and reading problems triggered you to notice that they are dyslexic.
  - You all feel that your B.Ed and PGCE course did not train you enough to tackle students with dyslexia.
  - You all agreed that students with dyslexia find it difficult to express their answers in writing and if they are being assessed through exams only, they are disadvantaged.
  - MATSEC can also include different assessment strategies from which all students can benefit such as: exam, oral, practicals and continuous assessment, presentation, drawing, use of computer, assessing topics year by year not one exam in form 5.

## Second Focus Group with teachers & dyslexia expert...



What we  
discussed

Results

- Based on our first focus group with the teachers, I drafted a pack for the students.
- During the second focus group we discussed the pack and adjusted it according to how it would be best for students with dyslexia.
- We also discussed how different assessments can be done each having different percentages.

**Project Marks**  
Topic; Newton's Laws of Motion:

- Oral Activity (15%)
- Unseen Practical Activity (30%)
- IWB Group Quiz (5%)
- Short Written Test (30%)
- Booklet Activities (15%)
- Participation through this topic (5%)
- Total of 100%



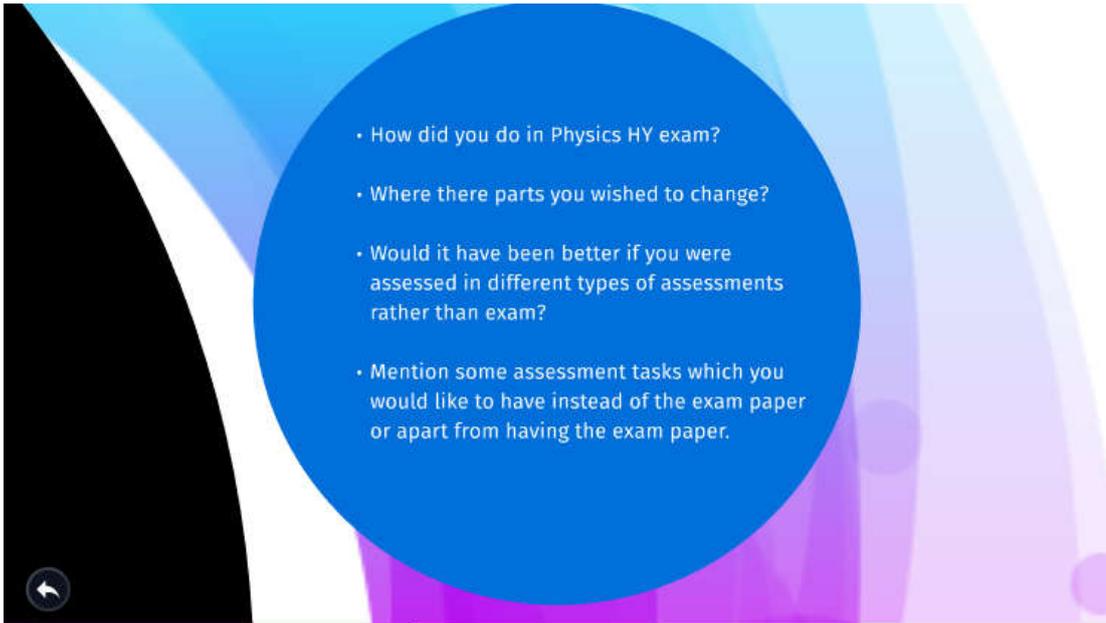
**First short interview  
with students with a  
profile of dyslexia**



Questions

Answers





<p>"Ippanikajt hafna...dak l-aktar wiehed li studjajt imbaghad xhin mort għall-eżami u rajt il-karta ffrikajt u hallejt hafna vojta. Ippanikajt għax anka fi xhin tara l-question u taraha miktuba differenti...tkun l-istess, issaqsi l-istess haġa imma anke dak il-hin moħħok ma jikklikkjax li għal dik il-haġa trid tfissirha."</p>	<p>"Qabel l-eżami ma nkun irrid nara 'l hadd għax joqogħdu jgħidu jien ha mmur hazin, jien ma studjajtx dak sew?...Imbaghad huma jgħibu marka aħjar minni u jien ghamilt l-effort tiegħi biex noqgħod nistudja u hekk...jew hemm tfal li lanqas biss jistudjaw u jgħibu in 90s...għax għandhom il-memorja jiftakru affarijiet hekk."</p>
<p>"Jiena nkun nafha imma mbaghad ma nafx kif ha niktibha u anka jekk niktibha hażina iżjed iċ-ċans li t-teacher mhux se tifhimni kif ktibtha jew ma tkunx taf how to word it..."</p>	<p>"Naqbel li jkun hemm eżami però mhux daqshekk pressure f'eżami wiehed.. għax pereżempju jekk m'għaddejtx... pereżempju jien fid-Design m'għaddejtx folio jgħifieri fi xhin kellna l-karta, imma mbaghad il-marka tal-folio mort veru sewwa fih...so il-marka telgħatli...folio veru sewwa imma l-eżami le...all due to panicking. U dak l-aktar li ridt immur l-aħjar fih fis-Science." Assessments jistgħu jkunu differenti: orals, handouts, testijiet żgħar jew quizzes jew anka naghmlu experiments u jkollna marka fuq l-experiments toghgobni għax jien nippreferi naghmel l-affarijiet b'idi milli ttni paragraph u jkolli noqgħod nikteb."</p>
<p>"Fill in joghgobni aktar milli question u answer... ikollha table u tista' tiehu words li ddaħhalhom...hekk joghgobni hafna... għax il-kelma tiktibha sewwa."</p>	<p>"Stress u panicking it-tfal joqogħdu jgħidu kemm kien hafif... jew inkella joqogħdu jgħidu mhux se ngħaddi, mhux se ngħaddi...għax imbaghad tgħid jien mhux se ngħaddi, mhux dawk mhux se jgħaddu...għax bħal min jgħid hekk iżomm aktar affarijiet ġo moħħu milli jien allura...għax jien qisni ninsa."</p>
<p>"Iwa. Oral imma imbaghad mhux quddiem il-klassi kollha għax aktar tippanikja.. jew anka presentations...jew ittina xi handouts u jkollna marki għalihom...handouts b'assessments differenti...anka l-karti tal-eżami, it-testijiet li jkollna topic wiehed u mbaghad inkun f'himtu sew dak it-topic u mmur sew fil-pic wiehed u tagħmel assessment għalih."</p>	

## Scenarios:

- Current Situation
- Student's Half Yearly
- First part of the questions
- Students' actual works + opinions
- Second part of the questions



Current Situation

Student's HY

First part of the questions

Actual Results

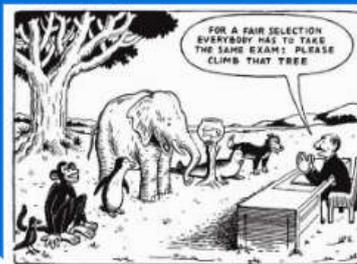
Students' opinions

Second part of the questions

School Policy

## At the moment:

- We have the Half Yearly and Annual exams only
- We have continuous assessment such as: quizzes, end of topic worksheets, test, lab exercises and so on. But this continuous assessment does not form part of the final mark of the exams.



## Their final results

Student 1: 49%    Student 2: 48 %



## Let's Discuss...

1. When you look at the assessments in the pack what do you think of them? Do you think that they will be helpful for students with dyslexia?

2. Do you think that the school assessment policy should be revised to help students with a profile of dyslexia?

3. Do you think that there should be specific adaptations for students with dyslexia or for all students in general?

4. Do you think that the types of assessment used in the pack can be used as an integral part of the school assessment system?

5. Could we introduce an oral and practical aspect? Could we have different types of questions in the examination?

6. Do you think it would be useful if we used different font, coloured paper, etc. would the SMT agree to this?

Distributing Photocopies

### Their project results

Student 1: 84%    Student 2: 91%

Students with Learning Disabilities Are Not...

- "Retarded"
- "Slow Learners"
- "Dumb"
- "Lazy"
- "Bringing Other Students Down"
- "Incapable"
- "Getting Away with Something"
- "Looking for Excuses"

Back

Search

Search

Search

Search

Search

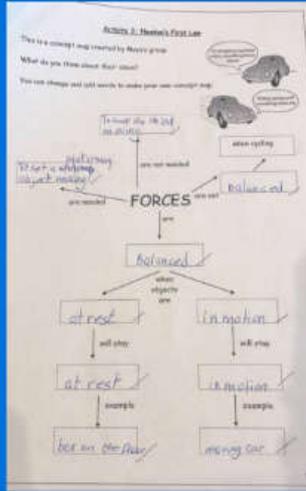
observe & report

I am passing on photocopies of students' works of the Pack

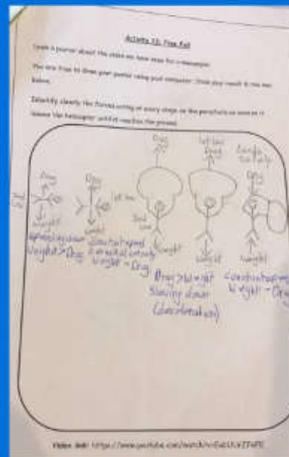
- Oral Activity
- Practical Activity
- Test

Also, let's see some shots...

# The Pack



# The Pack



# The Oral

**Activity 17: Oral Activity**  
Which is the QAS QAS in the following activity?

Picture 1	Picture 2	Picture 3	Tell me which
			<input checked="" type="checkbox"/>

Dr. Manish K. Gupta | Term 4 | Newton's Laws of Motion - Oral Activity | 1

# The Practical

**inertia**  
**Activity 10: Practical Activity**

*Goal: To observe the effect of inertia in a simple experiment to show that all bodies have a property called inertia.*

*Why did I choose this activity? It is very simple and easy to do and it is very interesting.*

*My aim is to observe the effect of inertia in a simple experiment to show that all bodies have a property called inertia.*

*My hypothesis is that when a body is at rest, it will remain at rest unless an external force is applied to it.*

*My prediction is that when a body is at rest, it will remain at rest unless an external force is applied to it.*

*Procedure:*

1. Take a smooth surface and a smooth ball.
2. Place the ball on the surface.
3. Push the ball gently.
4. Observe the motion of the ball.
5. Repeat the experiment with different masses.

*Observation:*

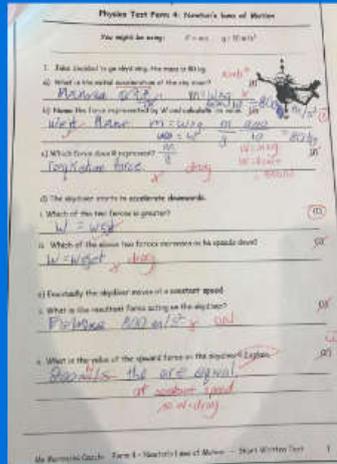
When I pushed the ball, it started moving. When I stopped pushing, it stopped. When I pushed it harder, it moved faster. When I pushed it from a higher height, it moved faster.

*Conclusion:*

The aim of the experiment was achieved. It was found that when the smooth ball was pushed with the same force as that of

Dr. Manish K. Gupta | Term 4 | Newton's Laws of Motion - Practical Activity | 1

## The Test



## Students' Opinions

"Tistudja sena jkollok quizzes u marki jinqasmu f'hafna assessments differenti...wiehed tmur hażin allura jpatti iehor ghalih... aktar ma jkollok assessments aktar ahjar... as you go along matul is sena mhux fl ahjar koċċ pressure biex tmur sewwa...jieldu percentage matul s sena kollha."

"B'halma ghedt qabel mhux kollox fl-ahjar trid tistudja kollox...mhux tmur Form 5 u tmur hażin u qisek you failed 3 years of your life... kieku jien naghmilha bhal Hospitality...ghandek parti minnu jkun lest, eżempju tal Form 3 ghamilt l-eżami u l-percentage diġa qiegħed hemmhekk imbagħad ma jkollokx għalfejn tghaddih fil-Form 5...Matsec Exam...niippreferi li jkolli reader naf li mhux se jkolli, Hawnekk reader when requested...Matsec ma jkun...din krudeltà... ma tlaqtx fl-istess linja ma' shabi. M'ghandix dak li tixtieq biex inti tkun tista' timxi għax kieku ngħid ha mmur hafna ahjar imma jekk sentenza ma nifhimhiex jew naqraha hażina, l-answer se tiġi hażina żgur. Kieku nixtieq ukoll li l kmamar inkun naf...nixtieq li l eżamijiet il kbar bhal tal-Matsec isiru ġol iskola tagħna stess mhux tmur ġo sala kbira u koċċ desks differenti...issib id-desk tiegħek...jilhaq jaqbadni aktar panic."

"Oral quiz u practical u ftit żghira test. Għax joghgbuni u ehfef biex tiġi assessed inqas pressure milli test jew eżami u bhal ikun hemm shabek maġenbek.. allura jgħinuk tikka speċjalment fir-reading...biex nikteb la jaċċettaw l-answer u tkun il-kelma t-tajba imma miktuba hażina ok imma jekk ma jaċċetawhiex hażin...bhal tar-Religion jaċċettaw...nixtieq li s-subjects kollha hekk. Imma mbagħad xi kultant waqt l-eżamijiet bhal lill habiba tiegħi li hi dyslexic ukoll kienu jiktbulha bl-ahdar il-kelma l-propja biex b'hekk it-teacher xhin tikkoreġi tagħraf il-kelma aktar malajr. Lili jdejjaqni jekk jiktbuli bl-ahdar għax ngħid jien kapaċi biżżejjed biex ngħid u nuri x'naf avolja jhossni f'it diffiċli biex nikteb."

### Let's Discuss...

7. What do you think of these results?

8. How does this information influence your way of thinking about assessment in general and with regards to students with a profile of dyslexia?

9. Is it feasible to develop a different assessment policy for our school?

10. What would such an assessment policy look like?

11. Would you as teachers and SMT support such a change?

12. What would be the challenges?

### Let's Discuss...

Drafting a school assessment policy

Will it be general?

Or specific for students with a profile of dyslexia?



## ***Appendix K***

### Interview Questions

Interview Questions 1 - Questions for students with a profile of dyslexia after Half-Yearly examinations

Interview Questions 2 - Questions for students with a profile of dyslexia after the implementation of the action plan

***Interview Questions 1 - Questions for students with a profile of dyslexia after Half-Yearly examinations***

1. Since you have just sat for this year's half yearly exams, how did you do in the Physics subjects?
2. Did you feel confident in doing all the paper? Where there parts where you wished to change?
3. Would it have been better if you were assessed in different types of assessment rather than an exam paper? If yes, how would you preferred it to be and why?
4. Mention some assessment tasks which you would like to have instead of the exam paper or apart from having the exam paper.

***Interview Questions 2 - Questions for students with a profile of dyslexia after the implementation of the action plan***

1. Which assessment task did you like the best? Rank the following, 1 being: the most preferred, 12: the least preferred.
2. Explain your choice.

Assessment tasks from the pack:

Answering questions in point form/diagrams	
Commenting by writing sentences or defining terms	
Mind mapping	
Playing bingo and snakes and ladders	
Computer lab games	
Comparing using pictures	
Discussing sketched graphs	
Predicting experiments	
Drawing posters	
Matching exercise	
Answering questions by drawing	
Ticking answers	

3. We used other assessment practices: oral activity, practical activity, quiz, test and participation.
- Do you agree with each of these?
  - Which assessment task did you like the best? Rank the following, 1 being: the most preferred, 5: the least preferred.
  - Explain your choice.

**Test**

You had to read the questions yourself and write your answers. You could not answer your questions orally.

**Quiz**

You were in divided into groups. Questions were presented onto the IWB and you had to choose the correct answer.

**Oral Test**

You had to answer questions orally and talk about your ideas. You did not have to write any of your answers.

**Practical Test**

You had to do an experiment in the lab and then write a short report on your observations and results.

**Participation**

A small percentage was given to the participation that you showed throughout the whole topic.

***Game: Let Us Imagine***

1. Let us imagine that you were the teacher preparing an assessment for her students. Would you give them a half-yearly examination or something different? How would you assess your students?
2. Let us imagine that you were the Minister of Education and could change the assessment system, what would you change and why?
3. Let us imagine that you could choose the way in which you could be assessed at the end of the scholastic year. What would you choose?

## ***Appendix L***

Points to discuss with MATSEC  
representative

## ***Points to discuss with MATSEC representative***

### ***Science teachers' views:***

1. Dyslexia...difficulty in reading, writing...Why are we still assessing students mostly by written exams?
2. In Science subjects, if the word can be read, will it be accepted? Do spelling mistakes count?
3. Why not using the computers? Nowadays at work we only use computers...In today's life we just Google things even us teachers.
4. More training to B. Ed students.
5. MATSEC 60%, 40% and 60% which is written but the 40% mainly are practicals, investigations, site visits.
6. Why not using different assessments so we try and reach all different abilities, intelligences etc? In class we use different assessments yet in SEC students are faced with one exam only.
7. Sometimes syllabus restrains teachers from doing activities due to time constrains.
8. Three years in three hours...marks do not show one's true potential.
9. What about font, colour page, graph papers, line spacing, images, use of readers, computer, use of borders in an exam paper? No flipping through pages to go from one question to another. Why can't they use highlighters? Can they use Maltese or English in an exam paper? Since we're assessing Physics.
10. Students never have a mark on the proper practice. The experiment marks: what we call labs are given on the report as well.
11. Can we assess topic not all at once? Like VOC subjects.

12. Our system is not used with having orals except for languages, yet one of the 21<sup>st</sup> C skills embraces communication skills.
13. If we revise the current assessment policy it's going to help all the students...like we tell a diabetic person not to eat carbohydrates, fats, sugars etc but to have a balanced diet but ultimately we all need a balanced diet.
14. Not everybody may like oral but giving chance to all the students to flourish and show their true potential.
15. Pack & different assessments: from failing students got good marks.

***Students' views:***

1. Use of orals, hands-on tasks... percentage from different assessments...they hate reading and writing questions.
2. Wish that SEC accepts mistakes and words not written exactly as they are not practicing languages.
3. Can SEC exams be done at school?
4. They wish to tell MATSEC to do exams one after the other just a short break in between.
5. They are capable to show what they know what what they learnt...it is just difficult the way how to express it.
6. They need to do more effort to study then others as they have to learn not only the definitions but also how to write the definitions...exams bring a lot of stress.

***Our school policy next year: INSTEAD OF 100% exam***

1. Adaptations – already Verdana 12, green graph paper and enlarged font.
2. Starting from 3 only: topics assessed till HY, others from HY till annual.

3. Form 5 MOC papers – one exam only...a few days before exams...study days

4. Form 3 and Form 4 HY and annual exams of next year:

*Half Yearly:*

- Written exam 70%
- Oral 10%
- Continuous assessment – 5% presentation & 15% unseen practical/ investigation

*Annual:*

- Written exam 70%
- Oral 10%
- Continuous assessment – 5% site visit & 15% experiments

What do you think of these?

## ***Appendix M***

The Action Plan:

Pack Activities

Practical Activity

Written Test

Oral Activity

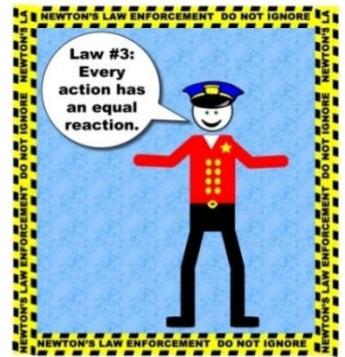
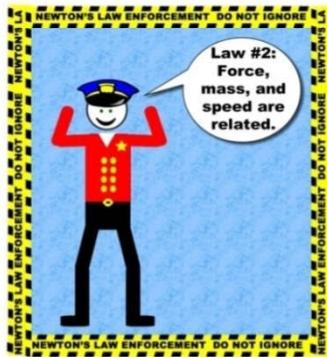
IWB Quiz Activity

**Pack Activities**



# Newton's Laws of Motion

*"Wherever you move, we'll be there!"*



FORM  
4

## PACK ACTIVITIES: NEWTON'S LAWS OF MOTION

***"Tell me and I forget.***

***Teach me and I remember.***

***Involve me and I learn".***

***Benjamin Franklin.***

**Ms Marouska Cauchi**

Name & Surname: \_\_\_\_\_

## **Index:**

***For the topic of Newton's Laws of Motion, the activities will be held as follows:***

**Activities 1 to 16:** Will be done in class from this pack.

**Activity 17:** Oral Activity: Odd one Out: Will be done after the pack - In class (extra sheet).

**Activity 18:** Practical Activity: Will be done in the lab (extra sheet).

**Activity 19:** IWB Group Quiz.

**Activity 20:** Short Written Test (extra sheet).

### **Other Resources:**

#### **For Activity 7 – go to the below links:**

1. <http://www.brainrush.com/lesson/play/balanced-vs-unbalanced-forces>
2. <http://www.physicsclassroom.com/Concept-Builders/Newtons-Laws/Balanced-Unbalanced-Forces/Interactive>

#### **For Activity 14 – go to the below link:**

3. [http://www.gamelearn.com.au/html\\_samples/cambridge\\_physics/mp-m4u1-01.html](http://www.gamelearn.com.au/html_samples/cambridge_physics/mp-m4u1-01.html)

### **Activity 1: Inertia and Newton's First Law**

Look at the picture below. Discuss the questions in groups of 3. Answer the question in point form or in diagrams in the box provided.

Scenario 1:



- 1) What can you comment about the motion of the coin?
- 2) What do you think will happen if you had to flick the card?
- 3) What is keeping the coin at rest?

Look at the picture below. Discuss the questions in groups of 3.  
Answer the question in point form or in diagrams in the box provided.

Scenario 2:



Mary is riding a bicycle.

- 1) What is her motion?
- 2) What do you think will happen if she had to brake immediately?
- 3) Why do you think this happens?
- 4) What is keeping her safe from hurting?

Look at the picture below. Discuss the questions in groups of 3. Answer the question in point form or in diagrams in the box provided.

Scenario 3:

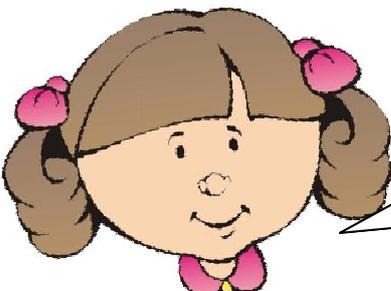


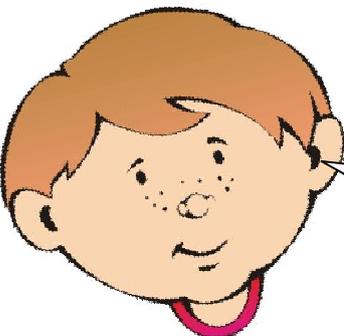
Baby Maya is put in her car seat.

- 1) What is her motion?
- 2) What do you think will happen if the car suddenly stops?
- 3) Why do you think this happens?
- 4) Why should passengers wear seatbelt when travelling in a car?

## Activity 2: Inertia

Below you can see that different children identified where we can find inertia in our everyday lives. Comment about their statements in the boxes provided.

1.  Inertia makes it difficult to run fast the first few metres of a race.

2.  When switching on a fan, it rotates very slowly in the first few seconds.

3.  When standing on a bus and it slows/stops, passengers move forward.

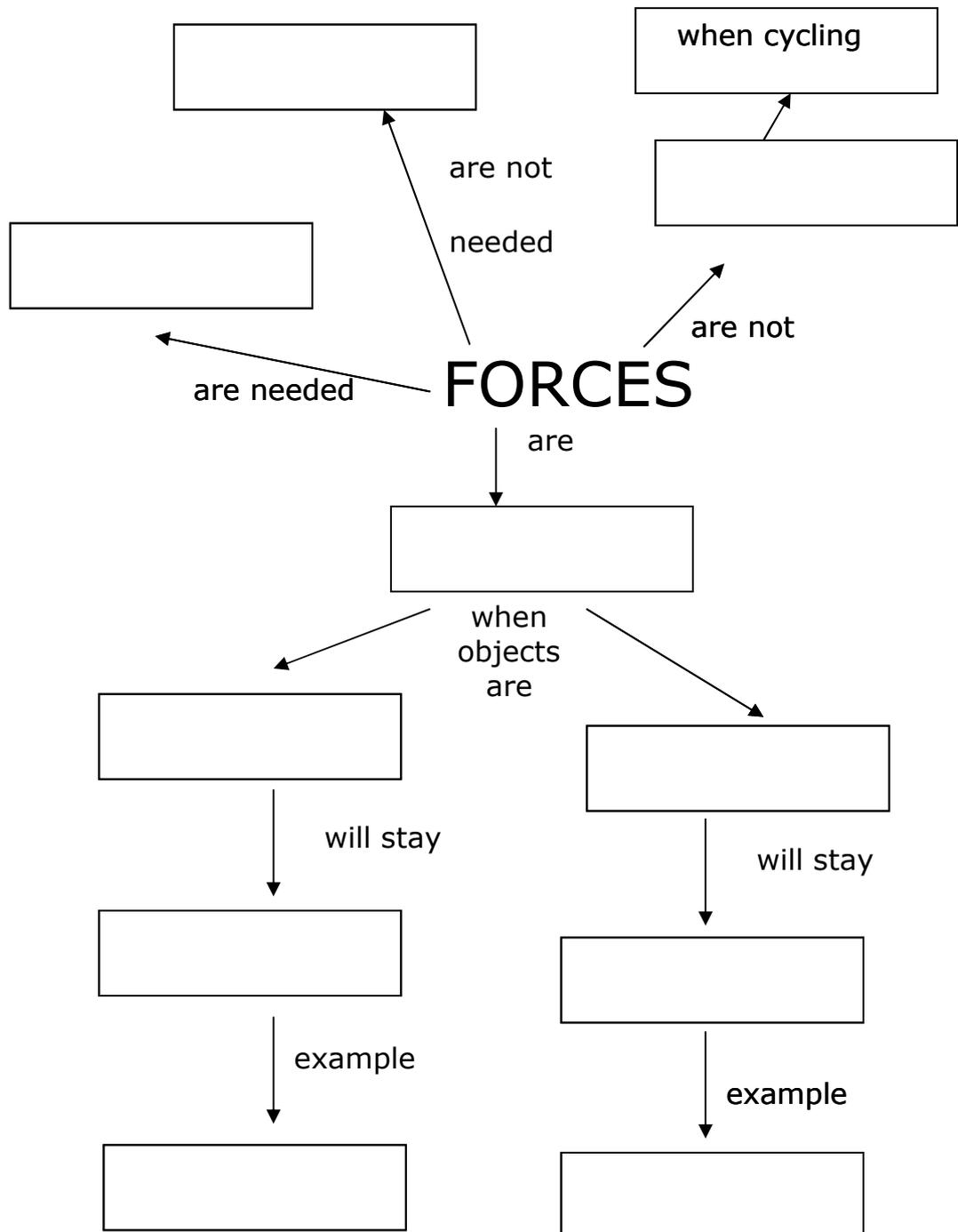
4.  feels hard to push a heavy object which is at rest.

### Activity 3: Newton's First Law

This is a concept map created by Maya's group.

What do you think about their ideas?

You can change and add words to make your own concept map.



### Activity 4: Inertia

John made a sentence using the cards below.

Do you agree with his ideas?

Make your own sentences using the cards below as many as you like.

When I am standing on a moving bus, my body is moving forward with the same speed the bus is moving.

**starts moving**

**stops moving**

**reluctant**

**move**

**turns a corner**

**state of motion**

**change**

**as before**

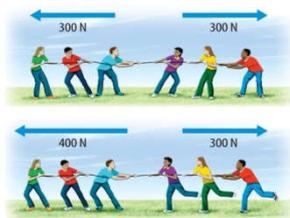
**same direction**

**continues**



### Activity 5: Terms Definitions

Write or draw what you think the following terms mean.



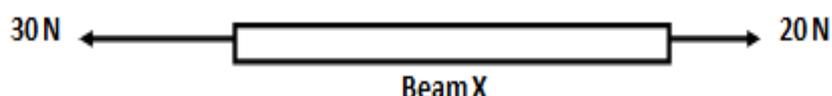
Terms	What I think it means	How sure am I?  *** = Pretty Sure  ** = So and So  * = Not very sure
Resultant force		
Unbalanced forces		
Equilibrium		
Balanced forces		
Acceleration		

### Activity 6: BINGO

Move to a group of 3. Tick the corresponding answer to the description I am reading out. You can also follow the below same questions.

Immediately shout BINGO when you have ticked all the answers.

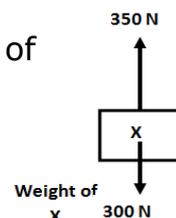
**Question 1:** A beam X is acted upon by two opposing forces as shown. Find the Resultant Force on the beam.



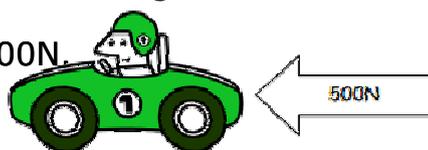
**Question 2:** A box containing preserves weighs 300 N.

It is towed up by means of a pulley with a force of 350 N.

What is the Resultant Force on the box?



**Question 3:** The car moves to the left / right with a resultant force of 500N / 200N.

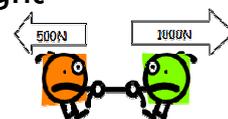


**Question 4:** The rocket moves up / down with a resultant force of 1000N / 2000N.

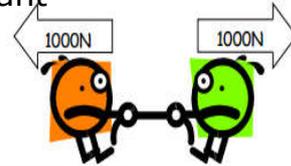


**Question 5:** The figure on the left is pulling with a force of \_\_\_\_\_ N. The figure on the right is pulling with a force of \_\_\_\_\_ N. The force to the left / right is bigger than the force to the left / right.

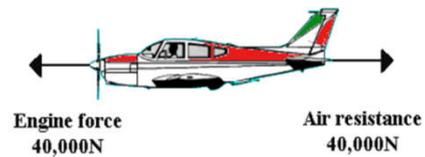
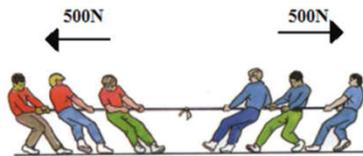
The Resultant Force is \_\_\_\_\_ N to the left / right.



**Question 6:** The figure on the left is pulling with a force of \_\_\_\_\_ N. The figure to the right is pulling with a force of \_\_\_\_\_ N. The forces are the same / different and cancel each other out. There is a Resultant Force of \_\_\_\_\_ N.



**Question 7:** Look at the following 3 diagrams



The resultant force in each case is

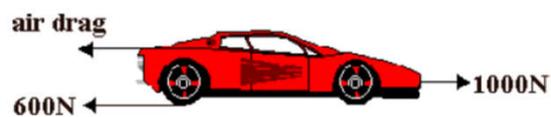
\_\_\_\_\_

In each case the object can either be:

\_\_\_\_\_ or \_\_\_\_\_

**Question 8:** Suggest a value for the drag of the car if

it is moving:



a) Constant speed

\_\_\_\_\_

b) Accelerating

\_\_\_\_\_

BINGO CARD				
BINGO CARD FOR QUESTIONS 1 - 5				
10 N ←		1000 N		right
left	50 N ↑		up	
		500 N		left
500 N		right	500N	1000 N

BINGO CARD				
BINGO CARD FOR QUESTIONS 6 - 8				
1000 N		same		at rest
	1000 N		0 N	
		0 N		400 N
200 N		constant speed		

### **Activity 7: Fun Work at the Lab**

Balanced versus Unbalanced Forces Games. Let's go to the computer lab so you can play games in pairs. Each pair is given a computer.

### **Activity 8: Drawing**

Draw force diagrams for the following situations:

<b><i>Situation</i></b>	<b><i>Diagram</i></b>
An object at rest	
An object moving at constant speed	
An object accelerating	
An object decelerating	

### **Activity 9: Bowling ball and Football**

Complete the two sentences below.

When both the football and bowling ball are pushed, the more **force...**

---

When both the football and bowling ball are pushed, the more **mass...**

---

Compare the football and the bowling ball.

	Mass	
	Acceleration	
	Force	

## Activity 10: Graphs



- Are the following statements true or false?
- Explain your answer by drawing a sketch or writing.

1. The gradient of a force – acceleration graph gives us the mass. \_\_\_\_\_
2. The gradient of acceleration – force graph gives us the mass. \_\_\_\_\_
3. The acceleration is plotted on the x- axis. \_\_\_\_\_
4. The force is plotted on the y- axis. \_\_\_\_\_
5. In a force-acceleration graph, the bigger the mass, the steeper the line. \_\_\_\_\_

### **Activity 11: The Equation of Newton's Second Law**

Fill in the table below. Use your answers instead of a dice to play snakes and ladders. If your answers are correct, you should reach 30.

Important: Questions must be answered starting from number 1 going to 6.

<b>Question Number</b>	<b>Force (N)</b>	<b>Mass (kg)</b>	<b>Acceleration (m/s<sup>2</sup>)</b>
<b>1</b>	125	25	
<b>2</b>		2	2
<b>3</b>	63		7
<b>4</b>	572		52
<b>5</b>	40	20	
<b>6</b>		1	1

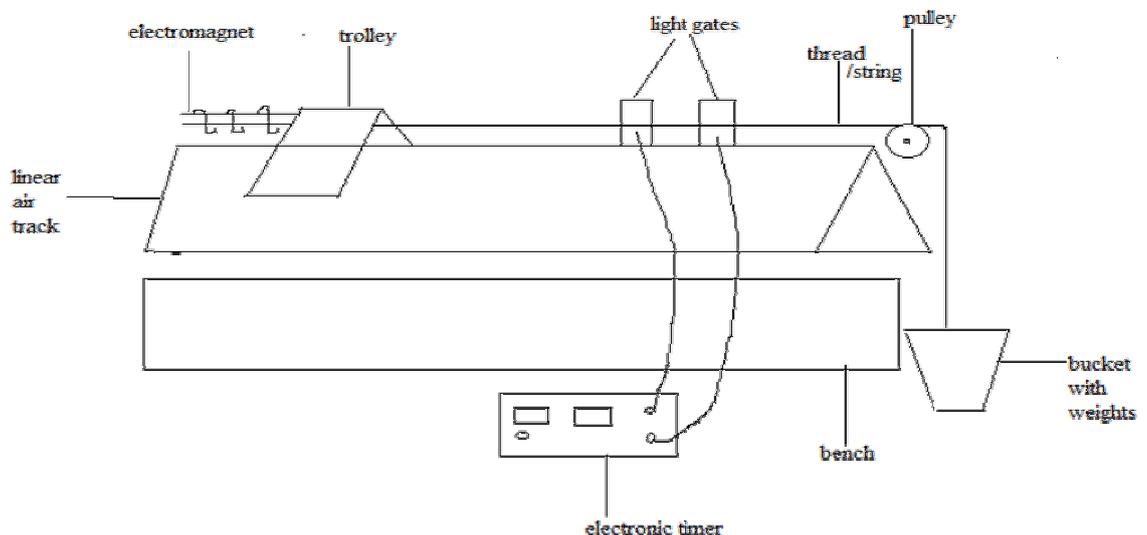
# Snakes and Ladders



## Activity 12: The Linear Air Track

Read the situations below. Predict what will happen and write the result.

Situation	Prediction	Result
1. A mass was added in the bucket. Its force was calculated. Electromagnet was switched off and mass was left to fall off. The acceleration was calculated. What do you think will happen to the acceleration if a larger mass was put into the bucket?		
2. This time, the experiment was repeated by loading different masses on the trolley BUT keeping the force pulling the trolley constant. What do you think will happen to the acceleration?		

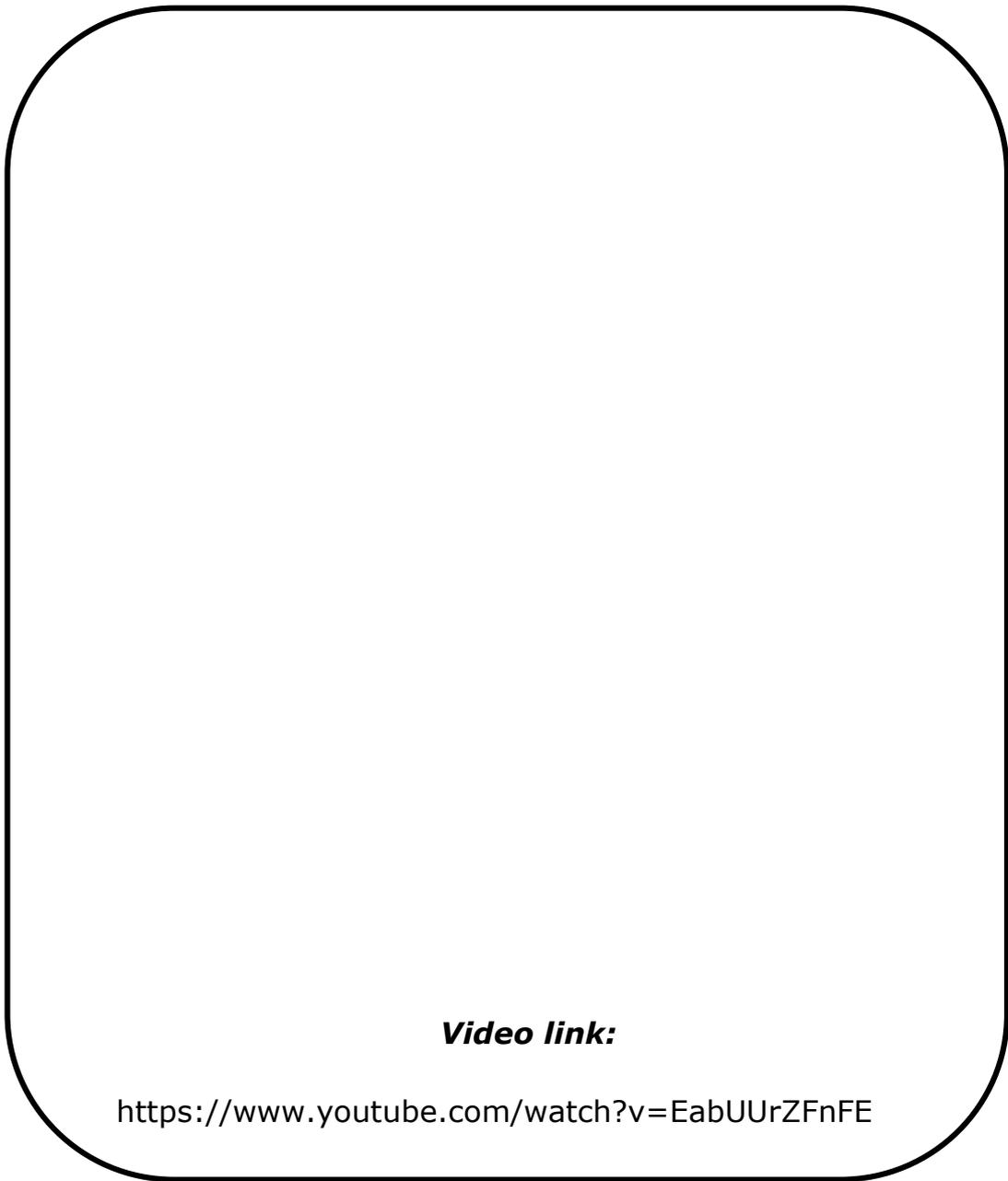


### **Activity 13: Free Fall**

Draw a poster about the video we have seen for a newspaper.

You are free to draw your poster using your computer. Stick your result in the box below.

Identify clearly the forces acting at every stage on the parachute as soon as it leaves the helicopter until it reaches the ground.



**Video link:**

<https://www.youtube.com/watch?v=EabUUrZFnFE>

### **Activity 14: Terminal Velocity and Streamlining**

Read the following statements. Choose whether you 'agree', 'disagree' or 'depends on'.

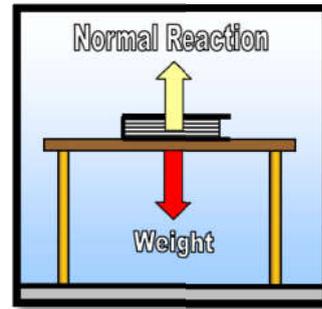
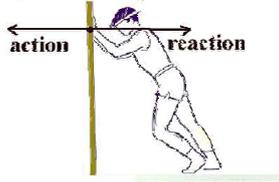
<b>Statement</b>	<b>Agree</b>	<b>Disagree</b>	<b>Depends on</b>
Boats are streamlined.			
Another word for constant velocity is terminal velocity.			
Streamlining increases the air resistance.			
Objects are always streamlined.			
When a car reaches constant velocity, it keeps on moving at constant velocity due to Newton's 2 <sup>nd</sup> law.			
Drag depends only on the size and shape of the object.			
Formula 1 cars are always streamlined.			
It is better not to streamline a parachute.			

Go to the **Index** of this pack for further information.

## Activity 15: Newton's 3rd Law

Match the following sentences.

Draw a line from one side to another.

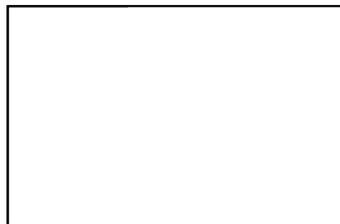
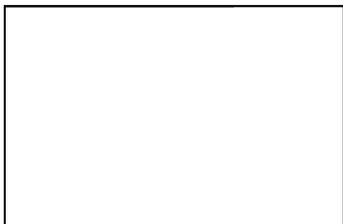


<p>Forces always come in</p>		<p>they act on different objects.</p>
<p>For every action there is an equal</p>		<p>but            opposite reaction.</p>
<p>Two forces cannot cancel each other out because</p>		<p>reaction force.</p>
<p>A book pushing the table downwards is an action force therefore</p>		<p>pairs.</p>
<p>When you lean against a tree., your push is the action force and the contact force of the tree is the</p>		<p>a table pushing the book upwards is a reaction force.</p>

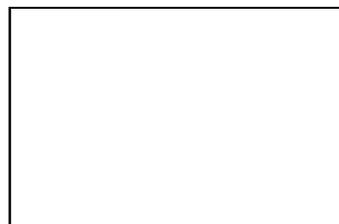
## **Activity 16: Action and Reaction**

State the action and reaction.

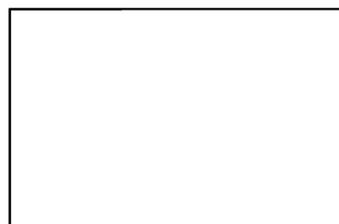
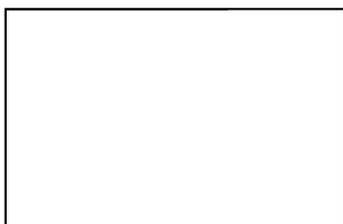
1. Man walking



2. Boy jumping off a boat



3. Car moving forward



4. Person swimming



**Assessment Marks:**

<b>Oral Activity 17: Odd one out (15%)</b>	
<b>Practical Activity: Unseen (30%)</b>	
<b>IWB Group Quiz (5%)</b>	
<b>Short Written Test (30%)</b>	
<b>Booklet Activities (15%)</b>	
<b>Participation throughout this topic (5%)</b>	
<b>Comments/Feedback:</b>	
<b>Total (100%)</b>	

**Practical Activity**

**Task:** Using the materials given, do a simple experiment to show the difference in inertia between a big mass and a small mass.

Aim:

---

Apparatus: \_\_\_\_\_

---

Diagram:

Method:

---

---

---

---

Precautions:

---

---

Conclusion:

---

---

**Written Test**

**Physics Test Form 4: Newton's laws of Motion**

---

**You might be using:**  $F = ma$       $g = 10 \text{ m/s}^2$

---

1. Jake decided to go skydiving. His mass is 80 kg.

a) What is the initial acceleration of the sky diver? (1)

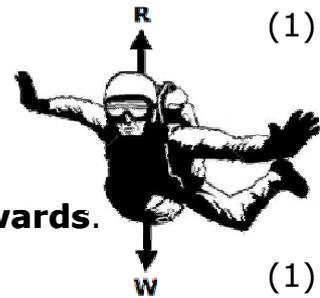
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b) **Name** the force represented by  $W$  and **calculate** its value. (2)

---

c) Which force does  $R$  represent? (1)

---



d) The skydiver starts to **accelerate downwards**.

i. Which of the two forces is greater? (1)

---

ii. Which of the above two forces increases as he speeds down? (1)

---

e) Eventually the skydiver moves at a **constant speed**.

i. What is the resultant force acting on the skydiver? (1)

---

ii. What is the value of the upward force on the skydiver? Explain.

---

(2)

2. Sam pulled off the table cloth from a table prepared for dinner. The utensils on it did not fall off. Explain why. (2)



---

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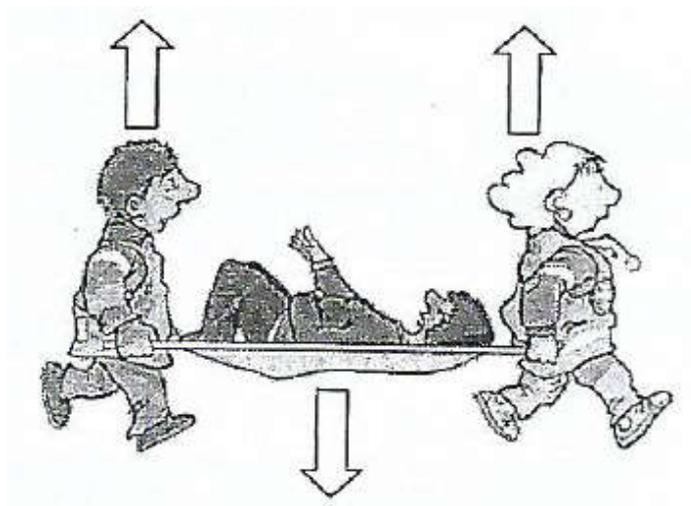
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3. A **64 kg** woman, trapped in a burning building jumps into a life net, held by some firemen. The woman is then taken to an ambulance by means of a stretcher.

i. On the diagram write down the **name** and **value** of the forces. (5)



ii. Write down and state the Law which helped you answer (i).(2)

---

---

3. A trolley is placed on an air track. The trolley is pulled by a force which is attached to the trolley by a means of string. The acceleration is calculated.

<b>Force (N)</b>	0.5	1.0	1.5	2.0	2.5	3.0
<b>Acceleration (m/s<sup>2</sup>)</b>	0.2	0.4	0.6	0.8	1.0	1.2

- a) The trolley is pulled with a force of 0.5N. Calculate the mass of the trolley if the acceleration produced is 0.2 m/s<sup>2</sup>. (2)

---



---

- b) The experiment is repeated by attaching different weights to the trolley. Each time the acceleration is calculated. The results are shown below.

- i. Plot a graph of acceleration (m/s<sup>2</sup>) on y-axis against Force (N) on the x-axis. Start the graph from the origin. (6)

- ii. What is the relationship between force and acceleration?

Explain. \_\_\_\_\_  
 \_\_\_\_\_ (2)

- iii. If the experiment was repeated using different masses loaded on the trolley while keeping the force constant, would the results obtained be the same? Explain. (2)

---



---

**THE END – PLEASE Staple your graph paper and REVISE YOUR WORK**

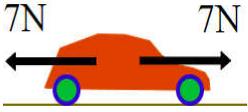
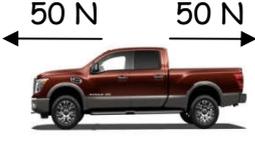
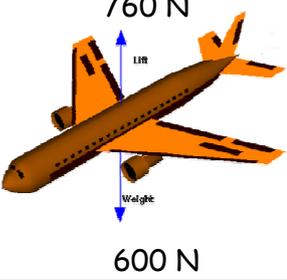
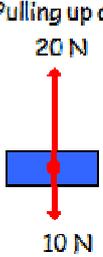
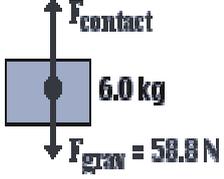
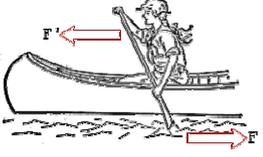
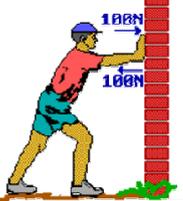
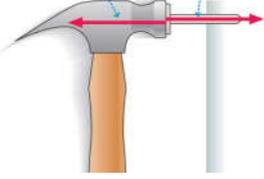
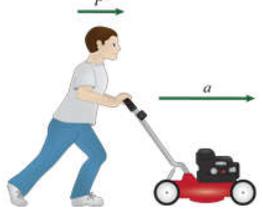
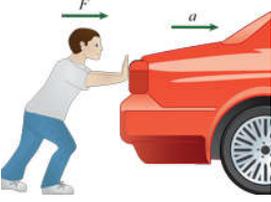
— Comments:  
 30

### Oral Activity

Which is the **ODD ONE** out in the following?

Why? What made you think that?

Please interpret each picture after your choice of answer.

Picture 1	Picture 2	Picture 3
		
		
		
<p>Before    After</p> 	<p>Before    After</p> 	<p>Before    After</p> 
		

## IWB Quiz Activity

# QUIZ

Physics Form 4  
Newton's Laws of Motion

## Newton's Laws



CHOOSE WHICH NUMBERS YOU WANT!

Question 1

Question 5

Question 10

Question 7

Question 2

Question 9

Question 6

Question 3

Question 8

Question 4



For each question there is the possibility of the below two interactive answers:



**Very Good**

WELL DONE!  
LET'S MOVE ON TO THE NEXT QUESTION.

Return to question!



OOOPS!  
THAT'S WRONG. WOULD YOU LIKE TO TRY IT AGAIN?  
Yes OR No

Questions asked:

QUESTION 1

An object at rest will stay at rest and a moving object will continue to move at constant speed unless acted upon by an unbalanced force.

Newton's 1<sup>st</sup> Law

Newton's 2<sup>nd</sup> Law

Newton's 3<sup>rd</sup> law

Newton's 1<sup>st</sup> & 2<sup>nd</sup> Law





QUESTION 2

The resultant force is the product of mass and acceleration

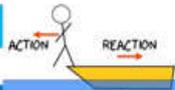
Newton's 1<sup>st</sup> Law

Newton's 3<sup>rd</sup> Law

Newton's 1<sup>st</sup> & 2<sup>nd</sup> Law

Newton's 2<sup>nd</sup> Law

**QUESTION 3**



For every action there is an equal but opposite reaction on another object.

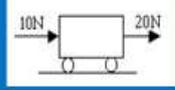
Newton's 2<sup>nd</sup> Law      Newton's 1<sup>st</sup> Law

Newton's 2<sup>nd</sup> & 3<sup>rd</sup> Law      Newton's 3<sup>rd</sup> Law

**QUESTION 4**



Work out the resultant force



30 N to the right      10 N to the right

**QUESTION 5**

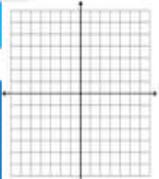
Work out the resultant force



83000 N upwards

7000 N upwards

**QUESTION 6**



Acceleration is the \_\_\_\_\_ variable  
So it is plotted on the y-axis.

dependent      independent

**QUESTION 7**

Work out the acceleration of a car which has a force of 10 N on it and has a mass of 20 kg.

0.5 m/s<sup>2</sup>      2 m/s<sup>2</sup>



**Define**

**QUESTION 8**

Terminal velocity is another word for

All of these      Uniform velocity

Constant velocity      Steady velocity

QUESTION 9

Stream lining is not used in a



car

boat

parachute

rocket

QUESTION 10

Inertia is

The willingness  
an object has to  
start moving



The resistance  
an object has to  
change its state  
of motion

The resistance  
an object has to  
stop moving

The willingness  
an object has to  
change its state  
of motion